SMALL ARMS HANDBOOK

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UNITED STATES ARMY INFANTRY SCHOOL
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SMALL ARMS HANDBOOK

CHAPTER 1

RIFLE MARKSMANSHIP

Section I. US RIFLES, 7.62MM M14 and M14A2

1. GENERAL. The rifle is the Infantryman's basic weapon. To obtain maximum effectiveness from his rifle, the Infantryman must develop two skills to an equal degree - he must be able to fire his weapon well enough to get hits on the battlefield, and he must know enough about the rifle's working parts to keep them functioning properly at all times and under all conditions. The Infantryman learns these two skills in the Basic Rifle Marksmanship Course during his Basic Combat Training. He maintains proficiency in these skills as he progresses through his Army career by completing other marksmanship courses provided in the Rifle Marksmanship Program.

2. DESCRIPTION OF THE RIFLES.

a. M14.

(1) The US Rifle, 7.62mm, M14 is an air-cooled, gas-operated, magazine-fed, shoulder weapon. It is designed primarily for semiautomatic fire.

(2) When employed as an automatic rifle the selector and bipod, M2, must be installed.

(3) The flash suppressor is designed with a wide rib on the bottom to reduce muzzle climb and lessen the amount of dust raised by muzzle blast.

(4) The lug on the rear of the flash suppressor accommodates a bayonet, a grenade launcher, and a blank firing attachment.

(5) The spindle valve, when rotated to the closed position, is used when launching a grenade to prevent gas operation of the rifle, thus avoiding damage to the weapon.

b. M14A2. The US Rifle, 7.62mm, M14A2, is an air-cooled, gas-operated, magazine-fed, shoulder weapon. It is capable of semiautomatic or automatic fire; however, it is designed primarily for automatic fire. It features a stabilizer assembly, modified bipod, front and rear hand grip, straight line stock and a rubber recoil pad.

3. GENERAL DATA.

a. Physical and Mechanical Characteristics (identical for both weapons except where indicated).

Weights in pounds (approximate):

M14 Complete with full magazine (steel), cleaning equipment, and selector	11 1/4
M14 complete with full magazine (steel) cleaning equipment, selector, and bipod	13
Empty magazine (steel)	1/2
Full magazine (steel) with ball ammunition	1 1/2
Cleaning equipment	2/3
Bipod, M2	1 3/4
M14A2 complete with full magazine	14 1/2

Length in inches:
Overall with flash suppressor . . . . . 44.31 in
Sights:
Front: . . . . . Fixed
Rear . . . . . Adjustable. One click of elevation or windage. Moves the strike of the bullet .7 centimeters at 25 meters
Trigger Pull:
Minimum . . . . . 5 1/2 pounds
Maximum . . . . . 7 1/2 pounds
Ammunition 7.62mm

b. Firing Characteristics.

Muzzle velocity (approximate) . . . . . 853 meters per second
Cyclic rate of fire. . . . . 700-750 rounds per minute
Rates of fire: (The following rates of fire can be maintained without danger to the firer or damage to the weapon.)

Semiautomatic:
1 minute . . . . . .40 rounds
2 minutes . . . . . .40 rpm (80 rds total)
5 minutes . . . . . .30 rpm (150 rds total)
10 minutes . . . . . .20 rpm (200 rds total)
15 minutes . . . . . .20 rpm (300 rds total)
20 minutes . . . . . .20 rpm (400 rds total)
30 minutes or more . . . . . .15 rpm

Automatic:
1 minute . . . . . .60 rounds
2 minutes . . . . . .50 rpm (100 rd total)
5 minutes . . . . . .40 rpm (200 rd total)
10 minutes . . . . . .30 rpm (300 rd total)
15 minutes . . . . . .30 rpm (450 rd total)
20 minutes . . . . . .25 rpm (500 rd total)
30 minutes or more . . . . . .20 rpm

Range:
Maximum effective, semiautomatic without bipod . . . . . 460 meters
Maximum effective, semiautomatic with bipod. . . . . 700 meters
Maximum effective, automatic with bipod . . . . . 460 meters
Maximum (M59 ball ammunition). . . . . 3725 meters

c. Definitions.

Cyclic rate . . . . . The rate at which the weapon fires automatically.
Maximum effective range . . . . . The greatest distance at which a weapon may be expected to fire accurately to inflict casualties or damage.

Section II. DISASSEMBLY, ASSEMBLY, STOPPAGES AND IMMEDIATE ACTION M14 RIFLE

4. GENERAL.

a. The individual soldier is authorized to field strip his weapon without supervision. Normal maintenance can be performed on a field stripped rifle without further disassembly by the individual. (Chart I in FM 23-8)

b. The rifle was designed to be easily disassembled and assembled. Parts of one M14 Rifle, except the bolt for safety reasons, may be interchanged with those of another.

5. SEPARATION OF THE THREE MAIN GROUPS.

a. Place, or attempt to place, the safety in the safe position. Remove the magazine, pull the operating rod handle to the rear and depress the bolt lock, locking the bolt in its rearward position, and inspect the chamber to insure that it is clear. Verify the safety's being in the safe position. Allow the bolt to move forward. Loosen the sling.

b. To remove the firing mechanism, grasp the rear of the trigger guard and pull downward and outward approximately 90°. Lift out the firing mechanism.

c. Lay the weapon on a flat surface with the sights up and muzzle to the left. Grasp the receiver over the bolt and raise the butt of the rifle a few inches, strike down on and grasp the small of the stock, separating the stock group from the barrel and receiver group.

6. ASSEMBLY OF THE THREE MAIN GROUPS.

a. Place the barrel and receiver group on a flat surface, sights down. Engage the stock ferrule in the front band, then lower the stock group onto the barrel and receiver group.

b. Unlatch and open the trigger guard. Place the firing mechanism straight down into the receiver, making sure that the guide rib on the firing mechanism enters the recess in the receiver. Close and latch the trigger guard.

7. DETAILED DISASSEMBLY. For further disassembly of the M14 Rifle refer to FM 23-8.

8. STOPPAGES AND IMMEDIATE ACTION.

a. Stoppage - any unintentional interruption in the cycle of operation. (Feeding, chambering, locking, firing, unlocking, extracting, ejecting, and cocking.) If a stoppage occurs, apply immediate action and attempt to fire.

b. Immediate Action - Immediate action is applied in two phases:

(1) Phase I - Pull operating rod to the rear, release, re-aim, and attempt to fire. If this fails apply the second phase.

(2) Phase II - Take the rifle from the shoulder.

Pull operating rod slowly to the rear.

Look in the receiver.

Locate the stoppage by observing as you pull the operating handle to the rear, what is in the chamber, and what has been ejected.

Reduce the stoppage and continue to fire.

Section III. MAINTENANCE

9. GENERAL. Maintenance includes all measures taken to keep the rifle in operating condition. This includes normal cleaning, inspection for defective parts, repair, and lubrication.

10. CLEANING MATERIALS, LUBRICANTS, AND EQUIPMENT.

a. Cleaning Materials.

(1) Bore cleaner. Cleaning compound solvent (CR) is used primarily for cleaning the bore; however, it can be used on all metal parts for temporary (1 day) protection from rust.

(2) Hot, soapy water or boiling water will be used only when bore cleaner is not available.

(3) Dry-cleaning solvent is used for cleaning rifles which are coated with grease, oil, or corrosion-preventive compounds.

(4) Carbon removing compound (PC111-A) is used on stubborn carbon deposits. This process must be followed by the use of dry cleaning solvent.

b. Lubricants.

(1) Lubricating oil, general purpose (PL special), is used for lubricating the rifle at normal temperatures.

(2) Lubricating oil, weapons (LAW) is used for low temperatures (below 0°).

(3) OE 10 engine oil may be used as a field expedient when the oils prescribed in (1) and (2) above cannot be obtained. However, as soon as possible, the weapon should be cleaned and lubricated with the proper, authorized lubricants.

c. Equipment.

(1) A complete set of maintenance equipment is stored in the stock of the M14 rifle and consists of:

(a) Combination tool.

* (b) Brush, cleaning, chamber.

(c) Case, lubricant.

(d) Case, small arms cleaning rod.

(e) Rod, section, cleaning, small arms (4 ea).

(f) Holder, cleaning patch.

(g) Brush, cleaning, small arms, bore.

(2) Combination Tool.

* Insure the M14 chamber brush is used to prevent barrel damage. The M14 brush is 1/2 inch shorter than the M1 chamber brush.

(a) The combination tool can be used as either a 20° offset screwdriver or as a gas cylinder plug wrench.

(b) The handle of the combination tool is also used as the cleaning rod handle. To do this, allow the cleaning rod extension of the tool to fall from the tool handle so that it hangs perpendicular. Assemble the four sections of the cleaning rod and screw into the threaded hole. The cleaning patch holder may be attached to the end of the cleaning rod.

(c) The plastic case, lubricant, is closed with a screw cap which has a stem (applicator) attached to apply oil. The cap is fitted with a gasket to prevent oil leakage. The other end has another screw cap and contains rifle grease.

11. CLEANING THE RIFLE.

a. The rifle must be cleaned after it has been fired. The ammunition has a noncorrosive primer which makes cleaning easier, but not less important. The primer still leaves a deposit that may collect moisture and promote rust if it is not removed. The procedure for cleaning the chamber and bore is described in FM 23-8. Upon completion of firing, bore cleaner should be applied for ease of further cleaning.

b. Gas Cylinder Plug. Pour a small quantity of bore cleaner in the plug, insert the bore cleaning brush and rotate it. Remove the brush, clean and dry the plug with patches.

c. Gas Cylinder. Install the patch holder on a section of the cleaning rod. Put two patches in the holder, moisten them with bore cleaner and swab the cylinder bore. Dry the cylinder bore with clean patches. Use no abrasives in cleaning the cylinder; do not oil the interior surfaces.

d. Gas Piston. Saturate patches with bore cleaner and wipe the exterior surface of the piston as clean as possible. Install the bore cleaning brush on a section of the cleaning rod. Moisten the brush with bore cleaner and clean the interior of the piston. Wipe the piston dry, but do not oil. The gas system incorporates a self-cleaning section and functions within very close tolerances. A piston does not have to be shiny to function properly. Do not use abrasives to clean the piston.

e. Face of the Bolt. Clean the face of the bolt with a patch and bore cleaner, paying particular attention to its inside edges. Remove the bore cleaner with dry patches and oil lightly.

f. Spindle Valve. Depress the valve and rotate it several times after each day's firing. Do not disassemble it.

g. Magazine. Inspect the interior of the magazine by depressing the follower with the thumb. If the interior is dirty, disassemble the magazine and clean it, then lightly oil the component parts. Otherwise, merely wipe the magazine assembly clean and dry, then oil it.

h. Stabilizer Assembly (M14A2). The stabilizer assembly should be removed and cleaned with a stiff brush to remove all carbon or other particles which may block the gas ports.

i. All Other Parts. Use a dry cloth to remove all dirt or sand from other parts and exterior surfaces. Apply a light coat of oil to the metal parts and rub raw linseed oil into the wooden parts.

j. The rifle must be thoroughly cleaned no later than the evening of the day it is fired. For three consecutive days thereafter, check for evidence of fouling by running a clean patch through the bore and inspecting the patch. The bore should be lightly oiled.

12. NORMAL MAINTENANCE.

a. The rifle should be inspected daily when in use for evidence of rust and general appearance. A light coat of oil should be maintained on all metal parts, except the gas piston, interior of the gas cylinder, and the gas plug.

b. The daily inspection should also reveal any defects such as burred, worn or cracked parts. Defects should be reported to the armorer for correction.

INSPECTION CHECK-POINTS FOR THE M-14 & M-14A2 RIFLES

Following are some of the non-technical maintenance checks that should be made during a Command Inspection of the M-14 and M-14A2 rifles. However, the inspector should not be limited to only these checks. Individual commanders and staff officers may expand the list to the extent deemed necessary.

PRIOR TO INSPECTION INSURE THAT THIS WEAPON IS CLEAR!

ITEM	YES	NO	REMARKS
EQUIPMENT (One per weapon on hand and serviceable: TM 9-1005-223-12.)			
1. Chamber brush			
2. Bore brush			
3. Combination tool (Cleaning Rod Handle)			
4. Rod (4 Sections)			
5. Patch holder			
6. Case, Cleaning rod			
7. Case, Lubricant			
8. Sling			
GENERAL CONDITION			
1. Incorrect assembly of parts			
2. Broken or missing parts			
3. Use of unauthorized cleaning agents (Detected by small scratches, distinct shine, & particles of steel wool)			
4. Rust or corrosion on metal surfaces			
5. Sling dirty and/or frayed			
FLASH SUPPRESSOR			
1. Loose			
2. Bayonet lug damaged (Try bayonet fit)			
3. Lock screw missing			
4. Lock nut loose			
5. Cracks			
FRONT SIGHT			
1. Loose			
2. Screw missing			
3. Guards bent			

ITEM	YES	NO	REMARKS
GAS CYLINDER			
1. Gas cylinder lock improperly positioned			
2. Gas cylinder plug loose or missing			
3. Threads damaged			
4. Spindle valve frozen			
5. Gas piston dirty or oily (Will not fall freely of its own weight)			
BOLT ASSEMBLY			
1. Extractor missing			
2. Extractor spring plunger missing			
3. Firing pin chipped or broken			
4. Outer edges of bolt face dirty			
5. Cracks (Top rear of locking lugs)			
REAR SIGHT			
1. Improper sight tension			
2. Left pinion knob screw loose			
OPERATING ROD			
1. Bent or damaged spring guide			
2. Kinked, "cut," or broken spring			
3. Short or long spring (Compare with new spring)			
4. Carbon and/or cracks on rod			
5. Missing or broken connector lock pin			
BARREL AND RECEIVER			
1. Pitted bore (Refer to Support Unit for classification)			
2. Dirty and/or rusty bore or chamber			
MAGAZINE			
1. Magazine tube bent or cracked (Lips)			
2. Follower spring weak or broken			
3. Follower bent			
4. Locking plate burred, cracked, or missing			

ITEM	YES	NO	REMARKS
FIRING MECHANISM			
1. Broken safety			
2. Trigger guard bent			
3. Magazine latch spring weak or missing (Insert magazine)			
STOCK AND HANDGUARD			
1. Butt plate screws stripped or missing			
2. Cracks which affect strength of item			
3. Wood appears "dry"			
4. Hinged shoulder rest bent			
5. Receiver loose in stock			
ADDITIONAL CHECKPOINTS APPLICABLE TO M14E2 ONLY			
STABILIZER ASSEMBLY			
1. Improperly mounted			
2. Cracks			
3. Gas ports plugged with carbon			
4. Retainer screw loose or missing			
5. Locking nut loose or missing			
STOCK AND HANDGRIPS			
1. Front handgrip assembly improperly mounted			
2. Rubber recoil pad improperly mounted and/or cracked			
BIPOD GROUP			
1. Loose yoke assembly			
2. Improper functioning of pivot plungers			
3. Improper functioning of extension assemblies			
4. Base of leg assembly cracked			

NOTE: Publications include FM 23-8, TM 9-1005-223-12, and TM 9-1005-223-20P.

Section IV. THE RIFLE MARKSMANSHIP PROGRAM

13. GENERAL. Early in 1961, a Rifle Marksmanship Evaluation Board convened at Fort Benning, Georgia. Its purpose was to study the various marksmanship courses that were then in effect to determine if these courses satisfied the requirements for training the individual soldiers and, if not, to recommend new courses that would satisfy the US Army training requirements. The recommendations made by the Evaluation Board constituted a completely new approach to rifle marksmanship, in that it provided a course of instruction for almost every situation and for every marksmanship training need. This resulted in the Rifle Marksmanship Program consisting of three standard courses for active Army personnel, and one standard course for Reserve Components.

STANDARD COURSES - ACTIVE ARMY

1. BASIC RIFLE MARKSMANSHIP COURSE (PRESENTED DURING BCT UNDER ATP 21-114)	75 HOURS
2. COMBAT READINESS MARKSMANSHIP PROFICIENCY STANDARD COURSE - A1 (ANNUAL QUAL & POR - PERSONNEL LESS THAN 10 YRS SVC)	36 HOURS
3. COMBAT READINESS MARKSMANSHIP PROFICIENCY STANDARD COURSE - A2 (ANNUAL QUAL & POR - PERSONNEL OVER 10 YRS SVC)	18 HOURS

STANDARD COURSE - RESERVE COMPONENTS

4. PRE-MOBILIZATION READINESS MARKSMANSHIP PROFICIENCY STANDARD COURSE - C	16 HOURS

14. The Basic Rifle Marksmanship Course was designed to train the individual soldier to detect and hit combat type targets in a minimum amount of time. The course is organized into a 75-hour block of instruction designed to accomplish three objectives: first, to develop the soldier's confidence and desire to engage combat type targets, second, to develop his ability to detect combat-type targets and third, once the targets are detected, to develop his ability to hit combat type targets.

BASIC RIFLE MARKSMANSHIP COURSE

Orientation	1 Hour
Mechanical Training	4 Hours
Preparatory Marksmanship	32 Hours
Field Firing	16 Hours
Target Detection	14 Hours
Record Firing	8 Hours
	75 Hours

NOTE. An additional 8 hours is provided for night firing principles and practical exercises in night firing.

15. ORIENTATION. During the one-hour orientation period the history and development of military rifles is discussed with the soldier. The importance of the close relationship between the soldier and his weapon is also emphasized. The soldier views a film entitled. "This is the Infantry", which depicts the versatility of the Infantryman and his weapons.

16. MECHANICAL TRAINING. Mechanical training may be presented indoors or outdoors. In either case it is recommended that a ten-man horseshoe type setup be used. Here the soldier learns: to disassemble and assemble his weapon, to understand its operation and functioning, and to properly care for his weapon.

17. PREPARATORY MARKSMANSHIP. This training is conducted on a 25-meter range and should follow the sequence as outlined below.

a. Integrated Act of Shooting. The soldier is taught that shooting is a combined act consisting of two major components -- aiming and steady hold.

(1) Aiming. Aiming is further divided into two elements - sight alignment and placement of the aiming point. Sight alignment is defined as the relationship between the front and rear sights. To insure correct sight alignment, the top of the front sight blade should be centered in the rear sight aperture. When the aiming point is centered on and tangent to the front sight blade, correct placement of the aiming point has been achieved.

(2) Steady Hold Factors. The second component of the integrated act of shooting is steady hold There are eight factors that must be properly applied when firing from each position to achieve a steady weapon.

(a) Left arm and hand: The weapon rests in the "V" formed by the thumb and forefinger of the left hand. The firer exerts a slight pressure to the rear while keeping his left wrist and arm straight and the left elbow as far under the weapon as possible. The sling is not used since experience has shown that in combat, the individual rifleman rarely uses his sling when firing.

(b) Butt of stock in pocket of shoulder: Proper placement of the butt of the stock reduces the effects of recoil and prevents the weapon from slipping from the shoulder during firing. The hinged shoulder rest is not used since it offers no additional support and requires additional time to raise when assuming the various firing positions. It is used when the M14 is modified for use as an automatic rifle, i.e., M14 w/selector and bipod, M2, and the M14E2.

(c) Grip of the right hand: The thumb extends over the top of the small of the stock. The trigger finger is positioned on the trigger in such a manner that there is daylight between the trigger finger and the side of the stock.

(d) Right elbow: Correctly positioned, the right elbow helps form a pocket in the shoulder for the butt of the rifle. In addition, it provides balance to the firer's position.

(e) Spot weld: The firm contact between the firer's cheek and his thumb enables him to position his eye the same distance from the rear sight for each round fired. It also prevents the thumb from striking the firer's cheek or eye.

(f) Breathing: The rise and fall of the firer's chest will cause the muzzle of the weapon to rise and fall accordingly. Proper breathing while firing requires the firer to take a normal breath, exhale half, and hold the remainder in his lungs by locking his throat.

(g) Relaxation: If the soldier is not relaxed when firing, the tension in his body develops a trembling movement which is transmitted to the muzzle of the weapon. If unable to relax, the firer should adjust.

(h) Trigger Control: The most important of the steady hold factors is trigger control. To obtain proper trigger control, the forefinger should be positioned on the trigger between the tip and the second joint, insuring that the finger does not touch the side of the stock, and the trigger pressed straight to the rear, with a uniformly increasing pressure, until the weapon has fired.

b. Positions.

(1) There are eight standard firing positions - three supported and five unsupported:

SUPPORTED	UNSUPPORTED
Prone	Prone
Kneeling	Sitting
Foxhole	Squatting
	Kneeling
	Standing

(2) The soldier fires three 3-round shot groups from each position, attempting to obtain a tight shot group. To determine whether or not the shot groups are tight enough, the instructor evaluates them by placing a scoring template (FM 23-71) over the shot group. For the two most stable positions (prone supported and foxhole) the shot groups must be on or within a 3 centimeter circle. For the remaining six positions, the shot groups must be on or within a 5 centimeter circle.

c. Anti-fear Demonstration. The soldier may understand how to aim his weapon and apply all the factors of steady hold, but if he is afraid of the weapon he will not be able to fire accurately. To dispel any fear of recoil, an antifear or recoil demonstration may be conducted in the following manner:

(1) A well trained rifleman fires a round with the weapon held in one hand by his side to demonstrate the amount of recoil.

(2) He then fires, holding the weapon with the butt in his groin.

(3) He then fires, holding the weapon with the butt in the pit of his stomach.

(4) He then fires with the butt against his chest.

(5) Finallly, he places the butt of the rifle on the point of his chin and fires.

NOTE: Conducted at the beginning of Preparatory Marksmanship.

d. Target Analysis. During the initial firing on the 25-meter range, the shot groups may be inconsistent, resulting from errors in the application of the integrated act of shooting. If a shot group is extended vertically or horizontally the firer may not have had correct sight alignment, his front sight blade was not centered vertically and/ . horizontally in the rear sight aperture. If the shot group was close, vertically or horizontally, the error may be defined as

incorrect placement of the aiming point; the firer did not have his aiming point centered on and/or tangent to the front sight blade. These are errors in aiming. Many errors are caused by incorrect application of steady hold. For instance, improper trigger control may cause a shot group to be low, right, and oblique on the target. Improper breathing could cause a shot group to be vertical on the target and the size of the error would depend on how heavily the firer was breathing. If the firer has a scattered shot group, the instructor should observe the individual to determine if his problem is aiming, steady hold, fear, or a combination thereof.

e. Follow Through. Follow through is a term used in marksmanship as in any sport. Just as the ball player continues to swing his bat when he has made contact with the ball, or a golfer continues to swing his club when he has made contact with the ball, the rifleman continues to aim his weapon and to apply the eight steady hold factors even though the weapon has fired. This enables the firer to detect errors which were present when the weapon fired.

f. Calling the Shot. When a soldier "calls his shot" he announces aloud the place on the target at which he was aiming the instant the rifle fired. He has six basic calls he can use: high, low, left, right, hit, or, if he has no idea where the round hit, he sounds off with "doubtful". Of course there may be a combination of these calls such as high left, low right, high right, and low left. By calling the shot the firer can detect and correct his own shooting errors and by doing this he develops confidence in his weapon and himself.

g. Firing Data Card. After the firer calls his shot he immediately records this call on the firing data card. The firing data card provides a means for the soldier to record his calls, hits, position from which he fired, and the sight setting on his weapon.

h. Progress Envelope. The firing data card is maintained in the progress envelope along with a target analysis sheet, used targets, field firing score sheets and target detection score sheets. The progress envelope gives the instructor an opportunity to check a student's progress during any phase of his marksmanship training.

i. Coach and Pupil. The coach and pupil method of training gives the student an equal opportunity for learning while acting alternately as coach and pupil. The class is broken down into two orders; the first order fires while the second order coaches. The coach, using the eight steady hold factors and his knowledge of aiming as a guide, detects and corrects the firer's shooting errors.

j. Ball and Dummy. The ball and dummy method of training provides a means for the coach to detect errors of flinching, jerking, or bucking. The coach directs the firer to turn his head away from the receiver while he loads a dummy or a live round. The firer does not know which round is in the chamber. The coach directs the firer to aim at his target and fire. If there is an error and a dummy round is in the chamber, the error will become more evident to both the coach and pupil.

k. Sight Adjustments. Initially, the primary interest of the firer is to obtain a tight, 3-round shot group. When the instructor is satisfied that the class has become thoroughly familiar with aiming and steady hold, and that the majority of the class can obtain tight shot groups, he will permit sight changes. To make sight changes there are several factors the firer must consider.

(1) Range to the target - 25 meters for preparatory marksmanship training.

(2) Size of the target - The black rectangle on the 25 meter target is 7 centimeters wide and 3 centimeters high. Each surrounding square is 1.4 centimeters.

(3) Elevation and windage rule - Two clicks of elevation or windage will move the strike of the bullet one square (1.4 Cm) on the target at 25 meters.

(4) The rear sight is moved in the direction the firer wants the strike of the bullet to move.

l. Area of Corrective Instruction. The Basic Rifle Marksmanship Course uses the Area of Corrective Instruction for firers having unusual shooting difficulties. Unusual difficulties are those that cannot be corrected immediately on the firing line. An area is set aside on one side of the firing line. The Area of Corrective Instruction should include:

(1) The best marksmanship instructors available to detect the errors the firers are making and to determine what corrective action to prescribe for these errors.

(2) Devices to detect shooting errors:

(a) M15 Sighting Device.

(b) Aiming Bar.

(c) Rifle Rest with Target Box and Disc.

(d) M2 Aiming Device.

m. Progress Check. Before battlesight zeroing, a progress check is conducted to determine if the rifleman can apply the fundamentals of rifle marksmanship. Each soldier fires a three-round shot group from each of the eight positions. Using the scoring template to evaluate the shot groups, the instructor determines whether or not the individual should progress to battlesight zeroing. The instructor can use the progress check to divide the class. He will take the best 50% of the class and have them fire to obtain their battlesight zero, keeping the lower 50% on the 25 meter range for additional training. This move will hold the interest of the better shooters and prevent the poorer ones from advancing before they have mastered the fundamentals of marksmanship.

n. Calibration of the Rear Sight.

(1) After the soldier has obtained the battlesight zero for his rifle, he must calibrate the rear sight. This is necessary since, throughout the marksmanship course, the soldier must continually check the rear sight and, if necessary, re-establish the correct setting.

(2) Procedure for calibrating the rear sight:

(a) Insure the rear sight has proper sight tension (See FM 23-8).

(b) Turn the elevation knob counterclockwise until the rear sight aperture is at its lowest possible setting. Count the clicks as this is done and compare the number to that recorded on the firing data card as the battlesight zero of the rifle. This procedure is simply a means of checking the accuracy of the information on the firing data card.

(c) Loosen the screw in the center of the elevation knob until the knob can again be turned forward.

(d) Turn the elevation knob forward until the 250-meter line (the line between the numbers 2 and 4 on the elevation knob) is opposite the index line on the receiver.

(e) Turn the elevation knob forward the number of clicks of the 250-meter battlesight zero setting.

(f) Hold the elevation knob in position and tighten the center screw (fingertight). Raise the rear sight until it is at its highest possible setting, and again tighten the center screw (with combination tool).

(g) To check the adjustment, turn the elevation knob counterclockwise until the rear sight aperture is at its lowest possible setting. Turn the elevation knob clockwise counting the clicks. The number of clicks will be equal to the battlesight zero setting if the sight has been calibrated correctly.

o. Battlesight Zero. A 250-meter Battlesight Zero is defined as that sight setting in elevation and windage that will permit the line of sight and trajectory of the bullet to coincide at 250 meters. It is known that the trajectory of a round travels in a curved line; the line of sight is a straight line. Where these two lines intersect is the range at which the weapon is zeroed. The soldier zeros his weapon for a range of 250 meters on a 25-meter range. He aims at the bottom center of the black rectangle and adjusts his shot group until the center of that shot group is 4.6 centimeters above the point of aim, (the "X" on the 25 meter target.) He fires three 3-round shot groups to obtain his zero and one shot group for confirmation (See Figure 1).

18. FIELD FIRING.

a. Purpose and Scope. Field firing provides the soldier with practical experience in firing at realistic targets located at ranges comparable to those on the battlefield. Field firing begins with simple exercises designed to familiarize the soldier with the range, the targets, and the scoring system. It is during these initial exercises that the soldier learns to compensate for the battlesight zero of the rifle by adjusting his point of aim on the target. He does this by firing at targets located at ranges other than 250 meters, the range for which the zero is established for his rifle. During the first field firing exercise, the soldier will have a reasonable time to check his position, sight picture, and fire at the target (no time limit). However, in subsequent exercises, increased emphasis is placed on speed as a time limit is imposed on the firer. In later exercises, there are added requirements such as rapid reloading, reducing a stoppage, and firing at multiple targets. Initially, the soldier fires from the more stable positions and gradually progresses to the less stable positions. During the final exercises of field firing, the firer is required to advance toward the targets, quickly move into positions, and fire when the targets appear.

b. Adjusted Aiming Point. Using an adjusted aiming point means that the firer, utilizing his 250-meter battlesight zero, aims above or below the actual desired point of impact. The reason for this procedure is that once the soldier has established a battlesight zero for 250 meters, he should not change the sight setting throughout the remainder of the marksmanship course. Thus, he must be able to hit targets located at ranges other than 250 meters using this 250-meter sight setting.

c. Rules for Applying Adjusted Aiming Point. The "rule of thumb" for engaging combat-type targets is: for targets located at ranges up to 250 meters, the rifleman should aim at the bottom center of visible mass. At ranges between 250 and 460 meters, he should aim at the center of visible mass. Using this rule minimizes over-shooting the target, enabling the firer to take advantage of richochet hits, which are often as effective as direct hits. If the round falls short the soldier has a better chance to see the strike of the bullet, thus enabling him to rapidly adjust on his target.

19. TARGET DETECTION.

a. Purpose. The most skilled marksman will not be effective if he cannot detect his target. For the combat rifleman, detecting the target can be a greater problem than hitting it. Except during the assault, it is a poor soldier who fails to use cover and/or concealment when he is in the vicinity of the enemy. Consequently, emphasis must be placed on teaching the soldier the techniques of detecting targets as they would appear on the battlefield. As applied to rifle marksmanship, the term, "Target Detection", is defined as the locating, marking, and determining the range to combat-type targets. These targets may be either single or multiple, stationary, sound or moving targets. They can also be completely visible, partially visible, or completely hidden, but giving indications as to their position, by sound.

b. Training Concepts. Target detection training is based on concepts governing the usual behavior and employment of Infantry units on the battlefield. These concepts are:

(1) Enemy personnel are seldom seen except in the close assault.

(2) The range at which individual enemy soldiers can be detected rarely exceeds 300 meters.

(3) The indications that may reveal the location of the enemy are: sound, movement, and lack of or improper use of camouflage. Normally, these indications will be heard or seen momentarily.

c. Target Detection Teaching Points. Target Detection is taught in three steps:

(1) Locating the target. The soldier must first select a good observation position, one which offers maximum visibility of the area while still affording maximum cover and/or concealment. As used here, "position" is the observer's location on the ground. The soldier makes a brief (approximately 30 seconds) initial search of his area. Here, he is concerned mainly with any enemy activity that might be an immediate hazard to him. This is often referred to as the "self-preservation search." He then makes a more thorough search of his area by using the 50-meter overlapping strip method of search. He begins his search from in front of his position, searching from flank to flank, out to a range of 50 meters. He continues his search in 50-meter increments, from flank to flank as far out as he can see, overlapping each sector by 10 meters. He seeks out enemy targets by looking for target indications. These indications are:

(a) Sound.

(b) Movement.

(c) Improper use of or lack of camouflage.

(2) Marking the Target. The soldier marks his target by the use of a common reference point or a reference point. A common reference point is a point at which he aims in order to hit his target; a reference point is an object, such as a terrain feature, which enables the soldier to correlate the location of a poorly-defined target. Of the two, the common reference point is usually the more effective means of delivering accurate fire on the target.

(3) Determining Range. Simply stated, range determination is the process of finding the distance between two points. There are two methods taught to determine range:

(a) 100-Meter Unit of Measure. The soldier must be able to visualize a distance of 100 meters on the ground. This is effective up to 500 meters. If the target or suspected target is over 500 meters, the soldier should select a point halfway to the target, determine how many 100-meter increments to this point, and double that figure.

(b) Appearance of individuals and recognized objects. A means of determining range by the size and other characteristic details of the object in question. If the soldier knows how different objects appear at various ranges, he can readily determine the range to these objects. Constant practice is required for the soldier to maintain a degree of accuracy.

(c) Sector Sketch. An aid a rifleman can use to assist him in range determination is the Sector Sketch. On the sketch the rifleman will indicate easily recognized object, likely hostile target areas and avenues of approach and the ranges to these positions.

d. Conduct of Training. Training is conducted in a series of trials in the detection of stationary targets, single and multiple moving targets, sound targets and a combination of sound and multiple moving targets. Tests are conducted at the end of these trials to determine the proficiency of the soldier in detecting combat-type targets.

20. RECORD FIRING.

a. Purpose. Record firing is a series of firing exercises conducted to test the soldier's ability to detect and hit combat-type targets in a minimum amount of time. The record firing phase of marksmanship training is considered an extremely valuable training exercise. It provides a means for the commander to determine the proficiency of his unit in marksmanship.

b. Record Course of Fire. Several record courses of fire have been developed in order to provide flexibility in adapting local facilities to meet the requirements of the marksmanship program. Record firing for active Army units can be conducted on either of two types of range complexes: a standard record range specifically constructed for combat-record firing, or a combination of a modified known-distance range and a combat positions range. A third record course, designed solely for use on known distance ranges, may be conducted at those installations which have neither a standard record range nor a combat positions range. Of these record courses, the course conducted on a standard record range provides the best training benefit since it requires the soldier to apply all of the combat marksmanship skills.

c. Training Criteria.

(1) When firing the record course the soldier should wear his combat equipment (steel helmet and load bearing equipment with all accessories) and not be permitted to use his sling or hinged shoulder rest.

(2) The soldier should be informed that an alibi occurs only when the target device or his weapon malfunctions through no fault of his own.

(3) If an alibi occurs, the soldier will be given additional time at the end of the exercise to fire the number of rounds he missed during the exercise.

d. Standard Record Firing Course.

(1) Record I - Record Firing I is conducted in two phases, a supported and an unsupported phase.

(a) Supported Phase - During the supported phase the soldier fires four exercises from the foxhole, rotating to another lane after each exercise. He fires one magazine of eight rounds at eight target exposures for each exercise, a total of thirty-two rounds for the supported phase. The soldier is then instructed to move in front of the foxhole where he will begin the unsupported phase of firing.

(b) Unsupported Phase - In the unsupported phase, the soldier fires three exercises from positions of his choice. He rotates to the next designated firing lane after each

exercise. He fires one magazine of eight rounds for each exercise, a total of twenty-four rounds in the unsupported phase. The total number of target exposures for Record I is fifty-six.

(2) Record II - Record Firing II is conducted in two phases, a supported and an unsupported phase. In the supported phase the soldier fires one exercise from the foxhole at six target exposures. He fires two exercises in the unsupported phase. In one of the unsupported exercises he fires twelve rounds at ten target exposure and, in the other, he fires sixteen rounds at twelve target exposures. The soldier receives forty rounds to engage twenty-eight targets in Record Firing II. The targets are exposed singly and in multiples of 2 and 3. Time limits are imposed on the firer in both Record I and II. For single targets at ranges of 200 meters and less, the soldier has five seconds to detect and engage those targets. For single targets in excess of 200 meters the soldier has ten seconds to detect and engage his targets. For double target exposures he has 15 seconds and for triple target exposures he has 25 seconds, regardless of range.

(3) If the soldier fires Record I in the morning of one day, he should fire Record II on the afternoon of the next day.

(4) Qualification:

60-84 Expert.

45-59 Sharpshooter.

30-44 Marksman.

0-29 Unqualified.

21. INDIVIDUAL NIGHT FIRING.

a. Purpose. Individual night firing training teaches the soldier to detect and hit targets at night or during other periods when limited visibility prevents the conventional use of sights.

b. Phases of Training.

(1) Night Vision: The soldier is taught the construction of the human eye and how to best use his eyes at night through the principles of night vision.

(2) Daytime Instruction Firing: This is conducted during the hours of daylight. The soldier is taught to fire his weapon through the use of the pointing technique and a feeling zero (the natural feel of weapon in the rifleman's hand to put his shot group in the center of the target).

(3) Night Practice Firing: This is conducted on the night firing range where the soldier applies the principles he has learned during Night Vision and Daytime Instruction Firing. The soldier fires 2 magazines of 8 rounds each. He fires one magazine at a near range (25 or 50 meters) and one at a greater range (50 or 75 meters). The range depends on lighting conditions.

(4) Night Record Firing: This is to test the soldier's ability to engage targets during periods of limited visibility. The soldier fires the exercise outlined in paragraph (3) above.

c. Training Conditions.

(1) Individual night firing training should be conducted immediately following daytime marksmanship training since many of the procedures used at night are the same or similar to those used during the day.

(2) Night firing training should be scheduled only under conditions of half-moonlight or less. If there is greater light intensity, some individuals will discover they can use their sights in the same manner as daytime firing. By so doing, they will fail to learn the proper night firing techniques and thus be ineffective under conditions of half-moonlight or less.

d. Fundamentals of Night Firing. Firing a rifle at night is similar in many respects to firing during the daytime. With the single exception of "spot weld", the steady hold factors discussed in preparatory marksmanship apply equally as well at night as during the day. Although target detection and weapon alignment can be a problem during the day, the absence of light makes these two techniques even more difficult at night. Consequently, night firing training is focused on teaching soldiers the night application of target detection and weapon alignment.

(1) Target Detection. First the soldier learns the principles of night vision which are: dark adaptation, off-center vision, and scanning. These principles are outlined in detail in FM 21-75, Chapter 2, Section V. He applies these principles in the application of night vision to night firing. He keeps both eyes open and holds his head high. These techniques will aid the firer in detecting his target.

(2) Weapon alignment. The soldier uses a natural pointing technique to align his weapon on the target. The pointing technique can be applied to any position, however, for training, either the foxhole or prone supported position should be used, since these positions are the most difficult from which to detect targets at night. Consequently, they offer the greatest challenge to the individual's night firing capability.

22. OTHER COURSES. Other courses of rifle marksmanship instruction follow the same sequence as the Basic Rifle Marksmanship Course.

a. Combat Readiness Marksmanship Proficiency: Standard Course A1. Designed for annual qualification and POR firing for active Army personnel with less than 10 years of service. Following is a breakdown of instruction hours:

ORIENTATION	1 Hour
MECHANICAL TRAINING	1 Hour
PREPARATORY MARKSMANSHIP	14 Hours
TARGET DETECTION	6 Hours
FIELD FIRING	4 Hours
RECORD FIRING & TARGET DETECTION	8 Hours
NIGHT FIRING	2 Hours
	36 Hours

b. Combat Readiness Marksmanship Proficiency; Standard Course A2. Designed for annual qualification and POR firing by active Army personnel who have more then ten years service. Following is a breakdown of instruction hours for this course:

PREPARATORY MARKSMANSHIP & 25 METER FIRING	4 Hours
TARGET DETECTION	4 Hours
FIELD FIRING	4 Hours
RECORD FIRING & TARGET DETECTION TEST 1	4 Hours
NIGHT FIRING	2 Hours
	18 Hours

c. There are alternate marksmanship courses for nonactive Army units. These courses are outlined in FM 23-71.

Section V. RANGE REQUIREMENTS, TRAINING AIDS, AND PERSONNEL

23. RANGE REQUIREMENTS. The range requirements for the Marksmanship Courses are listed in FM 23-71.

a. Targets: The target for 25-meter firing and battlesight zero is indicated in Figure 1.

b. Battlesight Zero: The soldier adjusts his rear sight so that the center of the shot group is 4.6 centimeters above his point of aim as indicated on the sample target in Figure 1.

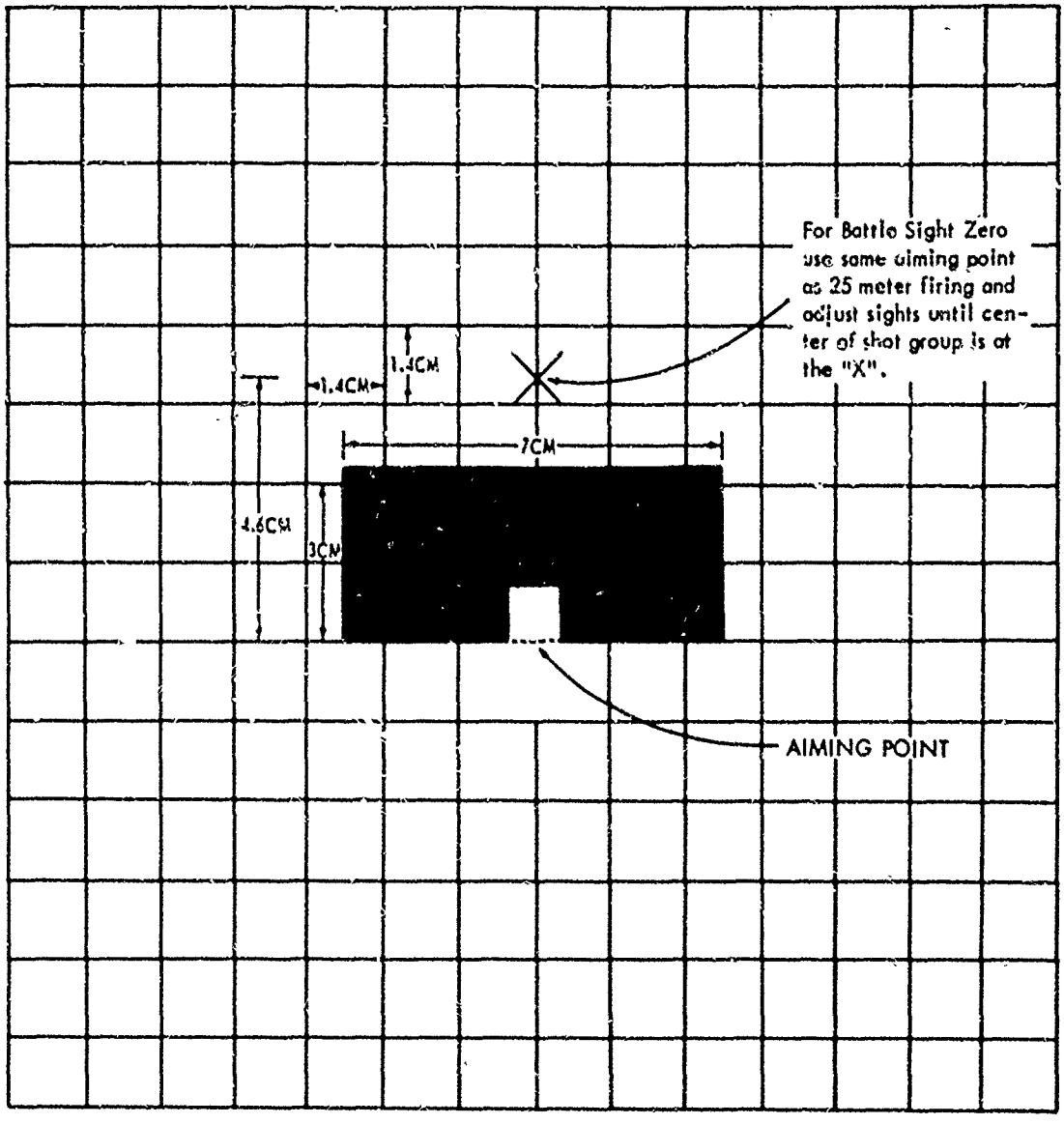


Figure 1. 25-Meter Target.

24. TRAINING AIDS.

a. Training Aids for Mechanical Training:

(1) Transparencies/Charts.

(a) One Objectives' Chart.

1. The rifleman must develop the confidence and desire to engage combat targets

targets.

2. He must develop the ability to detect combat type targets.

3. He must develop the ability to hit combat targets once they have been detected.

(b) One Basic Rifle Marksmanship Course Chart.

Orientation	1 Hour
Mechanical Training	4 Hours
Preparatory Marksmanship	32 Hours
Field Firing	16 Hours
Target Detection	14 Hours
Record Firing	8 Hours
Total	75 Hours

NOTE: 8 hours Individual Night Firing follows Record Firing.

(c) One Cycle of Operation Chart.

1. Feeding.

2. Chambering.

3. Locking.

4. Firing.

5. Unlocking.

6. Extracting.

7. Ejecting.

8. Cocking.

(d) One Immediate Action - 2d Phase Chart.

Take the rifle from your shoulder.

Pull the operating rod handle to the rear.

Look in the receiver.

Locate the stoppage by observing as you pull the operating rod handle to the rear, what is in the chamber, and what has been ejected.

Reduce the stoppage and continue to five.

(2) Additional Training Aids Required.

(a) Wooden Pointer to point to material on transparencies or charts.

(b) Wire Pointers for each assistant instructor (used to point at various parts of the rifle as principal instructor discusses them).

(c) Five-Round Magazine Cartridge Clip w/dummy ammunition for each assistant instructor (used for methods in loading).

(d) One each round (inert) of the following types of ammunition:*

Ball, M59	Blank, M82
Ball, M80	Duplex, M198
Tracer, M62	Armor-Piercing, M61
Dummy, M63	Crimped Cartridge

(e) One dummy round M63 for each student.

(f) One combination tool M14 for each assistant instructor.

(g) One cleaning cloth for each assistant instructor.

(h) One M14 Rifle with selector for each assistant instructor.

(i) One magazine for each assistant instructor.

(j) One 5-round cartridge clip for each assistant instructor.

(k) One magazine filler for each assistant instructor.

b. Training Aids for Preparatory Marksmanship Training - 25-Meter Firing.

(1) Models.

(a) Sight Picture Model

(b) Rear Sight

(2) Charts.

(a) Sight Alignment Chart.

(b) Steady Hold Chart.

(c) 25-Meter Target w/dimensions and 3 magnetic spotters.

(d) Firing Data Card.

(3) Additional Equipment Required.

(a) Chalk.

*This ammunition is used by assistant instructors during methods of loading; also for safety orientation on various types of ammunition.

(b) Eraser.

(4) Area of Corrective Instruction.

(a) M15 Sighting Device.

(b) M2 Aiming Device.

(c) Rifle Rest with target box and disc.

(d) Aiming Bar.

c. Training Aids Required for Target Detection Training.

(1) Charts.

(a) Target Detection Breakdown Chart.

(b) Target Detection Phase Chart.

(c) Multiple Moving Targets (Factors).

(d) Single Moving Targets (Factors).

(e) Observation Chart.

(f) Blackboard.

(g) Test Score Card Chart.

(2) Aiming Devices (One per observation point).

d. Training Aids Required for Field Firing Ranges.

(1) Target Device.

(2) Additional Equipment Required.

(a) Stop Watches.

(b) Pointers.

(c) Score Cards.

(d) Carbide Lamps.

e. Equipment Required for Record Firing.

(1) Target Devices.

(2) Carbide Lamps.

(3) Combination Tools.

(4) Pointers.

(5) Score Cards.

(6) Seasonal Aids.

25. PERSONNEL REQUIREMENTS. The personnel requirements listed below are guides and will vary with the needs of the various units.

a. Mechanical Training.

OFFICER	ENLISTED
1 OIC	1 Principal Instructor 1 Assistant Instructor per 10 man setup 2 Floor Walkers'

b. Preparatory Marksmanship.

OFFICERS	ENLISTED
1 OIC 2 Safety Officers	1 NCOIC 1 Assistant Instructor per 5 points 1 Tower Operator 1 Ammunition NCO 1 Qualified Instructor per individual in the area of corrective instruction.

c. Field Firing.

OFFICERS	ENLISTED
1 OIC 2 Safety Officers	1 NCOIC 1 Assistant Instructor per 7 to 10 points 1 Tower Operator 1 Ammunition NCO

d. Target Detection.

OFFICERS	ENLISTED
1 Safety Officer	1 NCOIC 1 Principal Instructor 8 Target Men 1 Assistant Instructor per 5 points

e. Record Firing.

OFFICERS	ENLISTED
1 OIC 2 Safety Officers	1 NCOIC 1 Tower Operator 1 Assistant Instructor/scorer per firing lane. 1 Ammunition NCO 1 Ready Area NCO 1 NCO in the Retired Area (present concurrent training)

Section VI. THE AUTOMATIC RIFLE MARKSMANSHIP PROGRAM

26. GENERAL.

a. The success of a combat unit is said to depend on its ability to MOVE, SHOOT, and COMMUNICATE. Each element is interdependent on the other, and each contributes to the success of the battle only in relation to the proficiency displayed in the other. The ability to SHOOT (to detect and engage a target with accurate fire, or to cover a specific area with a heavy volume of automatic fire) can be developed only through a thorough and competently administered marksmanship program. The effectiveness of such a program will be judged in the final analysis by the consistent ability of each individual trained to SHOOT. Marksmanship instructors are cautioned that neither the most comprehensive marksmanship program, the most extensively tested techniques, nor the most elaborate range facilities will be sufficient to produce a skilled marksman if the unit-level instruction is poorly presented.

b. The procedures and techniques used in the United States Army Automatic Rifle Marksmanship Training Program are based on the concept that automatic riflemen must be proficient marksmen, capable of effectively applying their marksmanship skills under combat conditions. This proficiency can be developed only through the mastery of the fundamentals of marksmanship. These fundamentals are taught in an environment designed to prepare the soldier for later combat-type exercises, and ultimately, combat itself. For example, throughout field and transition firing personnel are required to wear the individual equipment they would be expected to wear in combat.

27. PURPOSE AND SCOPE:

a. To be proficient in the employment of the automatic rifle the infantryman must be thoroughly trained in the fundamentals of automatic rifle marksmanship so that their correct application will become almost instinctive in later phases of training and ultimately, in combat.

b. Technique of fire doctrine prescribes various situations in which automatic rifleman must engage targets with semi-automatic fire, therefore proficiency in the employment of the automatic rifle requires the automatic rifleman to be an expert rifle marksman. The training in semi-automatic fire included in this program is designed to refine that proficiency by requiring the firer to deliver accurate long-range semiautomatic fire at a very rapid rate.

c. The fundamentals taught in automatic rifle marksmanship training in no way conflict with those taught in rifle marksmanship training, rather, they supplement that instruction. In several areas instruction on fundamentals of rifle and automatic rifle marksmanship (as taught with the M14 and M14A2 rifles) are indentical. The collective skills of rifle marksmanship are all used by the AR man with only slight variations, i.e., positioning of the hands on the weapon and the lack of a thumb and check spot weld when firing the M14A2. However, because of the nature of automatic fire, and the increased range capability of the M14A2, additional skills are needed by the automatic rifleman to become proficient in the employment of the automatic rifle. These include:

(1) The need for a more stable body position, obtained through slightly different body alignment in the prone position.

(2) The need for proficiency in rapid and systematic magazine handling to enable the delivery of the heaviest possible volume of fire consistent with accuracy.

(3) The need for skill in the distribution of fire over linear targets to cover the entire target area with fire.

(4) The need for additional knowledge of the operation of the rear sight to engage long-range targets, i.e., targets between 460 and 700 meters.

d. The degree of proficiency attained by the automatic rifleman will be largely dependent upon correct teaching by instructors, and correct application by the individual of the fundamentals of automatic rifle marksmanship.

Figure 2. M14A2 (Bottom) and M14 with Selector and Bipod, M2.

28. FUNDAMENTALS OF AUTOMATIC RIFLE MARKSMANSHIP.

a. The Integrated Act of Automatic Rifle Shooting.

(1) Aiming.

(2) Steady Hold.

b. Positions.

(1) Unsupported Position (without use of bipod).

(a) Squatting.

(b) Kneeling.

(c) Kneeling Supported.

(d) Standing.

(e) Sling Supported Hip.

(f) Underarm.

(2) Bipod Supported Positions.

(a) Prone.

(b) Foxhole.

c. Automatic Fire.

d. Fire Distribution.

e. The Rear Sight, Battlesight Zero, and Sight Adjustment.

29. THE INTEGRATED ACT OF AUTOMATIC RIFLE SHOOTING. Just as in combat rifle firing, combat automatic rifle firing is an integrated act involving several techniques and skills which are necessary to fire the weapon and hit the target. These techniques and skills must be so instilled in the individual that he will apply them instinctively and almost simultaneously in the act of combat shooting. This integrated act of shooting consists of two elements: aiming and steady hold.

a. Aiming. The sights on the M14 and M14A2 rifle are identical, therefore, the procedure used to align the sights on the target is the same as that taught in rifle marksmanship, i.e., attainment of correct sight alignment, placement of the aiming point, and concentration on the front sight blade when pressing the trigger. The soldier will have completed rifle marksmanship training prior to receiving automatic rifle marksmanship training. However, it will be necessary to conduct a review of aiming techniques prior to automatic rifle firing. The extent of this review will depend primarily on the level of proficiency of personnel in the unit. For a detailed discussion of aiming, and aiming exercises see FM 23-16, Automatic Rifle Marksmanship.

b. Steady Hold Factors.

(1) Steady hold is the technique of holding the automatic rifle as steady as possible while aligning the sights and firing the weapon. Steady hold in automatic rifle firing is somewhat different from that in rifle firing. The reason for this is threefold: first, the automatic rifle fired from the bipod mount is more stable due to the bipod and hinged shoulder rest support; second, the recoil of each round of a burst of automatic fire will cause a displacement of the weapon, and consequently a slight change in weapon alignment on the target; and finally, the configuration of the weapon itself will prevent the firer from attaining a thumb and cheek spot weld, and also necessitates a different grip on the weapon.

(2) There are eight steady hold factors which affect holding the automatic rifle steady. These factors are the same for firing from either of the two primary automatic rifle position, the foxhole and prone positions.

(a) The Left Arm and Grip of the Left Hand. The firer grips the front handgrip with the left hand and exerts a strong pressure directly to the rear forcing the weapon into the shoulder. The handgrip must be adjusted on the stock so that when the arm and wrist are straight the thumb fits naturally against the rear of the handgrip. Unless the firer has exceptionally long arms, no part of the left arm should touch the ground.

(b) The Hinged Shoulder Rest and Right Shoulder. The hinged shoulder rest should always be used when firing the automatic rifle from the prone and foxhole bipod supported positions. The weapon should be drawn against the shoulder at the point where the neck and shoulder join, with the recoil pad against the collar bone, and the shoulder muscle wedged into

the junction of the hinged shoulder rest and recoil pad. The tighter the weapon is held against the cheek, the neck, and shoulder, the smaller will be the dispersion of automatic fire. The right shoulder should be relaxed when firing; care must be taken not to buck the shoulder into the weapon while firing as it will cause the muzzle to be displaced down and to the left for the right-handed firer.

(c) Grip of the Right Hand. The rear handgrip is grasped so that the rear of the handgrip rests in the V formed by the thumb and forefinger. The thumb, third, fourth, and fifth fingers are closed tightly around the handgrip, exerting only a slight pressure to the rear. The trigger finger is placed on the trigger between the tip and second joint so that there is no other contact between the finger and stock. This permits the trigger to be pressed straight to the rear without disturbing the lay of the weapon.

(d) Right Elbow. The location of the right elbow is extremely important as it provides balance to the firing position. The right elbow is positioned so that the right upper arm forms an angle of approximately 90 degrees to the ground. The nearer to 90 degrees the upper arm is held, the more stable will be the firing position. In no case should the angle be less than 45 degrees. A quick reference point to insure correct placement of the right elbow is to inspect the firer's shoulders to see they are level and parallel to the ground. It should be pointed out that failure to hold the right upper arm and the shoulders in this manner is the most common error found in firing the automatic rifle from the prone and foxhole positions. This error will cause the shot group to be dispersed down and to the right for the right-handed firer. In distributing fire to cover a linear target, many firers will move the right elbow when making adjustments to the lay of the weapon. This causes the right shoulder to drop, and become the only portion of the body behind the weapon, resulting in exceptionally wide and erratic dispersion of fire. When lateral adjustment in the lay of the weapon would require a movement of the elbow, the entire body must be realigned directly behind the weapon.

(e) Position of the Cheek. Because of the placement of the right hand on the rear handgrip, the firer will have no thumb and cheek spot weld. Therefore, there is no index to insure the placement of the cheek on the stock at precisely the same point each time the weapon is fired. It should be emphasized that the cheek must be placed on the stock at the same point each time the weapon is shouldered so that the eye will be in the same relation to the aperture of the rear sight each time the automatic rifleman fires. This is essential for consistently accurate shooting. During marksmanship training, a small piece of masking tape can be placed on the stock at that point which the firer has found most suitable, so that he will place his cheek at precisely that point each time he fires.

(f) Breathing. The effects of breathing in automatic rifle marksmanship are the same as in rifle marksmanship, the movement of the chest causes a vertical movement of the weapon. To eliminate this movement the firer must learn to hold his breath for the few seconds required to aim and fire. The firer takes a normal breath, releases part of it and holds the remainder in his lungs by locking the throat. He should not hold his breath for more than ten seconds, otherwise his vision may become blurred, and lung strain will cause undesirable muscular tension.

(g) Muscular Tension. Contrary to the necessity for complete relaxation in rifle firing, muscular tension of part of the body is necessary in automatic rifle firing. This tension, however, is not required to support the weapon as might erroneously be done in rifle marksmanship. The biped and shoulder rest provide the necessary weapon support when firing the automatic rifle from the prone or foxhole positions; support which, in fact, is more stable than that which the average rifle firer can provide with his body through correct use of the rifle steady hold factors. As stated in the discussion of the grip of the right and left hand, the firer

must exert a firm pressure directly to the rear on the front handgrip. This can be accomplished only by tensing the muscles of the right and left arms. The stronger the pressure, all other factors being correctly applied, the less dispersed will be a burst of automatic fire. Although this muscular tension is exerted primarily by the left arm, a certain tensing of the stomach and abdominal muscles will occur.

(h) Trigger Control. The automatic rifleman must be proficient in two types of trigger control: (1) that used is semiautomatic fire, and (2) that used in automatic fire.

1. Semiautomatic Fire Trigger Control. See FM 23-71, for a detailed discussion of correct trigger control for semiautomatic fire.

2. Automatic Fire Trigger Control. Correct trigger control in automatic fire is important in two respects:

   a. As in semiautomatic fire, correct trigger control eliminates movement of the weapon when pressure is applied on the trigger. In automatic fire from a bipod supported position, this aspect of trigger control decreases slightly in importance because the weapon is inherently more stable. In addition, a slight movement of the weapon will invariably occur after the first round of a burst has been fired.

   b. The automatic rifleman governs the length of a burst through manipulation of the trigger. Throughout automatic rifle marksmanship training, emphasis must be placed on the use of a two to three round burst of fire: Bursts of two rounds are preferable in most situations for maximum accuracy per round fired, and minimum dispersion of shots.

   c. Automatic fire trigger control is applied by pressing the trigger to the rear and quickly releasing it. This quick release will permit only two or three rounds to be fired. Most individuals with no previous training will initially encounter some difficulty in exercising proper automatic fire trigger control. Only through practice will they be able to attain proficiency in trigger control.

30. FIRING POSITIONS.

a. General.

(1) When delivering semiautomatic fire, sight alignment and trigger control are the most important aspects of shooting. This fact must be stressed in automatic rifle marksmanship training because the automatic rifleman must be proficient in semiautomatic fire, as well as automatic fire. He must further understand the contrasts that exist in the two types of marksmanship. In automatic fire, position becomes the most important aspect of marksmanship. To better understand this, let us assume that the firer has a good zero, aims his weapon correctly, and applies all of the steady hold factors in the proper manner, firing a burst of two to three rounds. The first round of that burst will hit the target at the point of aim, but this will not be true of the second or third round. The first round hits the aiming point just as when a round is fired singly, however, the recoil from the first and subsequent rounds will disturb the lay of the weapon progressively with each round of the burst. Consequently, the points of impact of the second and third rounds will differ from that of the first round. The distance between the impact of the first and subsequent rounds of the burst will depend to a very great degree on the

stability of the firer's position and the correct application of the steady hold factors. The firer's body directly behind the weapon serves as a foundation, and his grip a lock to hold the weapon against this foundation; the better the body alignment, and the steadier the grip, the less dispersed will be the rounds in a burst of automatic fire.

(2) On the battlefield, the automatic rifleman must be able to assume a position which provides observation of the target area, and which affords some cover and/or concealment. Considering the many variables of terrain, vegetation, and tactical situations, there are innumerable possible positions that might be used. However, in most situations the position used to employ the automatic rifle in the automatic role will be those which utilize the bipod mount and hinged shoulder rest, i.e., the prone and foxhole positions. The two unsupported positions used to enable the automatic rifleman to fire while moving are the underarm and sling supported hip positions. Conditions such as high grass, dense foliage or irregular terrain, restrict the use of the bipod. In situations of this nature, the automatic rifle should be employed in the semiautomatic role from the squatting, kneeling or standing positions as outlined in FM 23-16 Automatic Rifle Marksmanship.

(3) During training in fundamentals of marksmanship, positions are taught as a step-by-step process. The soldier is talked through a series of precise movements until he is in the correct positions. Through practice, the automatic rifleman will gradually become accustomed to the feel of the positions, and eventually, he will know instinctively if his position is correct. This is particularly important in later phases of the marksmanship course and in combat, for in these situations the automatic rifleman must be able to assume position rapidly.

(4) Throughout positions training, the automatic rifleman should be continually checked for the proper application of the eight steady hold factors. This check is the responsibility of the coach, who must closely observe the firer's actions during all phases of fundamentals training. This responsibility must be strongly impressed on the coach.

(5) Preliminary Checks. The automatic rifleman must make six preliminary checks on his weapon before firing. These are the same checks that he should make in an assembly area prior to moving into combat. These checks are first taught in positions training and are as follows:

(a) Selector. The selector is checked to insure it is set for the desired type of fire.

(b) Sling. The butt end of the sling is loosened to facilitate magazine loading and changing. The front end must be adjusted so that torque is applied to the bipod sling swivel when rearward pressure is exerted on the front handgrip.

(c) Spindle Valve. The spindle valve is checked to insure that the slot is perpendicular to the barrel to permit proper functioning in automatic or semiautomatic fire.

(d) Gas Cylinder Plug. The gas cylinder plug is tightened with a combination tool.

(e) Stabilizer Assembly. The stabilizer assembly lock nut must be checked to insure it is tightened securely against the locking bracket. This check must be performed periodically during extensive firing, as the vibration caused by recoil may cause the lock nut to become loosened.

(f) Bipod. Initially, the extension assemblies on the bipod legs are fully extended and locked by the pivot plungers. Only after the firer has ascertained that he cannot attain a good sight picture while maintaining the proper body position and applying the steady hold factors, should he be permitted to adjust the extension assemblies to a lower position. Extensive testing has indicated that the average firer will obtain best accuracy with the bipod legs fully extended.

b. Bipod Supported Firing Positions. Automatic fire will normally be delivered from one of the following bipod supported positions:

(1) Bipod supported prone position (fig. 3). The bipod supported prone position is the most stable position from which to fire the automatic rifle and it should be used whenever that tactical situation permits. The prone position has the advantage of presenting a low silhouette and is easily adapted to the use of cover and concealment. Its primary disadvantage is the limitation of its use in heavily vegetated or irregular terrain where the firer's field of vision may be limited.

(a) To assume the bipod supported prone position, the soldier will:

1. Stand facing the target with the feet spread a comfortable distance apart. Hold the weapon at port arms with the left hand at the balance and the right hand at the rear handgrip.

2. Drop to the knees; remove the right hand from the handgrip. Fall forward, breaking the fall with the right hand well forward and on line with the right knee.

3. Extend the left arm forward, placing the weapon on the ground. Lower the body to the ground on the left side and elbow.

4. With the right hand, raise the hinged shoulder rest; grasp the small of stock with the left hand and place the weapon into the shoulder.

5. With the right hand grasp the rear hand grip and lower the right elbow. Grasp the front hand grip with the left hand.

(b) The following checks should be made for this position:

1. The body should be aligned so that an imaginary straight line drawn through the long axis of the rifle would pass over the firer's right shoulder and through the center of the right buttock.

2. The legs should be spread well apart with the toes pointing outward. The heels should be as close to the ground as the conformation of the body permits.

3. The back should be arched, the chest off the ground, and the shoulders parallel to the ground.

4. The left arm and wrist should be straight; no portion of the arm should touch the ground.

5. The right upperarm should form an angle as near to 90 degrees to the side as the conformation of the firer's body will permit.

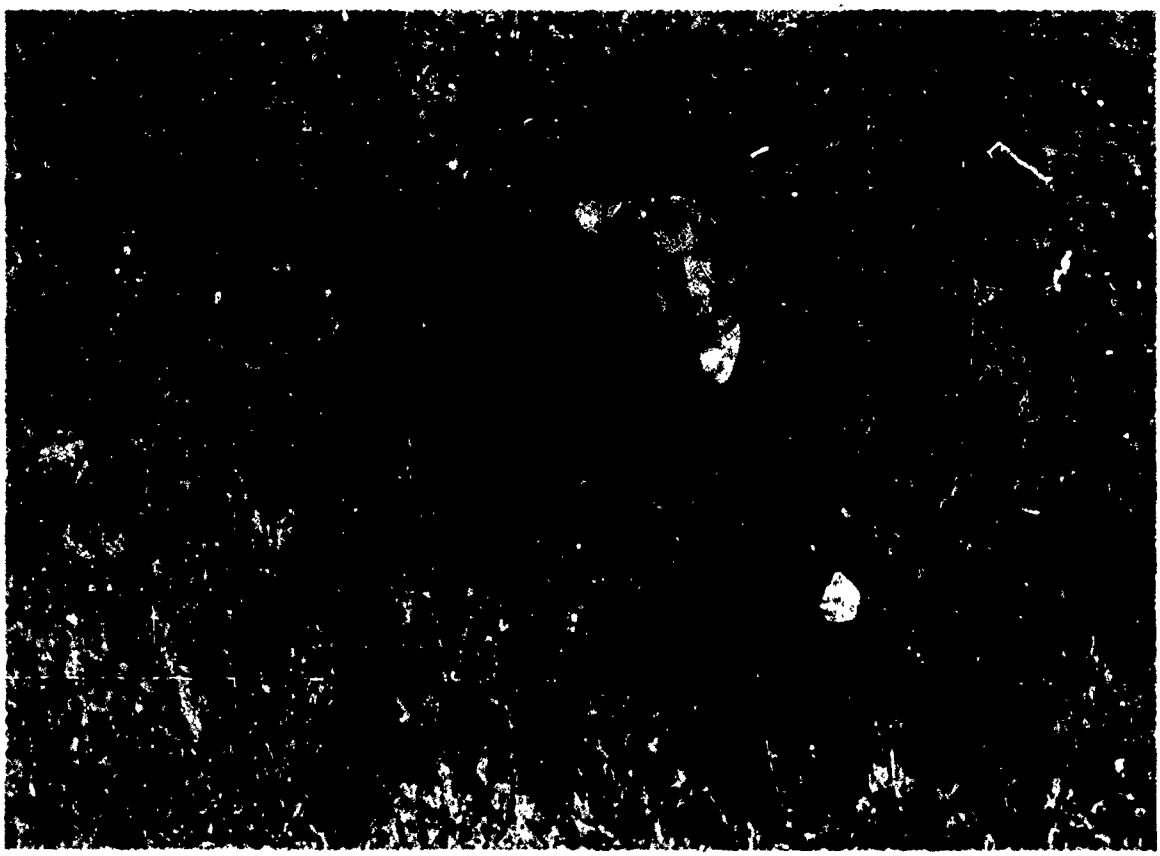


Figure 3. Bipod Supported Prone Position with the M14A2 Rifle.

(2) Bipod supported foxhole position (fig. 4). The bipod supported foxhole position is primarily a defensive position. This position is also used in offensive operations when the automatic rifleman is required to fire from high cover, e.g., deep ditches, chest deep ravines, shell craters and high road banks. The foxhole position used for firing the automatic rifle is essentially the same position as that used for firing the rifle. To assume the foxhole position:

(a) Place the bottom of the right foot against the rear of the hole as a brace, and lean forward until the chest is squarely against the forward wall of the hole.

(b) Grasp the automatic rifle in the same manner as in the bipod supported prone position.

c. Unsupported firing positions. (Without Use of the Bipod.)

(1) Squatting position. The squatting position is a relatively stable position which can be assumed rapidly. As only the feet contact the ground, it is an excellent position to use

Figure 4. M14A2 Bipod Supported Foxhole Position.

in mud, shallow water, or in a contaminated area. In assuming the squatting position, the firer faces the target and executes a half-right face. He spreads his feet approximately shoulder-width apart and squats as low as possible, keeping both feet flat on the ground. The left hand grasps the front handgrip and the left upper arm is placed firmly against the inside of the left knee. The rifle butt is positioned in the pocket formed in the right shoulder. He grasps the rear handgrip, lowers the right elbow, and blocks it against the inside of the knee. The hinged shoulder rest will not be used. The firer obtains a stock weld. This position will be used to deliver only semiautomatic fire in those situations which restrict the use of a bipod supported position.

(2) Kneeling positions. These positions are suitable for use on level and gently rising terrain. The kneeling positions can be adjusted in height and are readily adapted to supports such as trees, corners of buildings, and vehicles. The kneeling positions will be used to deliver only semiautomatic fire in those situations which restrict the use of a bipod supported positions.

(a) Kneeling unsupported position. To assume the kneeling unsupported position, the firer faces his target and executes a right face. He places the left foot to his left front with the toe pointed toward the target. He kneels on his right knee, and sits on his right heel. He places his left elbow over his left knee so that the upper arm rests on the flat position of the knee. The right hand places the butt in the pocket of the right shoulder, then grasps the rear hand grip. The right elbow is held horizontal or slightly above the horizontal to aid in forming a pocket in the right shoulder. He shifts his weight forward and obtains a stock weld. The front hand grip and hinged shoulder rest are not used in either the unsupported or supported kneeling position.

(b) Kneeling supported position (Without Use of the Bipod). To assume the kneeling supported position, the firer first assumes the kneeling position outlined above. He then shifts his weight forward, allowing his left shoulder, left arm, and left leg to come into contact with the support. The automatic rifle must not touch or rest on the support.

(3) Standing position. The standing position can be used to engage targets at ranges less than 100 meters when no other position can be assumed. It is the least stable of the automatic rifle firing positions and must be used only for semiautomatic fire. To assume the standing position, the firer faces his target, executes a right face, and spreads his feet a comfortable distance apart. The left hand grasps the stock at the balance, with the left elbow as nearly under the rifle as possible. With his right hand, he places the butt into the pocket of the right shoulder, and grasps the rear hand grip. The right elbow is held horizontal or slightly above the horizontal to form a good pocket in the right shoulder. This also permits the firer to exert a strong upward and rearward pressure with the right arm and hand. Most of the weapon's weight is held with the right arm. The firer shifts his feet until he is aiming naturally at the target, distributes his weight evenly on the hips, and obtains a stock weld. Neither the front hand grip nor the hinged shoulder rest are used in the standing position.

(4) The sling supported hip firing position. This position is used in those situations where the automatic rifleman must march for long distances with his weapon held in a position of immediate response to enemy fire. A distinct advantage of this position is that it leaves the automatic rifleman's hand free for rapid magazine changing. It must be strongly emphasized that accuracy from this position is limited for the average firer, at ranges greater than 50 meters. To assume this position:

(a) Detach the sling retaining clip from the front handgrip swivel. Adjust the automatic rifle sling so that when it is placed over the left shoulder, the automatic rifle hangs at belt level. The muzzle end of the sling is brought up on the outside of the stock.

(b) The rear portion of the stock is held against the right hip. The right hand on the rear handgrip exerts a firm forward pressure to counteract the force of recoil. The right forearm holds the stock firmly against the hip. The left hand on the front handgrip exerts a firm pressure to the rear and down so that the sling is pulled taut across the left shoulder. The automatic rifle is carried with the muzzle slightly depressed so that the firer can observe the signature effect of his rounds, thus he avoids overshooting and takes advantage of ricochets.

(c) The left foot should be well forward of the right for best balance. Where the firer must continue to move while firing, as in the assault, he attempts to fire a burst as the left foot strikes the ground. The firer bends at the knees, and leans forward from the waist as in a boxer's crouch. In this position, the firer is extremely flexible and can distribute his fire by pivoting on the ball of his lead foot in the direction of the target.

(5) The underarm firing position (fig. 5). This position is used in those situations where the automatic rifleman is required to move short distances, or when contact with the enemy is imminent. By placing the right forearm along the stock, the firer exercises greater control over the automatic rifle. This position is assumed in the same manner as the sling supported hip position with the following exceptions:

(a) The rear portion of the stock is placed against the body at a point between the waist and the armpit, and is held firmly against the body by the right forearm.

(b) No sling need be used; however, the sling may be used to support the automatic rifle to reduce firer fatigue in carrying the weapon and to allow the left hand maximum freedom for magazine changes. If used, the sling is placed over the right shoulder. The use

of the right shoulder to support the automatic rifle in this position provides the firer optimum flexibility in reacting to tactical conditions because he is not unduely restricted by the sling. The muzzle end of the sling rises on the outside of the stock and barrel; the butt end of the sling rises on the inside of the stock.

Figure 5. M14A2 Unsupported Underarm Firing Position.

31. AUTOMATIC FIRE.

a. Automatic fire is the firing of two or more consecutive rounds without releasing the trigger. Bursts of two to three rounds are usually fired to insure minimum dispersion. When does the automatic rifleman employ his weapon in the automatic role, and when does he employ it in the semiautomatic role? The automatic rifleman must understand the nature of automatic fire, its advantages and limitations, and the contrasts between automatic and semiautomatic fire. Only through such an understanding will the automatic rifleman know how and when to most effectively employ his weapon in any given situation.

(1) Semiautomatic fire is employed where the range to the target is in excess of 460 meters and in any situation where a high degree of accuracy is required to hit a small point target, e.g., when engaging bunker apertures, windows, and single enemy personnel.

(2) Automatic fire is employed:

(a) When engaging enemy formations at ranges out to 460 meters.

(b) When engaging large point targets such as crew served weapon emplacements, unarmored vehicles, and openings in buildings, out to ranges of 460 meters.

(c) To obtain fire superiority when the tactical situation warrants.

(d) When engaging enemy automatic weapons.

b. As was pointed out in the explanation of the importance of position stability, automatic fire will not be as accurate, per round fired, as semiautomatic fire. This decreased accuracy must be compensated for by the delivery of a heavy volume of fire. A heavy volume of fire is obtained in machinegun fire where ammunition is belt fed, necessitating no interruption of fire for reloading. With a magazine fed automatic rifle, however, volume of fire is governed by the automatic rifleman's ability to load and change magazines. Sustained automatic rifle fire is limited by the 20 round magazine. In order to obtain a heavy volume of fire the automatic rifleman must be able to change magazines in four to five seconds. This level of proficiency can be attained only through thorough and intense training in the fundamentals of automatic fire.

c. Automatic fire training develops proficiency in the rapid, systematic changing of magazines to insure that the firer can obtain maximum effectiveness from the automatic rifle.

(1) Magazine Handling.

(a) Two magazines are placed in each ammunition pouch with the open end down, the long edge to the rear. This will not only provide a systematic manner for removing the magazine, but also keeps the ammunition free from foreign matter, e.g., dirt, sand, snow, etc.

(b) To remove the magazine from the pouch, the firer grasps it with the thumb between the magazine and body, the remaining fingers on the outside of the magazine. As the magazine is withdrawn from the pouch, the arm is extended to the front while rotating the hand and magazine 180 degrees, causing the open end of the magazine to be up and in position for loading into the magazine feedwell.

(c) Right handed firers are taught to always use the magazines on the right of the body first, and not to use those on the left until both magazines from the right have been expended. In combat, when a lapse in a fire fight occurs, and loaded magazines remain in the left pouch, the right handed automatic rifleman should transfer these magazines to the right as he will be instinctively quicker when loading from the right.

(2) Magazine Changing.

(a) Right Side Load. When the magazine to be loaded is in the right pouch, the automatic rifleman uses his right hand to remove the empty magazine, secure the next magazine, load it into the weapon, and then to release the operating rod handle. At no time during the right hand load should the left hand have been taken from the weapon.

(b) Left Side Load. When the next magazine to be loaded is in the left pouch, the automatic rifleman uses his left hand to remove the empty magazine, secure and load the next magazine, and then to release the operating rod handle. When using the left hand the automatic rifleman must reach up and over the receiver to release the operating rod handle. At no time during the left hand load should the right hand have been taken from the weapon.

32. FIRE DISTRIBUTION.

a. Distributed fire is fire delivered in depth and width so that a linear, column, or area target is effectively covered, and can be contrasted with concentrated fire, which is fire directed at a point target. Rifle marksmanship training has taught the Soldier to think only in terms of concentrated fire, he must now be taught to apply the integrated act of shooting and positions to distribute, as well as to concentrate fire. This ability is essential, as the automatic rifle will frequently be employed to engage targets of width and depth with distributed fire. See FM 23-12, Technique of Fire of the Rifle Squad and Tactical Application, May 1963, for a detailed discussion of the application of both rifle and automatic rifle fire.

b. The object in fire distribution is to place as heavy a volume of fire as possible between the known or suspected flanks of a linear or area target. The automatic rifleman tries to cover with fire the area between the flanks of such targets. The flanks may not be easily discernible, depending on enemy use of cover and concealment. Therefore, the automatic rifleman must determine the approximate location of flanks of the target, and cover the area between with fire. It should be strongly emphasized, that the inability to see enemy personnel or positions should not be reason for not firing into an area if there is reason to suspect the presence of a target in the area to be covered. The foregoing skills of marksmanship are applied in distributing fire as follows:

(1) Fire Distribution from the Bipod Supported Positions. The key to effective fire distribution lies in the correct application of the eight steady hold factors and the use of correct body position. Body alignment, and the position of the shoulders and right elbow become a major concern in distributing fire. In attempting to deliver a heavy volume of fire, automatic riflemen will have the tendency to move only on the right elbow when making adjustments to the lay of the weapon. This causes the right shoulder to drop when distributing fire to the right; when distributing fire to the left the right shoulder becomes the only portion of the firer's body behind the weapon. Both will cause exceptionally erratic dispersion of fire. Where only small adjustments to the lay of the weapon are required, the automatic rifleman moves only his shoulders right or left, he must insure that the right elbow remains in place, and that the shoulders remain parallel to the ground. If the minor adjustment is not sufficient the automatic rifleman must relay his weapon by shifting his entire body so that the shoulders are level and correct body alignment is maintained, i.e., body aligned so that an imaginary straight line passes through the barrel and receiver, over the right shoulder, and through the right buttock.

(2) Fire Distribution from the Unsupported Positions (Without use of Bipod). Distributed semiautomatic fire from the unsupported positions is delivered in the same manner as fire distributed with the rifle, i.e., each shot is aimed at a specific point.

(3) Fire distribution from the underarm and sling supported hip firing positions. Fire can be distributed in approximately 180 degrees. The automatic rifleman does this by pivoting on the ball of the lead foot.

(4) Automatic Fire and Fire Distribution Exercise. A timed dry firing exercise is used to develop proficiency in rapid magazine changing, aiming, and shifting fire. The exercise is performed from the prone or foxhole position within a time limit of 1 minute.

(a) Before beginning the exercise, the coach will insure that the firer has 5 magazines of 2 dummy rounds each. The firer places 2 magazines in each ammunition pouch, keeping one in his hand to load on command.

(b) The coach assumes a position on the right of the firer and raises his hand to indicate that both he and the firer are ready to commence the exercise.

(c) The commands are: ALONG THE FIRING LINE, LOCK ONE MAGAZINE OF 2 DUMMY ROUNDS, LOAD. LINEAR TARGET IN 1 MINUTE. READY ON THE RIGHT? READY ON THE LEFT? READY ON THE FIRING LINE, COMMENCE FIRING! CEASE--FIRING! CLEAR ALL WEAPONS. (See Figure 9 for target used to conduct this exercise.)

(d) Upon receiving the initial command, the firer loads his weapon and assumes the correct grip. The coach positions the palm of his right hand 2 or 3 inches in front of the operating rod handle. On the command READY ON THE FIRING LINE, the firer unlocks his weapon and aims the lower left target. On the command COMMENCE FIRING he presses the trigger, simulating firing a burst of 2 to 3 rounds. The coach, hearing the hammer fall, strikes the operating rod handle to the rear with sufficient force to eject a dummy round. The firer re-aims and again presses the trigger. The coach strikes the operating rod handle, driving it all the way to the rear. The automatic rifleman must now change magazines using the procedures outlined in paragraph 31c. He repeats this procedure until he has simulated firing one magazine at each target or until given the command to cease fire.

(e) During initial phases of training, the speed with which the firer performs these actions should not be a major concern. It is essential that he conduct slow methodical practical work in loading and changing magazines before he tries for speed. Emphasis should be placed on complete understanding and application of the fundamentals. The automatic rifleman is then taught to combine the acts of magazine handling and loading to develop speed.

33. THE REAR SIGHT, BATTLESIGHT ZERO, AND SIGHT ADJUSTMENT.

a. The Rear Sight. The automatic rifleman must have a thorough knowledge of the nomenclature, operation, and procedure for calibrating the rear sight of the M14A2. This material is first presented to the soldier in rifle marksmanship training; however, a review in automatic rifle preparatory marksmanship training is essential to insure a high level of understanding. The individual instructor must ascertain the level of proficiency of his class to determine the amount of time that need be allocated to this subject. See FM 23-71 for details.

b. Battlesight Zero. The 250 meter battlesight zero is used with the automatic rifle (M14E2) to engage targets out to a range of 460 meters in the same manner as used with the rifle. The soldier has received instruction on (1) the principle, (2) the method of determining, and (3) the use of the battlesight zero in rifle marksmanship training; however, a review will be necessary to insure a high level of proficiency. See FM 23-71 for details.

c. Sight Adjustment.

(1) The M2 Bipod provides the M14A2 with greater stability than can be attained with the M14 rifle. Consequently, the capability of the M14A2 for accuracy at longer ranges (460 to 700 meters) is increased. The maximum effective range of the M14A2 is 700 meters when employed in the semiautomatic role. As the 250 meter battlesight zero is effective only out to a range of 460 meters, it is necessary to have a method of rapid sight adjustment to effectively engage targets between 460 and 700 meters.

(2) Sight adjustment for engaging targets between 460 to 700 meters is accomplished in the following manner:

(a) The 250 meter battlesight zero must have been determined and calibrated on the rear sight.

(b) The automatic rifleman determines the range to his target (in meters).

(c) The determined range is placed on the rear sight by aligning the appropriate range line on the elevation knob with the index line on the receiver. For example: If it is determined that the range to the target is 600 meters, align the "6" (600 meter) line on the elevation knob with the index line on the receiver. (See Figure 6) This method should enable the firer to hit close enough to the target to obtain kills through use of the adjusted aiming point method. For a detailed discussion of the technique of the adjusted aiming point see FM 23-71.

(3) This method of sight adjustment is highly accurate when used in conjunction with the adjusted aiming point method.

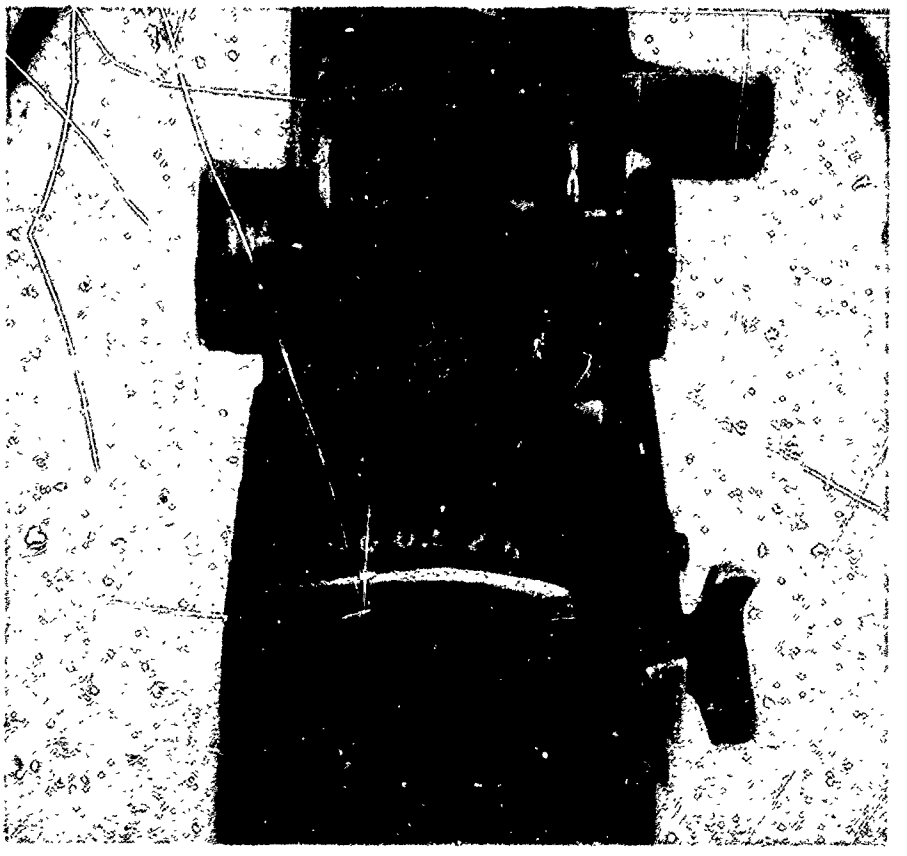


Figure 6. Sight Adjustment for Target at 600 Meters.

(4) Assuming the tactical situation indicates the necessity of placing the enemy under more than harassing fire, and time permits, the automatic rifleman must have a method for attaining greater accuracy than is possible by the method discussed above. This can be accomplished by the firer making a bold sight adjustment in the necessary direction(s) and firing another shot. Should the firer find that he is now hitting close enough to the target to effectively use the adjusted aiming point method, no further adjustment is necessary. Remember that at 600 meters, 20 clicks of elevation - a "bold" adjustment - will move the strike of the bullet slightly over eight feet. This may well place the fire in the desired proximity of the target. Whether the "bold" adjustment was, in fact, 20 clicks, 18 clicks, or 25 clicks is unimportant (placing the strike of the bullet 7.5, 8.3, and 10.5 feet respectively from the point of impact of the initial shot). Regardless of the actual change in sight setting, the degree of adjustment of aiming point will be less on subsequent rounds fired; thereby permitting more effective (accurate) fire. The application of this technique of sight adjustment is not unlike the adjustment of mortar or artillery fire by the bracketing method. In this case the closer to the target the firer can bring his fire the more effective will be his adjustment of aiming point. Time and the tactical situation will determine the number of such sight adjustments that can be made.

(5) A supplemental technique to the use of this method of sight adjustment may be used within the squad to assist the automatic rifleman in obtaining even greater effectiveness in long range fires (beyond 460 meters). This is a technique frequently used in automatic rifle match competition, where one of the two members of the automatic rifle team adjusts the fire of the other member by giving him oral commands as to the direction in which the firer must adjust his aiming point for hits on target. This adjustment may be made with the naked eye by observing from the rear and directly above the firer; however, the use of the binoculars will be necessary for personnel with limited experience. This method can be used within the rifle squad when employed in a fire support role, or when delivering long range defensive fires. A member of the fire team can be assigned the duty of assisting the automatic rifleman adjust his fire. This need not conflict with his primary duties, as targets beyond 460 meters are beyond the maximum effective range of all other weapons organic to the Infantry and Airborne Rifle Squads, (except the M60 Machinegun in the Mechanized Infantry Rifle Squad). By observing the strike of the rounds, or the flight of tracers, the individual orally commands the firer to "aim a little higher", "slightly to the left," "low and right", etc. The use of this technique will greatly increase the effectiveness of the automatic rifleman's long range fires by permitting him to concentrate solely on aiming, the steady hold factors, position, and speed of magazine changes.

34. ORGANIZATION FOR TRAINING.

a. The fundamentals of automatic rifle marksmanship have been organized into a logical sequence. The first three fundamentals should be presented in prescribed sequence. As such, they do not lend themselves to presentation concurrently; however, the latter two may be taught concurrently in the county fair system. The automatic rifleman is first taught the Integrated Act of Automatic Rifle Shooting. Throughout instruction on the second fundamental personnel must be closely supervised to insure they are using the principles of the Integrated Act. Position training is followed by Automatic Fire training. Fire Distribution and the Rear Sight, Battlesight Zero and Sight Adjustment, can be presented concurrently if it is desired to break the class down into smaller units for more informal instruction and closer supervision. Regardless of how the final two fundamentals are presented, emphasis again will be placed on the application of the first three throughout this instruction.

b. Preparatory marksmanship training is conducted on a 25 meter range.

c. The instructor in charge of preparatory marksmanship training must check to insure that the following have been accomplished prior to the scheduled class:

(1) Range clearance from proper authorities for all periods on a 25 meter range.

(2) Ammunition requested for all instructional and record firing.

(3) Arrange for adequate sound equipment for size of area.

(4) Arrange for support personnel, i.e., assistant instructors, ammunition detail, and pit detail for transition (field) firing if manually operated targets are used.

(5) Insure training aids are available, to include: dummy rounds, scorecards and targets.

(6) Insure pertinent range and safety regulations are available.

(7) Arrange for medical aid personnel for live firing.

(8) Assign instruction on each fundamental to competent personnel, and insure recommended references are available.

35. 25 METER FIRING. This course of fire is designed to accomplish the following training objectives:

a. To familiarize the new firer with the M14A2 employed in the automatic role.

b. To provide a live fire review of the techniques of aiming learned in rifle marksmanship training.

c. To familiarize the firer with the trigger control required to obtain a burst of two to three rounds.

d. To further develop skill in rapid magazine changing in a live fire environment.

e. To develop skill in distribution of fire over a linear target.

f. To detect errors in the application of the fundamentals of automatic rifle marksmanship through shot group analysis.

g. To determine the battlesight zero to be used throughout the remainder of the automatic rifle marksmanship training program.

36. COURSE OF FIRE.

a. The 25 meter (1000") course of fire consists of firing a total of 236 rounds: 36 rounds are fired semiautomatically from the four basic unsupported positions, 148 rounds are fired automatically from the bipod supported positions, 40 rounds are fired automatically from both the sling supported hip position and the unsupported underarm position, and 12 rounds are fired semiautomatically to establish the 250 meter zero. The target for Periods 1 and 2 consists of four 25 meter targets mounted on an "E" type silhouette target (see figure 7.1). The target for Period 3 consists of five 25 meter targets mounted on an "E" type silhouette target (see figure 8-B).

(1) Period Number 1. A practical exercise is conducted in the correct application of the integrated act of automatic rifle shooting (aiming and steady hold) by firing the automatic

rifle in the semiautomatic role from the squatting, kneeling, kneeling supported (without use of the bipod), and standing positions. The trainee fires three 3 round shot groups (9 rounds) semiautomatically from each of the four unsupported positions. Each exercise is fired at one of four 25 meter targets affixed to an "E" silhouette (see figure 7. 1).

(2) Period Number 2.

(a) Exercise Number 1: a practical exercise is conducted in the correct application of the integrated act of automatic rifle shooting (aiming and steady hold) by firing automatically from the bipod supported foxhole position. Four magazines of six rounds (24 rounds) are fired automatically in bursts of two to three rounds from each of the bipod supported positions, the prone and the foxhole (total of 48 rounds). Each magazine of six rounds is fired at one of the four 25 meter targets.

(b) Exercise Number 2. Two magazines of ten rounds are fired automatically in bursts of two to three rounds from both the sling supported hip position and the unsupported underarm position (total of 40 rounds). This exercise is fired at an "E ' silhouette target at a range of 25 meters. This exercise is only to acquaint the trainee with firing from these positions.

(3) Period Number 3. A practical exercise is conducted in live fire magazine changing and fire distribution exercises from the bipod supported prone and bipod supported foxhole positions. Five magazines of 6 rounds each (consisting of 5 rounds ball and 1 dummy round) are required for this exercise. Each firer is required to fire automatically in bursts of two to three rounds at five 25 meter targets affixed to an "E" silhouette target (see fig. 7.2). This is a timed exercise to develop proficiency in magazine changing, fire distribution, and the application of immediate action. Emphasis throughout this exercise will be to further develop proficiency in the integrated act of automatic rifle shooting. Seventy seconds are allowed to fire all five magazines, one magazine at each of the five targets. Dummy rounds will be loaded at random in each magazine to require the firer to apply immediate action once while firing each magazine. This exercise is fired twice from the bipod supported prone and twice from the bipod supported foxhole position.

(4) Period Number 4. This exercise consists of firing twelve rounds semiautomatically for 4, three round shot groups at 4 twenty-five meter targets affixed to an "E" silhouette target. This exercise is to establish the 250 meter battlesight zero to be used during transition firing. The 250 meter battlesight zero is determined by firing a series of three round shot groups from the bipod supported prone position. The firer aims at the distinct aiming point at the bottom center of the black rectangle and adjusts his rear sight until the center of his shot group is located 4. 6 cm directly above the aiming point (the "X" on the 25 meter target).

(5) Use of Shotgroup Template. Upon completion of each exercise outlined above, the shot groups from each position will be measured by the shot group template (see figure 7. 3).

(a) Period 1: For this exercise each three round shot group is measured with the shot group template, circle I. The third 3-round shot group from each position must be within the 5 cm circle (circle I) on the template.

(b) Period 2: For exercise 1 each six round shot group fired from each of the positions will be measured by the shot group template, circle II. Two shot groups (six rounds each) from each of these positions must be within the 14. 5 cm circle (circle II) on the template. The shot group template is not used for exercise number 2.

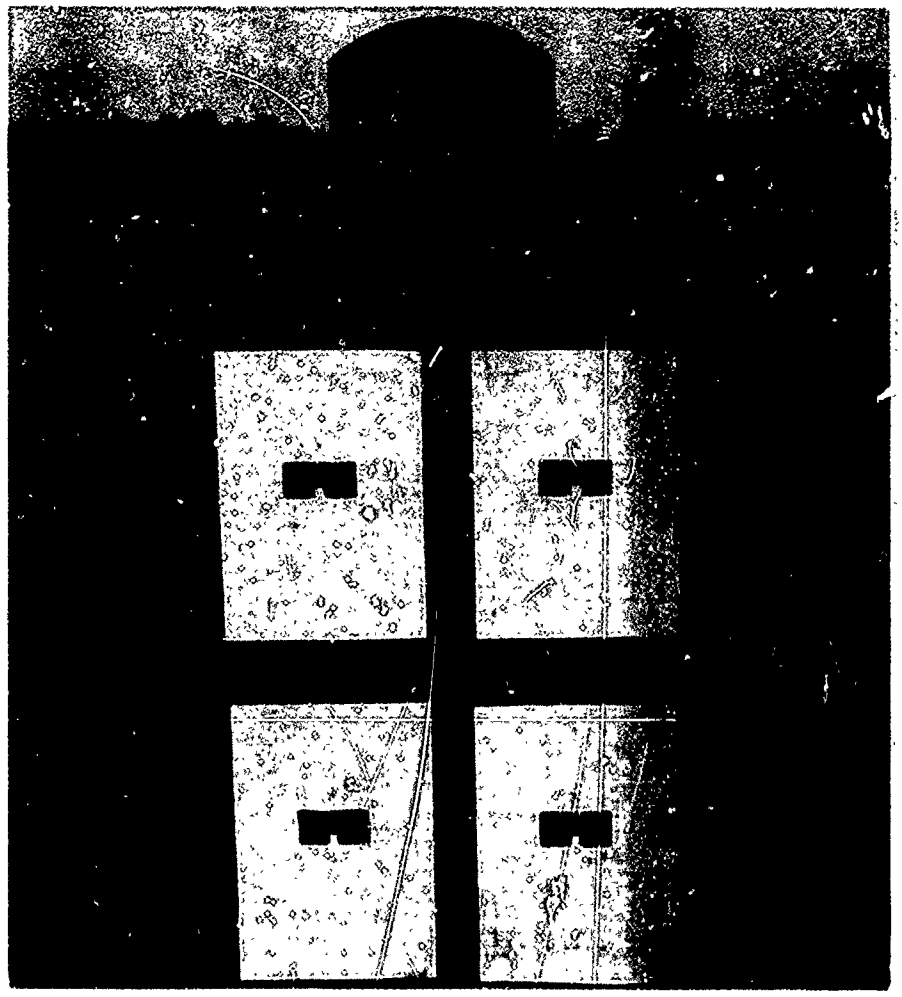


Figure 7.1. Target for Periods 1 and 2 of 25 Meter Firing.

(c) Period 3: For this exercise each five round shot group on each of the five targets will be measured by the shot group template, circle II. The last exercise fired from each position (total of 25 rounds on 5 targets) must have eighty percent hits (20 rounds) within circle II, on the template.

(d) Period 4: The shot groups for this exercise are not measured.

b. Instructional and Qualification Transition Firing. Until MG/AR transition range facilities can be constructed for firing the standard automatic rifle transition course, units are authorized to fire either the interim automatic rifle transition course or the alternate automatic rifle transition course as outlined in FM 23-16, Automatic Rifle Marksmanship.

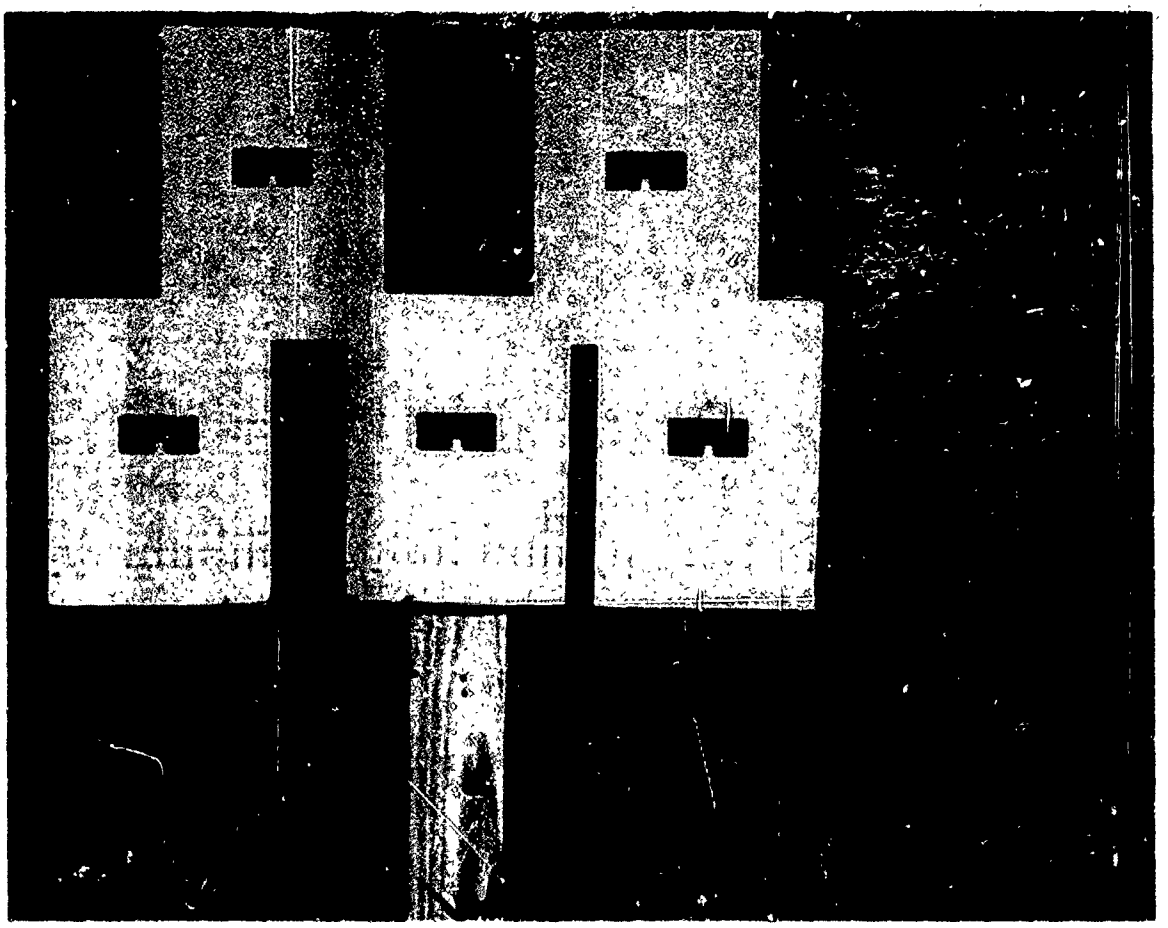


Figure 7.2. Target for Period 3 of 25 Meter Firing.

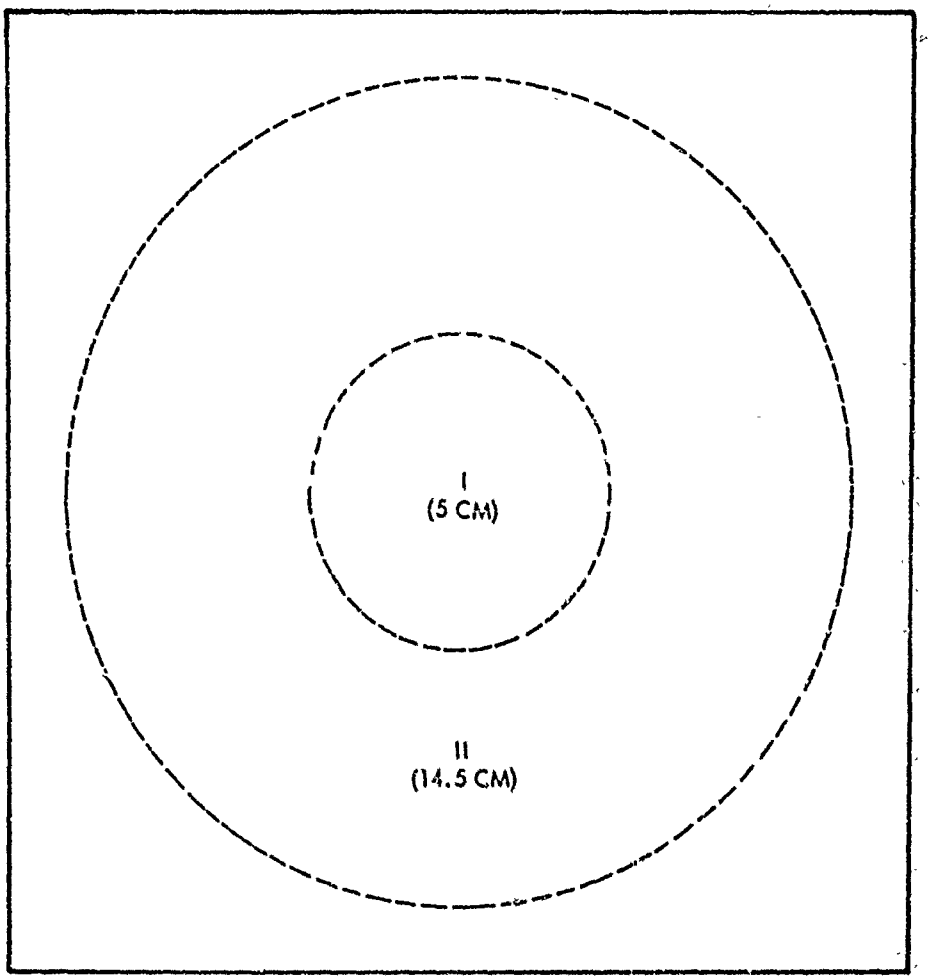


Figure 7.3. Automatic Rifle Shot Group Template.

Section VII. RIFLE, 5.56MM, XM16E1

37. WEAPON CHARACTERISTICS AND DISASSEMBLY.

a. General. One of the more recent additions to the US Army's arsenal of small arms is the Rifle, 5.56mm, XM16E1. This rifle was developed by the Armalite Division of Fairchild Stratos Corporation in 1957, at the request of the US Continental Army Command. The rifle (then known as the AR 15) was tested extensively in 1957 and the decision was made that it did not meet the criteria required of a new rifle. In 1962 the Department of the Army directed that the AR 15 be re-evaluated in light of certain new rifle characteristics being sought; specifically, a rifle that was easier to handle in jungle or heavily vegetated terrain and, of a lighter weight, which could be used by new units, such as Air Assault Divisions, in which weight is a critical factor. The AR 15 was re-evaluated by the United States Army Infantry Board at Fort Benning and, based on the findings, of this re-evaluation, approximately 85,000 of these rifles were purchased. With several modifications, the AR 15 was standardized for the Army as the XM16E1. These modifications include: a wider charging handle, a forward assist assembly, index lines on the rear sight, rifling of one turn per 12 inches, and a black stock, pistolgrip, and handguard.

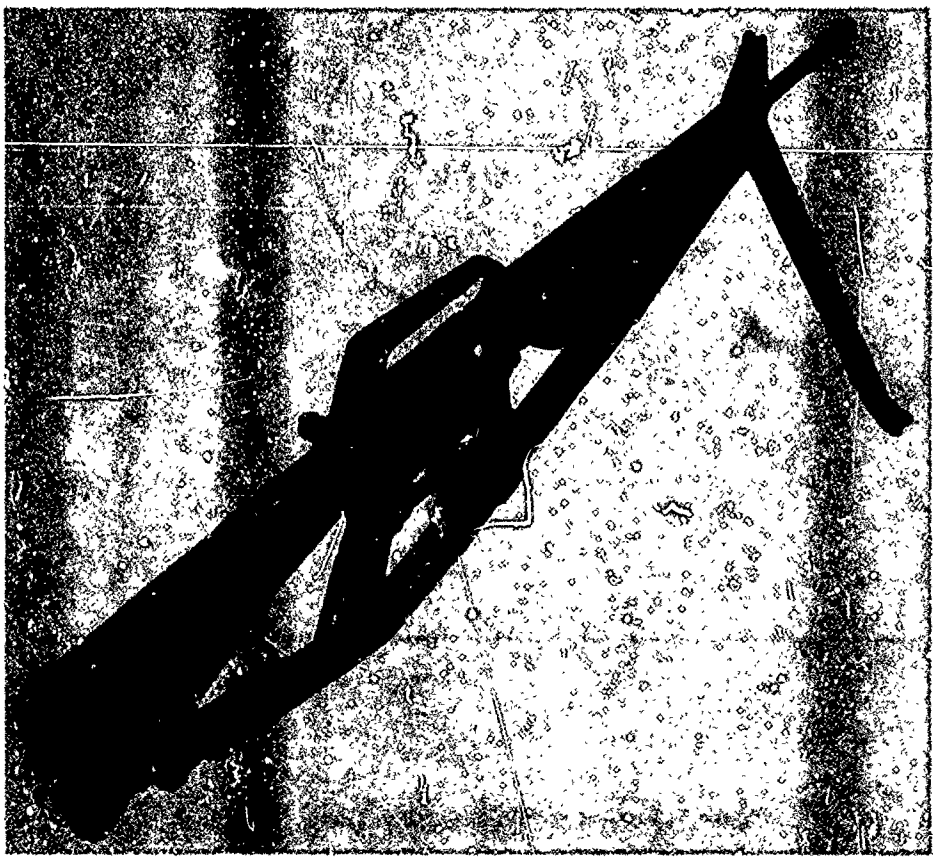


Figure 8. XM16E1 with Bipod Mount.

b. Characteristics.

(1) Gas-operated.

(2) Air-cooled.

(3) Magazine fed (20 rd box type magazine).

(4) In-line stock.

(5) Semi-automatic and automatic capability.

(a) Cyclic rate of fire	700-800 rd per min
(b) Maximum effective rate of fire (auto)	150-200 rd per min
(c) Maximum effective rate of fire (semi)	45-65 rd per min
(d) Sustained rate of fire	12-15 rd per min
(6) Maximum range	2,653 meters
(7) Maximum effective range	460 meters
(8) Muzzle velocity	3,250 f.p.s. (approx)
(9) Muzzle energy (at the muzzle)	1,300 ft lb (approx)
(10) Mechanical features:	
(a) Rifling	Six grooves, one turn per 12 inches
(b) Sight Radius	19.75 inches
(c) Trigger pull	8.5 lb maximum 5.0 lb minimum
(d) Sights	Rear sight adjustable for windage only Two apertures: short range 0-300 meters long range 300-500 meters Front sight adjustable for elevation One click of windage or elevation moves the strike of the bullet 2.8 cm at 100 meters
(11) Combat weight (with sling and full mag)	7.6 lb

(12) Special Features:

(a) Light weight aluminum bipod; quickly attached or detached.

(b) Trigger guard rotates down to facilitate firing with mittens.

(c) Dust cover over ejection opening (opens with movement of bolt).

(d) Forward assist assembly.

(13) Ammunition:

(a) Projectile: 5.56mm, 55 grain, full jacketed, steel core, boat-tailed.

(b) Tracer and blank ammunition currently under development.

(c) No armor piercing ammunition planned.

c. Disassembly and Maintenance.

(1) To disassemble the XM16E1 for normal care and cleaning:

(a) Disengage the take-down pin from the left of the receiver.

(b) Separate the upper receiver from the lower receiver in a manner similar to breaking open a single shot shotgun.

(c) Pull the charging handle to the rear and remove the bolt carrier group, and the charging handle will drop freely from the upper receiver.

(d) Pull the bolt forward into the unlocked position and remove the firing pin retaining pin; the firing pin will now drop freely from the bolt carrier group.

(e) Turn the bolt cam pin 90 degrees and remove from the bolt; the bolt can now be removed from the bolt carrier. This completes the field stripping of the XM16E1.

(2) The soldier should follow all directions for cleaning the XM16E1 previously outlined for cleaning the M14 Rifle (Section III). In addition and of particular importance, the face of the bolt should be brushed with the wire brush, paying close attention to the area behind the rings and under the face of the extractor. No attempt should be made to remove discoloration caused by heat.

38. XM16E1 MARKSMANSHIP TRAINING.

a. General. As the XM16E1 has both a semi-automatic and automatic capability, it is necessary to insure that personnel armed with this rifle have a high level of proficiency in employing the weapon in both roles. Marksmanship training is conducted in two phases: the semi-automatic phase, and the automatic phase. As with other small arms, marksmanship training consists of preparatory marksmanship training, and range firing.

b. Semi-automatic Marksmanship Training. Preparatory Rifle marksmanship training and range firing are conducted in accordance with the US Army Rifle Marksmanship Program as outlined in Section IV, with the following exceptions:

(1) Preparatory Marksmanship Training. Two elements of the Integrated Act of Shooting, Battlesight Zeroing, and Sight Adjustment, must be changed as follows:

(a) The Grip of the Right Hand. The configuration of the XM16E1 will require the firer to grasp the pistol grip with the right hand, forefinger on the trigger, and thumb and remaining fingers wrapped around the pistol grip. The thumb should not be placed over the small of the stock as in firing the M14. The firer will exert a firm pressure directly to the rear with the right hand.

(b) The Stock Weld. A stock weld is used in firing the XM16E1 because of the position of the right thumb around the pistol grip. It is particularly important that the firer place his cheek against the stock at the same point each time he fires to insure the same sight picture is obtained.

(c) Battlesight Zero. To obtain a 250 meter battlesight zero the sights must be adjusted so that the center of the shot group at 25 meters will be 2.4 cm below the point of aim.

(d) Sight Adjustment.

1. The sights on the XM16E1 are adjustable for both elevation and windage. Windage adjustments are made on the rear sight; elevation adjustments on the front sight.

2. The rear sight consists of two apertures, a windage drum, and a spring loaded stud. The aperture marked "L" is used to engage targets at ranges from 300 to 500 meters; the unmarked aperture for targets between 0 and 300 meters. (see Figure 9). Windage adjustments are made by pressing in on the spring loaded stud with a pointed object and rotating the windage drum in the direction desired to move the strike of the bullet. A clockwise movement moves the strike of the bullet to the right 2.8 cm per each 100 meters of range (.7 cm at 25 meters).

3. The front sight consists of a sight post and a spring loaded stud. The spring loaded stud must be depressed with a pointed object to allow the sight post to be rotated in the desired direction to raise or lower the strike of the bullet on the target. Moving the sight post in the direction of the arrow marked "UP" will raise the strike of the bullet. (see Figure 9). Each click the post is rotated moves the strike of the bullet 2.8 cm per 100 meters of range (.7 cm at 25 meters).

(2) Range Firing. It is necessary to place two "E" silhouette targets (thickness) in each M31 (M31A1) Target Holding Device used on the Field Firing and Record Ranges. This is necessary as it has been found that, due to its high velocity, the 5.56mm round will not consistently "kill" a single (thickness) target.

c. Automatic Fire Marksmanship Training. Preparatory automatic rifle marksmanship training and range firing is conducted in accordance with the US Army Automatic Rifle Program as outlined in Section IV with the following exceptions:

(1) Preparatory Marksmanship Training. The XM16E1 can be fired automatically from any of the eight firing positions outlined in Section IV. For minimum dispersion of automatic fire from the prone or foxhole positions the bipod should be used where the tactical situation permits. When firing from the bipod, the following changes in Steady Hold Factors, Positions, and Automatic Fire techniques will be required:

(a) The Grip of the Left Hand. The fingers of the left hand are wrapped around the front of the magazine feedwell with the thumb inside the trigger guard. The firer will exert a strong pressure directly to the rear with the left hand. All of the other steady hold factors outlined in Section IV will apply without change when delivering automatic fire.

(b) Body Alignment. When firing from the prone position the body will be aligned as when firing the rifle in the semi-automatic role, i.e., the body should be aligned at approximately a 45-degree angle to the line of sight.

(c) The Underarm Firing Position. This position may be used to deliver assault fire or when it is desirable to fire while moving; however, it should be strongly emphasized that the most effective fire can be delivered from the shoulder.

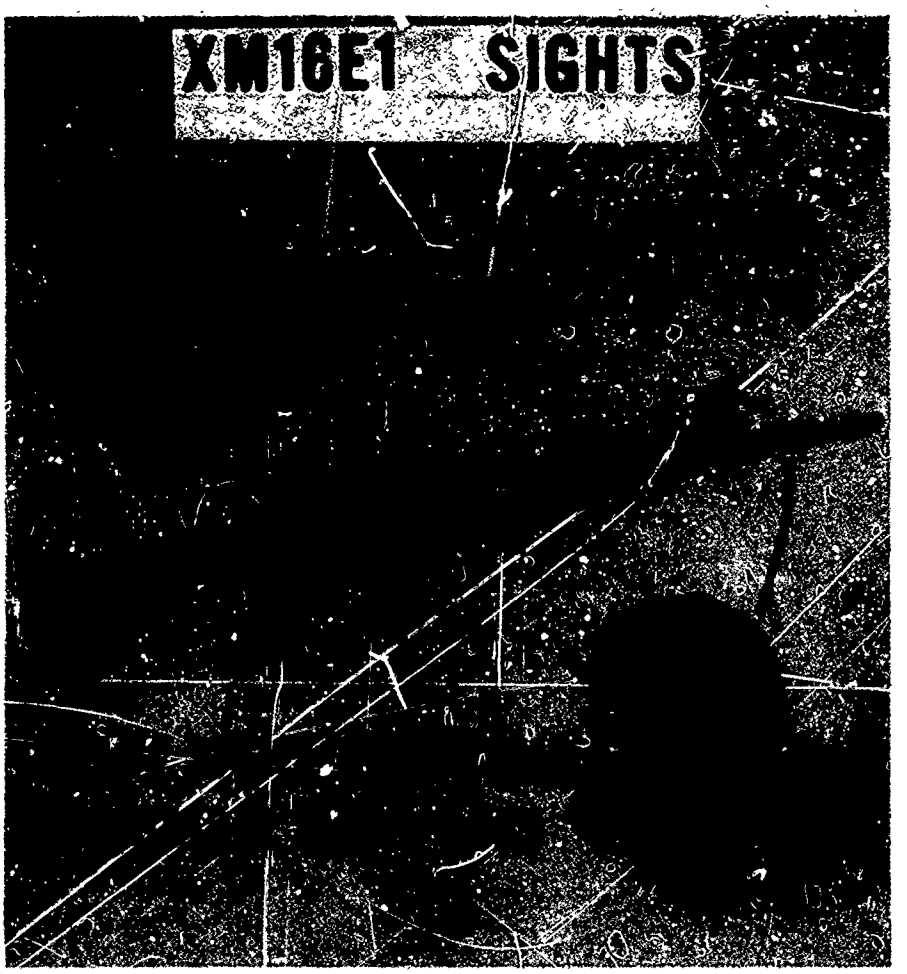


Figure 9. XM16E1 Sights.

(d) Automatic Fire. Except at close ranges (50-75 meters), maximum effectiveness of fire against point targets is normally obtained by employing the XM16E1 in the semi-automatic role. Except where enfilade fire is being delivered, maximum coverage of an area target is obtained by delivering automatic fire in burst of two to three rounds; for enfilade fire longer bursts (3-5 rounds) are generally more effective. The volume of fire delivered will depend to a great degree on the firer's ability to rapidly change magazines. Techniques of automatic fire as outlined in Section VI will pertain when firing the XM16E1 with the following exceptions:

(e) Magazine Changing.

1. Magazines should be placed in the ammunition pouch with the open end down and the short (or front) edge toward the body. Three magazines can be placed in each standard ammunition pouch in this manner. To remove the magazine from the pouch, the palm is placed over the

extended end of the magazine; as the magazine is withdrawn from the pouch the arm is extended to the front; the hand and magazine are then rotated 180 degrees causing the open end of the magazine to be up.

2. To remove an empty magazine, the right handed firer presses the magazine release with the forefinger, allowing the magazine to drop freely from the magazine feedwell. The left handed firer should release the magazine by pressing the magazine release with the thumb of the right hand.

(2) Range Firing. No modification is required to the courses of fire or range facilities for the automatic fire range firing outlined in Section VI, except as noted in paragraph b above.

CHAPTER 2

SPECIAL PURPOSE WEAPONS

In many instances, the organic weapons available to the Infantryman are not sufficient to dislodge or destroy a determined enemy force. In such instances, the soldier must rely on the many special purpose weapons found in our arsenal of small arms. This chapter discusses the weapons presently available to you, the Infantry leader, which will aid you in accomplishing your mission.

Section I. HAND GRENADES

39. GENERAL

a. When the Infantryman meets the enemy face-to-face in personal combat, a weapon is needed to drive the enemy from his bunker or position. The hand grenade is just such a weapon. Hand grenades have been used since the earliest days of organized warfare; but, hand grenades, as we know them today, are a recent development.

b. All present standard hand grenades share three common characteristics: short range, small effective casualty radius, and delay action of the fuze. Hand grenades are used for casualty-producing, screening, signalling, incendiary and riot control (see figure 10).

40. COMPONENTS.

a. Body. The body is constructed from any material capable of holding the filler. It gives the grenade its shape.

b. Filler. The filler is the explosive or chemical contained within the body. It gives the grenade its characteristics and determines its mission.

c. Fuze Assembly. The fuze assembly is the heart of the grenade. The fuze is a device which through a mechanical and chemical action causes the grenade to function. The fuze assembly consists of the safety lever, safety pin and safety pin pull ring, fuze body, striker, striker arm and spring, primer, delay element and the detonator or igniter.

(1) A detonator is used with high explosive fillers and bursting type chemical grenades.

(2) An igniter is used with burning type chemical grenades and with practice grenades.

(3) Ordnance hand grenades and bursting type chemical grenades have an average time delay element of 4.5 seconds. All burning type chemical grenades have an average time delay element of 2.0 seconds.

41. TRAINING TIPS.

a. The criteria for hand grenade training is distance and accuracy. Three out of every four hours of grenade training must be devoted to throwing practice.

(1) The method or position used to throw the hand grenade is relatively unimportant; however, the grenadier must follow through. The situation and terrain will dictate the position used. The positions described in FM 23-30 w/C2 must be used during training for control purposes.

(2) The method of gripping the grenade is very important. There is only one way to grip the grenade correctly. The body of the grenade is held firmly by the fingers and the safety lever is held down by the thumb between the first and second joints.

b. The hand grenade training course provides a means to develop distance and accuracy in throwing.

c. The hand grenade assault course adds realism to training and teaches the use of cover and concealment, while continuing to develop distance and accuracy.

d. Live hand grenades may be thrown only under supervision of a safety officer. Safety precautions must be observed when handling any hand grenade. Proper range management is necessary to insure safety and effective instruction.

42. CONCLUSION.

The Infantryman can use hand grenades against a wide variety of targets, and in many situations (enemy personnel pillboxes, armored vehicles, gun positions and many other targets). They are particularly useful at night since the grenadier can throw them without disclosing his position. The Infantryman can rely upon the hand grenade, his own "pocket artillery".

Grenade	Body	Filler	Fuse	Delay (seconds)	Color and Markings	Weight of complete grenade (ounces)	Range (average throwing distance) (meters)	Use	Effective Casualty Radius (meters)
Grenade, hand fragmentation, M26A2	Sheet metal	Composition B (5.5 ounces)	Detonating M204A2	3 to 5 (Avg 4.5)	Olive drab, yellow markings	16	40	Casualty	15
Grenade, hand smoke, WP M14	Cast iron, serrated tapered bottom	White Phosphorous (15 oz)	Detonating M206A2	4.5	Light green body w/light red markings WP smoke 1 band (yellow)	27.2	35	Casualty, Screening, Signaling, Incendiary	25
Grenade, hand smoke, HC, AN-M8; Grenade, hand smoke, colored M18 red, yellow, green, violet	28 gauge rolled steel cylindrical	19 oz HC mixture 11.3 oz colored smoke mix	Igniting M201A1	2	Light green body, smoke HC, smoke red, etc.	25.5 HC 19 color	25 HC 30 Color	Screening-Signaling HC Signaling-colored	Burning time - HC 105-150 sec Colored - 50-90 sec
Grenade, hand irritant, CN M7A1	28 gauge rolled steel cylindrical	CN mixture (12.5oz)	Igniting M201A1	2	Gray body, CN irritant, 1 band (markings in red)	19	35	Riot control, training	Burning time - 20-40 sec Effects: burning of the eyes and tears
Grenade, hand irritant, CN-DM M6A3	28 gauge rolled steel, cylindrical	CN (5 oz) DM (4 1/2 oz)	Igniting M201A1	2	Gray body, CN-DM irritant, 1 band (markings in red)	17	35	Riot control training (fatal in high concentrations in inclosed areas)	Burning time - 20-30 sec Effects: burning of eyes, tears nausea, vomiting.
Grenade, hand irritant, CS M7A1	28 gauge rolled steel cylindrical	CS mixture (3 1/2 oz)	Igniting M201A1	2	Gray body, CS irritant, 1 band (markings in red)	14.5	35	Riot control, training	Burning time - 18-35 sec. Effects: burning of eyes, tears, nausea, vomiting, burning of moist areas of skin, nasal drip, coughing, tightness of chest, involuntary closing of eyes
Grenade, hand incendiary, AN-M14	23 gauge rolled steel cylindrical	Thermate (TH3) (26.5 oz)	Igniting M201A1	2	Light red body, TH incendiary, Black markings (No Band)	32	25	Incendiary	Burning time - 30-45 sec at 3,706° Burn through 1.5cm of homogeneous steel

Figure 10. Summary of Hand Grenades.

Section II. RIFLE GRENADES

43. GENERAL.

a. Today's versatile Infantryman must possess the capability of damaging or destroying the heaviest known armor in the world today, killing or wounding enemy personnel, signaling, screening, and accomplishing incendiary missions. An effective weapon of this nature available to every Infantryman is the rifle grenade (see Figure 11).

b. To fire a rifle grenade, three accessories are used: a grenade launcher, a grenade sight and a special grenade cartridge. The accessories used with the M14 rifle to fire rifle grenades are: M76 grenade launcher; M15 grenade sight and M64 special grenade cartridge.

44. RIFLE GRENADE LAUNCHER, M76.

a. The standard rifle grenade launcher has these characteristics:

(1) Sufficient length to accommodate the present standard rifle grenades which have long stabilizer tubes.

(2) A clip type retainer spring to position and hold the rifle grenade at the desired position on the grenade launcher.

(3) Annular grooves numbered from #6 to #4a. When used for high angle direct fire, (sight setting from 26-60 degrees) range of the rifle grenade is determined by the location of the grenade in respect to the numbered grooves on the launcher and angle (in degrees) at which the rifle is held. A rifle grenade placed on position #6 will travel the minimum distance, while a grenade placed on position #4A will travel the maximum distance. For direct fire (sight setting from 0-25 degrees), the rifle grenade is always placed as far on the launcher as it will go.

(4) This launcher has a clip latch which fits onto the bayonet stud of the rifle, holding the grenade launcher to the rifle.

b. Ball ammunition can be fired from the M14 rifle without removing the grenade launcher.

c. With the M14 rifle, rifle grenades must only be fired after the spindle valve has been closed. If ball ammunition is fired from the M14 rifle with the spindle valve closed, the rifle will fire "single shot", and must be manually operated. For normal operation of the rifle, open the spindle valve.

d. The grenade launcher on the muzzle of a rifle will change the zero of the rifle slightly; therefore, the rifleman should have a zero for both conditions.

45. GRENADE SIGHT, M15.

a. Accurate firing of rifle grenades is accomplished by using the M15 sight attached to the left side of the rifle stock, and zeroed to the weapon. The sight pivots on a mounting plate which is permanently mounted by Ordnance on the left side of the rifle stock. The mounting plate is graduated counterclockwise from 0-60 degrees in five degree increments, numbered every ten degrees.

b. The M15 grenade sight, composed of a bar with a front sight post and a rear sight aperture and elevating screw, is used for direct fire from the shoulder. A leveling bubble is used for high angle direct fire. Since the sight is mounted on the left side of the rifle, direct fire must be done from the right shoulder.

c. High angle direct fire can be accomplished without the use of the M15 grenade sight; however, the sling must be marked at the critical degree markings (30°, 45°, 60°) and the position of the sling keeper.

46. SPECIAL GRENADE CARTRIDGE, M64.

a. The force used to propel the rifle grenade from the launcher is furnished by a special grenade cartridge. The M64 cartridge is used with the M14 rifle.

b. There is no substitute for this cartridge. It is easily identified by the five pointed star crimped end. The auxiliary cartridge, M7, formerly used as a grenade booster, is no longer used.

47. SPEED LEAD FORMULA.

a. In order to hit a moving target with direct fire, the target must be led. The amount of lead necessary is determined by the speed of the target and direction of movement.

b. A tank moving across the front, at a speed of 15 mph, range 50 meters, would require one speed lead (a length of the tank) from the center of mass. A tank moving across the front at a speed of 7 1/2 mph would require half of a speed lead (half the length of the tank) from the center of mass, thus the point of aim would be on the forward edge of the tank.

c. For antitank fire, the point of aim should be at the center of mass of the target. Leads must always be computed from the center of mass, thus allowing the maximum margin for error while still obtaining a hit.

48. POSITIONS. Correct positions, sight alinement, and trigger control are as important when firing rifle grenades as when firing conventional ammunition. When firing direct fire, the standing and kneeling positions are used. The kneeling and modified sitting positions are used when firing high angle direct fire.

49. RANGE TABLES. The number of degrees placed on the M15 grenade sight is determined by a range table card which is found in FM 23-30 w/C2 (Grenades and Pyrotechnics).

50. CONCLUSION. The rifle grenade is easy to use, dependable, and it provides the rifle squad with close-in antitank protection.

GRENADE	TYPE OR FILLER	FUZE	COLOR AND MARKINGS	CM LGTH	CM DIA	(OZ) WGT	USE	CAPABILITY
Gren, rifle, prac, M11A4	Inert (Limited Standard)	None	Blk, white mark	28	3.5	16	Prac, direct, high angle direct fire	
Gren, rifle, prac, M31	Inert	None	Blue, white mark	43	6.6	24	Prac, direct fire	
Gren, rifle HEAT, M31	Comp B (10 oz) shaped charge	Point initiating base detonating	OD, yellow mark	43	6.6	24	Destroys tanks and concrete fortifications	Over 25 cm of armor plate or 50 cm of reinforced concrete
Gren, rifle, WP, M19A1	WP (8 1/2 oz)	Impact detonating	Light green, with light red markings 1 yellow band	28	5	24	Casualty, incendiary screening, signaling	Casualty radius, 10 meters
Smoke streamers, gren, rifle, M23	Starts stream 15 meters from firer		Light green, with black markings	28.5	4.8	24	Signaling	Green, red, yellow, violet trail of smoke emitted throughout trajectory (red is standard)
Rifle Projected ground signals	Star cluster Star parachute Smoke pellets	Signal expelled and ignited at peak of flight (180-215 meters)	Gray with blk mark, flat nose with signal color painted on, raised letters on nose for night identification	25.8	4.8	16	Illuminating, signaling	White, green, amber, red
Signal Ground Hand Held	Star cluster illum Star parachute Smoke parachute	do	Gray with blk markings	27	4.5		do	White, red, green, yellow (red is standard)
Adapter, gren proj M1A2			OD	18			Project frag hand gren to extend ranges	Proj M30, M26, hand gren 160 meters, proj M34 WP hand gren 100 meters
Adapter, gren proj M2A1			Gray	13			Project chem hand gren to extend ranges	Proj CN, CN-DM, CS, HC, colored smoke hand gren 145 meters, proj M14 TH gren 120 meters

Figure 11. Types of Rifle Grenades.

Section III. PISTOL, CALIBER .45 AUTOMATIC M1911A1

51. GENERAL.

a. Individuals manning crew-served weapons, carrying the grenade launcher, M79, and performing command duties need a weapon that is compact, readily available, dependable and capable of accurately providing close-in self-defense. The pistol, caliber .45 automatic answers this need and is found in wide use throughout the US Army.

b. The pistol, caliber .45 automatic, is a recoil-operated, air-cooled, magazine-fed, semiautomatic hand weapon. The pistol is called an automatic weapon because it loads automatically, but the pistol will fire only one cartridge each time the trigger is squeezed.

52. STATISTICS.

Maximum Effective Range	50 meters
Maximum Range	1,500 meters
Length Overall	8-5/8 inches
Length of Barrel	5.03 inches
Weight of Weapon w/empty magazine	2.44 pounds
Weight of Weapon w/loaded magazine	2.8 pounds
Number of Grooves	6
Rifling, left hand twist	1 turn in 16 inches
Maximum Chamber Pressure	17,000 psi
Maximum Muzzle Velocity	860 ft per sec
Trigger Pull	5-6 1/2 pounds
Magazine Capacity	7 rounds
Sight Radius	6.48 inches

53. FUNCTIONING.

a. When a cartridge is fired, the recoil is utilized to perform the functions of extracting and ejecting the empty cartridge case, cocking the hammer, and forcing the slide to the rearmost position, thereby, compressing the recoil spring. The action of the recoil spring forces the slide forward, feeding a live cartridge from the magazine into the chamber, leaving the weapon ready to fire again. When the last cartridge in the magazine has been chambered and fired, the slide remains in the open position.

b. The rate of fire is limited by the ability of the firer to change magazines, aim, and squeeze the trigger.

54. TRAINING.

a. Instruction on the steps of preparatory marksmanship are a prerequisite for the Soldier to become an effective pistol marksman. Preparatory marksmanship training should include training in aiming, positions, trigger control, range firing exercises and examinations.

b. During the course of all pistol training, the instructor must be familiar with Army Subject Schedule 21-33 and Chapters 2-4 of FM 23-35.

c. AR 370-5 prescribes details as to the requirements for firing of record and familiarization courses.

d. Range firing is started after the soldier satisfactorily completes preparatory marksmanship training. Range firing courses are:

(1) Instruction Practice Firing which is practice firing on a range using the assistance of a coach.

(2) Record Firing which is the final test of the soldiers proficiency and is the basis for his marksmanship classification.

(3) Familiarization Firing which acquaints the soldier with the weapon. It is fired only by soldiers who are not required to fire the record course for qualification.

(4) Specialized Firing which is for use by specially qualified and selected individuals whose military duties demand special ability with hand guns. This course is not to be used for mass training of all individuals armed with the pistol or revolver.

55. SAFETY.

a. Safety must always be stressed when working with the pistol. Some of the most important safety precautions are:

(1) When entering a range, always clear the pistol. To clear the pistol place the pistol at position of "raise pistol", withdraw the magazine, pull the slide to the rear opening the chamber, inspect the chamber and magazine well, close the chamber by allowing the slide to move forward, remain at "raise pistol" and pull the trigger.

(2) Due to the pistols short length, caution must be taken to insure adherence to safety regulations while on the range. It takes only a very small twist of the wrist to have the pistol pointing in a dangerous position.

b. The pistol features three positive safeties: the safety lock, the safety grip, and the half-cocked notch position of the hammer. These safeties must be well understood and checked by the firer prior to loading the pistol.

c. The disconnecter is not a positive safety, since it is designed to cause the pistol to fire semi-automatic and cannot be controlled by the firer. The disconnector must be tested before the pistol is fired.

d. Immediate action is the prompt action taken by the firer to reduce a stoppage. The procedure for applying immediate action should become instinctive for the soldier armed with the pistol. If a stoppage occurs, immediate action is applied automatically in an effort to reduce the stoppage without attempting to discover the cause at that time.

56. CONCLUSION.

Although the Pistol, Caliber .45 Automatic, M1911A1, is over 50 years old and has seen a lot of combat, it remains one of our most dependable small arms in active use today.

Section IV. INFRARED EQUIPMENT

57. GENERAL:

a. Night operations have been an accepted phase of military operations for centures, but in the past few years they have assumed an ever-increasing importance in tactical doctrine. Difficulties encountered in these operations have shown the need for equipment which will aid individuals in the performance of their assigned tasks. Among the techniques considered in this respect has been the use of "Near" and "Far" infrared night vision systems and most recently image intensification night vision systems.

b. Although there has been and still is today, considerable research and development in the field of "Far" infrared and image intensification night vision systems, they are still not in the hands of troops in the field. However, when adopted, these systems will offer definite advantages over the current "Near" infrared night vision systems. In addition to increased range and clarity of image, the systems themselves are non-detectable.

c. "Near" infrared systems employ invisible infrared radiation found closest to visible light. These systems provide the user with a picture of the target or object being viewed. Such systems always involve the use of an infrared light source and therefore, are called "active" systems. "Active" infrared systems are susceptible to detection by a properly equipped enemy.

d. Filtered infrared light from the light source is reflected in varying intensities by the surfaces it strikes. This reflected invisible infrared image is converted into a visible image by the viewing device (telescope) employing an image converter tube. Thus, "near" infrared systems consist of three basic components: an infrared light source; a viewing device (telescope); and a power supply.

e. All "active" infrared equipment has a visual security distance (the distance from the light source that an observer can detect the source with the unaided eye when looking directly into the beam).

f. Before using "near" IR equipment there are four factors that must be taken into consideration; light, atmospheric conditions, terrain, and range.

(1) Light. Completely dark nights are required for the most efficient operation of IR equipment.

(2) Atmospheric conditions. The transmission of IR radiation through the atmosphere is influenced by absorption and scattering. The effect of rain, sleet, snow and smoke upon the efficiency of IR radiation is approximately the same as the effect of these factors on visible light.

(3) Terrain. Rough and heavily vegetated terrain will reduce the range of IR systems. Reflected glare from twigs, branches, brush, or tall grass in the line of sight reduces the operator's ability to see beyond the obstruction.

(4) Range. The range of IR equipment is dependent upon the strength of the IR light source used with it.

g. To increase the efficiency of "near" IR equipment and reduce the enemy's detecting capability the following techniques should be given serious consideration.

(1) The viewing device (electronic telescope) should be used alone to (prior to using an IR light source) scan for the enemy use of "active" IR equipment. Once it has been determined the enemy has an IR capability then more IR equipment should be utilized with a time limit placed on the use of any one item of equipment. This dispersed and intermittent operation of IR equipment will make it more difficult for the enemy to detect and will increase the use life of the equipment.

(2) The IR light source can be used in one place and the viewing device from another. Also one or more IR light sources can be used from the flanks to provide cross-illumination

giving greater illumination in the target area and making the target appear to stand out with a dimensional effect in relation to its background, thus increasing the target detection, identification, and viewing range capability of IR equipment.

(3) Stronger IR light sources (searchlights, etc.) may be employed with standard viewing devices to achieve increased viewing range.

58. SNIPERSCOPE INFRARED SET NO 1.

a. The sniperscope infrared set number one is an "active" 20,000 volt system employing three basic components:

(1) The light source is mounted permanently above the telescope and consists of a 30-watt light bulb, a reflector and an infrared filter. The filter absorbs all light emitted, except infrared rays which are allowed to pass through.

(2) The electronic telescope converts the reflected infrared image into a visible image allowing the operator to see his target.

(3) The light source and telescope are powered by a 6-volt battery that will provide about three hours of continuous operation and can be recharged about 75 times.

NOTE: This set is now limited standard.

b. The sniperscope was originally designed to be mounted on the carbine. Another receiver mount was later fabricated which allowed it to be mounted on the 3,5 inch rocket launcher. On both weapons, accurate fire can be placed out to 115 meters. The sniperscope features a two position "on-off" switch that operates the light source and telescope simultaneously.

Field of View	14 degrees minimum
Focus	Fixed
Magnification	1.6 power
Power Supply	6 volt
Visual Security Distance	16 meters
Weights	25.5 pounds unmounted 30.6 pounds mounted on carbine (unloaded)

59. INFRARED WEAPONSIGHT.

a. The infrared weaponsight, standardized in October 1957, was designed to replace the sniperscope. Ten weaponsights are assigned to Headquarters Company of the ROAD Battalion for use by units of the battalion.

b. The light source is mounted above the telescope and consists of 15 watt light bulb with reflector and plastic infrared filter. The beam of infrared light may be pin-pointed or spread by rotating the focus ring on the rear of the light source. The light source features a three position push pull switch, which permits the light source to operate independently from the telescope. By pressing the switch in and releasing it, the operator can send prearranged infrared signals. The infrared light source is off when the switch is in the center position. It is in the continuous operating position when the switch is pulled all the way out. The beam of infrared light can also be adjusted for elevation by manipulating the knob on the right side of the light source.

c. The telescope is powered by a 1-1/2 volt battery which is boosted to 16,000 volts by the power slug which is located in the high voltage power supply cylinder on the left side of the telescope. This battery also provides power to illuminate the sight reticle bar in the telescope. The average life expectancy of the power slug is 500 hours, and it can be replaced by the operator. The telescope features a four position switch that permits the operator to use the

telescope as a scanning device without illuminating the sight reticle. Position three and four are used to illuminate the sight reticle, either dim or bright respectively. Position one is the "off" position. The sight reticle is adjusted for elevation and deflection by manipulating the sight reticle elevation and deflection knobs on the lower front of the telescope. This provides the operator with a means of zeroing the weaponsight to the weapon upon which it is mounted.

d. The infrared light source is powered by a 6-volt nickel cadmium battery, having an average life expectancy of five hours under continuous use. It may be recharged up to 1,000 times.

e. The infrared weaponsight is primarily intended for night target detection and aiming, either on or off the weapon with its own light source or with a separate light source. The chief advantages of the infrared weaponsight over the sniperscope are; reduction of weight and increased viewing range.

Field of View	10 degrees minimum
Focus	Fixed
Magnification	4.5 power
Power Supply	One 1-1/2 volt battery...telescope 6 volt nickel cadmium battery...light source
Visual Security Distance	20 meters
Weights:	
Infrared light source	1 lb
Viewer (telescope)	4 lbs
Battery (light source)	6 lbs

60. IMAGE METASCOPES.

a. Image metascopes are lightweight, handheld, "near" infrared viewing devices equipped with a small accessory infrared light source. They are primarily intended for use in detection of enemy "near" infrared sources; and, secondarily, as a general purpose viewer with an accessory light source for short range viewing and signaling.

b. The earlier model image metascope is a limited standard item still found in wide use. It consists of a detector (telescope), a small clip-on infrared light source, and a pistol belt mounted carrying case. The telescope is powered by a storage condenser that is charged by hand-crank generator. One charge provides for operation for from 30 to 45 minutes.

c. The transistorized image metascope employs a small infrared viewing device and a small accessory light source. It weighs less than the earlier model due to transistorization and the use of a mercury battery to power the telescope. This battery may be used continuously for up to 300 hours.

Field of View	22-25 degrees minimum
Focus	Fixed
Magnification	1 Power
Power Supply	Crank operated generator and condenser (old) Mercury battery (new)
Light Source	Two 1-1/2 volt batteries (light source old and new)
Visual Security Distance	6 meters
Weight	2 or 3 pounds (dependent on model)
Viewing range	40-50 meters
Detecting Range	Several miles (depends on intensity of infrared light source being observed and atmospheric conditions).

61. INFRARED DRIVING BINOCULAR, T-6A.

a. The helmet-mounted "near" infrared binocular is primarily intended to permit night driving at normal speeds when used in conjunction with infrared filtered headlamps.

b. The binocular consists of two image converter tubes mounted binocularly and a power supply. The power supply is mounted on the rear of the helmet to counterbalance the weight. (other IR binoculars are undergoing test to permit use of accomplishing close tasks.)

Viewing Range	Depends on size and intensity of light source
Field of View	27 degrees minimum
Magnification	1 power
Weight	2 pounds
Battery Life	300 hours use continuous

62. PERISCOPE, INFRARED M-19.

a. The M19 or the T41 Periscope gives the Armored Personnel Carrier a night driving capability of crosscountry operation without visible light, when used in conjunction with the integral IR driving lights mounted on the carrier. Well trained drivers when using this device can achieve speeds of 8 - 12 KPH.

b. The head assembly of the periscope protrudes from the top of the carrier where it picks up the reflected IR rays and directs them into the body assembly. Within the body assembly are two image converter tubes that convert the invisible IR rays into a visible image.

Characteristics of Periscopes M19 and T41

Weight	15 pounds, 10 oz (M19) 16 pounds (T41)
Field of View	26.8°
Magnification	1 power
Focus	Fixed (18-20 yds)
Power Supply	Vehicle Battery

63. SEARCHLIGHT, GENERAL PURPOSE, 30" W/INFRARED FILTER.

a. The 30 inch general purpose searchlight, equipped with its organic infrared filter, is very effective as a supplementary light source. It will greatly increase the range of the Army's standard infrared viewing equipment when used in conjunction with the viewing devices. The searchlight uses a blown, carbon arc light source which can be operated continuously for approximately 6 hours. The equipment consists of two major components, the 30 inch-diameter searchlight with its controls on one trailer and a 20 kw gasoline generator on another trailer. It replaces the 60" SP/SLT which is now a limited standard item.

b. The beam spread can be changed from 3 1/4 to 10 degrees by the addition of a spread beam lens. The degree of illumination on the target is decreased by spreading the beam. It can illuminate the battlefield by direct light on the target; by indirect, diffused, scattered light from a low light beam, or by reflection from cloud cover. The searchlight, when using the infrared filter, can provide infrared illumination for very long range viewing.

c. The 30 inch General Purpose Searchlight is found in the Searchlight Battery of Corps Artillery.

(1) There are three platoons in the searchlight battery.

(2) Six 30-inch searchlights are organic to each platoon

Viewing Range	10,000 meters
Beam Spread	3-1/4 to 10 degrees
Peak Beam Candlepower	400 million
Weight	1,200 pounds...searchlight and trailer 2,000 pounds...engine generator and trailer

64. CONCLUSION.

"Near" infrared vision systems, although a great aid to night viewing, are not the optimum to the Infantryman's quest for a better means of seeing at night. Progress in the field of night vision aids is promising and the future holds forth many items of passive infrared night vision systems and especially image intensification systems that will be of tremendous value in the conduct of night operations.

Section V. THE 40MM GRENADE LAUNCHER, M79

65. GENERAL.

a. Description: The 40mm Grenade Launcher, M79, is a single-shot break-open, breach-loaded, shoulder-fired weapon capable of launching a 40mm projectile. The entire launcher, unloaded, weighs only 5.95 pounds. This light weight is due primarily to the fact that the barrel is made of aluminum. The M79 is composed of five (5) major subassemblies and groups.

(1) The sight assembly consist of a fixed blade front sight and an adjustable, leaf rear sight.

(2) The barrel group is rifled to impart spin to the projectile which stabilizes the projectile in flight and completes the arming of the fuze.

(3) The fore-end assembly secures the barrel to the receiver group.

(4) The receiver group is made of steel. Within it are found the locking, cocking, firing, and safety mechanisms. It has a winter trigger guard which can be rotated right or left away from the trigger.

(5) The stock assembly has a rubber recoil pad on the butt to help absorb some of the recoil. The recoil of the launcher is slightly greater than that of the standard service rifle, the M14.

b. Functioning. The launcher is loaded by rotating the barrel locking latch lever (located on the top of the receiver) its full travel to the right. This unlocks the barrel from the receiver and automatically places the launcher on SAFE. As the barrel rotates up to the loading position, the launcher is automatically cocked by the cocking arm (beneath the barrel) and the cocking lever (in the receiver). To unload the launcher, break it open again and manually extract the spent cartridge case. The extractor will extract the cartridge case about one-half inch out of the breech.

c. Capabilities: The M79 is capable of delivering lethal fire on both point and area targets. It can deliver point fire on targets such as windows, caves and bunker apertures to a maximum effective range of 150 meters. It can deliver area fire on targets such as troops in the open or open weapons emplacements, to a maximum effective range of 350 meters.

66. MECHANICAL TRAINING.

a. General Disassembly: Grenadiers are authorized to disassemble the launcher into four (4) of its five (5) major subassemblies and groups.

(1) Clear the weapon by rotating the barrel locking latch lever its full travel to the right and opening the barrel.

(2) Remove the sling from the stock.

(3) Remove the retaining band screw, which passes through the rear mounting hole of the front sling swivel, and pull the fore-end assembly away from the barrel.

(4) Press the barrel locking latch lever to the right; pivot the barrel down until it stops, slide the barrel off the fulcrum pin and remove it from the receiver. Do NOT remove the sights from the barrel.

(5) Remove the stock screw and washers (located in the underside of the small of the stock) and then pull the stock rearward from the receiver.

b. Assembly: The assembly of the launcher is the reverse of disassembly.

c. Maintenance: A maintenance equipment kit is issued with each grenade launcher to the grenadier. The maintenance equipment kit is composed of a combination tool, oil and grease case, bore brush and a thong. These items are carried in a canvas case that can be attached to the universal small arms ammunition pouch or to the load carrying equipment harness.

67. TABULATED DATA.

a. Weapon:

Length of launcher (overall)	28.78 in
Weight of launcher	
Loaded	6.45 lb
Unloaded	5.95 lb

b. Ammunition:

Caliber	40mm
Weight	8.0 oz

MODEL	TYPE	FUZE	
M381 M406E1	HE	M551 M552	(spin and setback armed in 14-28 meters. Standard)
M382 M407E2	Practice	M551 M552	

c. Operational Characteristics:

Action	Single shot - Break open
Sights	
Front	Blade
Rear	Folding leaf, adjustable
Chamber pressure	3,000 psi
Muzzle velocity	250 fps
Spin	3,700 rpm
Maximum range	400 meters
Maximum effective range (area fire)	350 meters
Maximum effective range (point fire)	150 meters
Minimum range	
Training	80 meters
Combat	31 meters

68. AMMUNITION. There are two types of ammunition presently available for use with the launcher. They are, high explosive and practice. Each round weighs eight ounces and has an impact detonating fuze.

a. The ogive of the high explosive round is painted gold and it contains 1 1/4 ounces of Composition B high explosive. The body of the grenade is 1 1/2 inches in diameter, and is formed of wrapped rectangular steel wire that is notched at intervals. The grenade has an effective casualty radius (the radius of a circle about the point of detonation in which normally we may expect 50% of the exposed personnel to become casualties) of five meters.

b. The ogive of the practice round is painted silver and is ballistically matched to the high explosive (HE) round. It has a filler which is a yellow dye powder and upon impact, the fuze booster breaks open the grenade and disperses the powder as a puff of yellow smoke. This smoke is visible out to the maximum range capability of the launcher.

69. SIGHTING EQUIPMENT.

a. The launcher is equipped with a fixed front sight blade and a folding, leaf-type adjustable rear sight. The rear sight consists of the following:

(1) A fixed notch type sight used with the rear sight in the down position, to engage targets out to a range of 100 meters.

(2) The windage scale (42 clicks right or left of center) and the windage knob. One click of windage at 200 meters will move the impact of the grenade about 10 inches (approximately 25 cms).

(3) The adjustable elevation scale is graduated in 25 meter increments from 75 to 375 meters and marked at 100, 200, 300 and 375 meters. The scale can be adjusted approximately 1/4-inch for zeroing purposes. The scale is inclined to the left as the range increases to compensate for the natural right hand drift of the projectile (due to the right hand spin).

(4) The elevation scale locking screw. By turning it counterclockwise the scale can be unlocked and moved either up or down.

(5) The elevating screw wheel is used for minor adjustments in elevation, primarily for zeroing. One click of elevation will move the impact of the grenade approximately 2 1/2 meters at 200 meters.

(6) The rear sight carrier and rear sight aperture. The top edge of the carrier is placed on the line corresponding to the desired range.

(7) The retainer lock nut locks the carrier at the desired elevation. By turning it counterclockwise and depressing it, the carrier can be moved rapidly up or down the scale.

(8) The rear sight lock. By depressing it the rear sight frame is unlocked and can be moved to either the up or down position. Release it and it is locked in the desired position.

(9) The grenadier always carries the M79 with the rear sight in the down position.

70. PREPARATORY MARKSMANSHIP.

a. There are five steps of preparatory marksmanship used to instruct and train the grenadier.

(1) Sighting, Aiming and Sight Manipulation are critical areas of marksmanship training. Sight alinement is the most important element of sighting and aiming. Because of the short radius between the front and rear sight on the weapon, a small error in sight alinement will cause a large error on the target. This error increases as the range to the target increases. The grenadier must be taught to focus his eyes on the front sight blade, not the target

in order to maintain sight alinement. When firing the launcher, the grenadier aims at the center of the target. Sighting and aiming exercises similar to those with the rifle should be conducted in grenadier training.

(2) Positions and rapid fire - the second step of preparatory marksmanship. Basically, the positions used with the M79 are the same as those used with the service rifle, with modifications due to the sights and the recoil. The fingers of the forward hand must be kept away from the rear sight base, or upon recoil, they may be injured. The thumb of the rear hand is held along the stock. This also is due to the fact that, upon recoil, the safety button may injure the thumb. A spot weld cannot be obtained. Instead, the cheek is placed firmly against the stock or over the curved portion of the stock. As the range increases beyond 150 meters, the grenadier must drop the butt of the weapon from his shoulder, and place his head over the curved portion of the stock in order to maintain sight alignment. The pointing technique is used in assault firing of the weapon. In this type of fire the grenadier leaves the sights in the down position and keeps both eyes open. He merely points the launcher at the target instead of accurately aiming it. This type of fire can increase the grenadier's rate of fire by 2 rounds per minute, and is accurate at the close ranges of the assault. A supported position is used whenever possible; however, the arm is supported, not the weapon.

(3) Sensing and Adjustment of Fire is another of the critical areas of marksmanship training. The grenadier must be able to accurately sense the impact of the round in relation to the target to the nearest five meters. Not only must the grenadier be able to sense the impact of the round, he must also be able to rapidly adjust his fire. If the impact of the round is sensed as being less than 25 meters from the target, he uses the adjusted aiming point (hold-off) to engage the target. If he senses the impact as being more than 25 meters from the target, he then makes a change in his sight setting in multiples of 25 meter increments.

(4) Zeroing Procedure is the fourth step of preparatory marksmanship. The launcher is zeroed at a known distance of 200 meters. First, the elevation scale is centered by unlocking it and aliming the 300 meter index mark with a notch on the right side of the sight frame, then locking it back down. Set the rear sight carrier at 200 meters. The grenadier fires, senses the impact, makes minor adjustments using the elevating screw wheel and windage knob, and fires again until he hits the target. If adjustments were made, the carrier will no longer be alined with the 200 meter mark. The grenadier must then unlock the scale and move it up or down until the 200 meter index mark is once again alined with the top of the rear sight carrier. Lock the elevation scale and the launcher is now zeroed.

(5) Range Determination is the last, and the most critical step of preparatory marksmanship. In order to obtain a first round hit, the grenadier must be able to accurately determine the range to the target. The sights on the launcher are accurate, and, if properly aimed, the grenade will land at the range set on the sights. For this reason, the exact range to the target must be determined. The range determination element cannot be overemphasized.

71. RANGE CONSTRUCTION, MANAGEMENT AND MAINTENANCE.

a. The grenade launcher range is designed to train the grenadier in the instruction, qualification, proficiency and instruction course modified courses. Each firing lane should be no less than 500 meters in depth and 30 meters in width. The terrain should slope gently downward for about 200 meters and then gently upward out to about 500 meters. As many lanes as necessary may be constructed. There are four stations to each lane, each handling a different capability of the launcher.

(1) At Station #1, the grenadier uses the prone supported position and zeroes the launcher on the zero panel at a known distance of 200 meters.

(2) At Station #2, the grenadier uses the kneeling supported position and engages two point targets, a window and a bunker. To score a hit on the window, the grenade must go through the window. To score a hit on the bunker the grenade must hit the face of the bunker.

(3) At Station #3, the grenadier uses the foxhole position and engages one point target, a bunker; and one area target, an automatic weapons position. To score a hit on the area target, the grenade must land on the edge of or within the circle (10 meters in diameter) defined around the target.

(4) At Station #4, the grenadier again uses the prone supported position and engages two area type targets.

b. Throughout the range, permanent targets should be set up whenever possible. The impact area becomes a dud area and must be marked as such. Therefore, the use of permanent targets will minimize the necessity of going down range to replace or maintain them. Steel pipe can be used for the window and the zero panel. Salvage 55-gallon drums filled with sand or dirt can be used for all the other targets. Canisters, sandbags or engineer tape can be used to mark the circle defined around the area type targets.

72. COURSES OF FIRE.

a. The courses of fire with the grenade launcher are designed to present a uniform method of firing the launcher for instruction, qualification, proficiency and instruction course modified.

b. Tables of Fire. There are four tables of fire for the range.

(1) Table I is instruction firing. The grenadier fires all four stations on the lane for instruction practice. He is given 3 rounds for each station, and a time limit of 2 minutes is imposed at each station.

(2) Table II is qualification firing. The grenadier refires Stations #2, #3 and #4 for record. Here he is given 3 rounds for each station. If not fired on the same day as the instruction firing, he must be allowed to fire Station #1 again in order to rezero the launcher. Time limit for Table II is same as Table I.

(3) Table III is proficiency firing. The grenadier fires the proficiency firing course once. The grenadier will not be allowed to fire the assault course until he has demonstrated his proficiency with the launcher by qualifying at least as a second class grenadier on Table II. A linear area type target is placed 175 meters from the firing line consisting of "E" type silhouettes enclosed in a rectangular area, 15 meters in width and 10 meters in depth. Three firing zones and phase lines are marked off with stakes between the firing line and the target area. At the command to move out, the grenadiers will move toward the first firing zone. The launcher will be loaded by the grenadiers while they are moving between the startin point and the first firing zone. The grenadiers fire at the linear target while moving through the firing zone using the pointing technique. The grenadiers are halted and realigned at the phase line. On the signal to move out, the grenadiers move to the second firing zone. The same firing procedure is repeated in the second and third firing zones. A safety noncommissioned officer must walk along with each firer. He credits the firer with either a hit or a miss for each round fired, and enforces safety precautions. If the grenadier fails to fire while in the firing zone, he is credited with a miss. The unexpended round is unloaded at the phase line and given to the scorer. The safety noncommissioned officer clears the launcher on his lane upon the command of the officer in charge, at the last phase line. When all launchers are clear, the grenadiers will return to the starting line. The proficiency firing course should be set up in an entirely new area because of the hazard due to duds.

(4) Table IV is the instruction course modified. In this table the grenadier fires Stations #1 and #3. At Station #1, he is given 3 rounds with which to zero the launcher. At Station #3 he is given 2 rounds with which he engages the targets on that station. There is no time limit and this table is not scored.

c. Qualification Scoring. The firer may select either target on his station to engage first. However, he must continue to fire on that target until he scores a hit on it. Then he can shift to the second target without command. He receives 5 points for each target hit. This gives him a possible of 10 points for the two targets on the station. If he hits both targets on the station, even though it required firing all three rounds, he is given a bonus of five points. Now he has a possible of 15 points on the station. He fires three stations, 2, 3 and 4, for qualification, so there is a possible of 45 points on the table. To qualify as an Expert Grenadier, he must amass 40 or 45 points; 1st Class Grenadier, 30 or 35; 2d Class Grenadier, 20 or 25; Unqualified Grenadier, 0 to 15 points.

73. SAFETY.

a. The surface danger area for range firing with the grenade launcher varies with the type of ammunition being used. Consequently, range safety requirements to be followed will vary. It is mandatory that AR 385-63, the latest range safety directives and local safety regulations be consulted prior to conducting any firing with the launcher.

b. Some points of safety which must be stressed include:

(1) All personnel on the range must be instructed on the danger radius from the point of burst of the grenade.

(2) Check all ammunition prior to firing to determine if it is the type that is intended to be fired. Keep all ammunition clean, dry and out of direct sunlight.

(3) Never allow a cartridge to be placed in the launcher unless it is to be fired immediately.

(4) In the event of a misfire, shout "Misfire". Keep the weapon pointed at the target area until the safety officer arrives. Do not attempt to fire the launcher again. The range safety officer should clear the area of all unnecessary personnel, remove the round from the launcher and take it to a safe area. If it is then determined that it is the fault of the launcher and not the ammunition, the round may be brought back to the firing line and used. If it is determined to be the fault of the ammunition, the round must be properly disposed of by authorized personnel.

(5) Overhead firing will not be conducted with the grenade launcher. No vegetation or growth which may activate the impact detonating fuze will exist in front of the firing line, within the danger area as given by current regulations.

(6) Firing must be discontinued when ground winds excessively effect the flight of the grenade into the impact area.

(7) Duds will not be handled. They will be located, marked and reported to Explosive Ordnance Disposal for destruction on the spot.

(8) After firing each grenade, the grenadier should visually inspect the bore of the launcher to insure that there is no obstruction in it prior to inserting and firing another round.

(9) Careful consideration must be given to the selection of the impact area. The impact area should be maintained free of any vegetation, at least nothing more than short grass. This will facilitate the location of and subsequent destruction of all duds.

(10) Steel helmets will be worn by all personnel within 100 feet of the launcher position during live firing exercises.

(11) The minimum safe distance for firing the high explosive round in training is 80 meters. (In combat the minimum safe distance is 31 meters.)

74. TRAINING NOTES. The present recommended training program for grenadiers armed with the 40mm grenade launcher M79, consists of 11 hours. The first two hours are devoted to mechanical training, to include disassembly and assembly, characteristics, functioning, capabilities, ammunition and maintenance. The next two hours are devoted to preparatory marksmanship to include instruction and practical work on the five steps of preparatory marksmanship. The last seven hours are devoted to range firing, consisting of a range and safety orientation, instruction firing, qualification firing and proficiency firing. The instruction course modified requires four (4) hours and is designed to provide minimum marksmanship training necessary to employ the grenade launcher. This course should be conducted only when a severe limitation of training time or ammunition exists.

Section VI. ANTIPERSONNEL MINE (CLAYMORE) M18A1

75. GENERAL.

a. Description: The Claymore mine is a one-shot, directional-fragmentation weapon that is designed primarily for use in the defensive role against mass infantry attacks.

b. Detailed Description: The Claymore M18A1 consists of a plastic body, a fixed plastic slit-type sight, four adjustable legs and two detonator wells. The front portion of the plastic case is a fragmentation face containing steel fragments. The back portion of the case contains a layer of explosive (1.5 pounds of composition C-4).

76. ACCESSORIES. The Claymore M18A1 and all accessories are carried in the M7 bandoleer. The accessories include:

a. Instruction Sheet: Sketches and printed matter on this sheet show some of the techniques of employment of the mine.

b. Detonator: One M6 electric blasting cap which is attached to 100 feet of firing wire.

c. Firing Device: The firing device, M57, is a handheld pulse generator which by a single actuation of the handle produces a double (one positive and one negative) electrical pulse (3 volts).

77. EFFECTS OF THE MINE.

a. Casualty Effects: When detonated, the Claymore M18A1 delivers highly effective fragments in a fan-shaped beaten zone 2 meters high and 50 meters wide at a range of 50 meters. This makes 50 meters the optimum effective range of the weapon. The fragments are moderately effective up to a range of 100 meters and can travel up to 250 meters forward of the weapon.

b. Danger from Backblast. The minimum safe firing distance from the weapon is 16 meters provided all secondary hazards such as pebbles are removed. From 16 to 100 meters, the operator should be in a foxhole or lie prone (preferably in a depression or behind protection regardless of how the weapon is employed).

78. INSTALLATION OF THE CLAYMORE.

a. The Claymore may be installed as a controlled or as an uncontrolled weapon. The Claymore may be mounted on a tree, a building or any similar object. However, it must be taken into consideration that damage to these objects will result from the backblast of the mine after it has been fired.

b. To Install the Claymore as a Controlled Weapon.

(1) The legs are unfolded to about a 45 degree angle and pressed halfway into the ground, making sure that the convex surface marked "Front Toward Enemy" and the arrows on top of the case are pointing in the direction of the intended target area.

(2) Aim the mine at an aiming point 8 feet (approximately 2 1/2 meters) above the ground at a range of 150 feet (approximately 50 meters). This aiming point should be the center of the desired area of coverage.

(3) Aim through the slit sight at the aiming stake. The bottom edge of the sight should be parallel to the ground to be covered with fragment spray.

(4) Prior to inserting the blasting cap into the detonator well, secure the firing wire to a stake driven into the ground near the mine. This will minimize accidental disturbance while laying out the firing wire. The wire should be buried to protect it and to prevent detection.

(5) Time permitting, conduct a circuit test. After testing, connect the blasting cap assembly to the firing device. The mine is now armed.

c. When Claymores are employed as uncontrolled weapons, they are treated as mines or booby traps. Their locations are marked, reported, and recorded in accordance with the procedures set forth in FM 20-32.

79. DISARMING. To disarm the Claymore M18A1, reverse the procedures described in paragraph 78(1) through (5).

NOTE: Insure that the man installing or disarming the Claymore keeps the firing device on his person at all times and does not connect it to the firing wire until actually ready to fire the mine. This insures that a second individual does not accidentally fire the mine while the first individual is installing or disarming it, and also lessons the possibility of the mine being detonated by electrical storms.

Section VII. PORTABLE FLAME THROWER M2A1-7 AND THE M4 INCENDIARY BURSTER

80. GENERAL.

a. The portable flamethrower was developed in World War II and remains basically the same; that is it consists of a frame, pressure tank, fuel tank, and a gun group. The portable flamethrower has been refined and current flamethrowers are reliable and lightweight. Although the ABC M9-7 flamethrower is standard, many units still have the M2A1-7 in their inventory.

b. Characteristics of the portable flamethrowers are:

	M2A1-7	ABC M9-7
(1) Weight (loaded)	65-69 lbs	50 lbs
(2) Range - thickened fuel	40-50 meters	40-50 meters
unthickened fuel	20-25 meters	20-25 meters
(3) Duration of fire		
continuous fire or	6-9 seconds	5-8 seconds
short bursts	4-5 bursts	3-4 bursts
(4) Fuel capacity	4 1/2-4 3/4 gallons	4 gallons

81. COMPONENTS.

a. Tank Group. The tank group consists of two systems, the fuel system and the pressure system. The fuel system consists of the fuel tanks, tank connector, the tank connector coupling, the filler plugs and the bleeder valves. The pressure system consists of the check valve, pressure tank, the pressure release valve, pressure regulator and the safety valve. Only two types of propellant gases are authorized for use in the portable flamethrower. They are compressed air or nitrogen.

b. The Gun Group. The gun group consists of a fuel hose, fuel valve assembly, barrel and ignition head assembly.

c. Types of fuel. Two types of fuel are available for use with the flamethrower, unthickened and thickened.

(1) Unthickened fuel is a mixture of gasoline with fuel oil, diesel oil, kerosene or crankcase drainings. It has a maximum range of 20-25 meters. It is characterized by a large billowing flame which envelops the target. It burns at a temperature of 2600° Fahrenheit.

(2) Thickened fuel is a mixture of gasoline with US Army fuel thickners. It has a maximum range of 40-50 meters and it is characterized by a thin, rodlike stream of burning fuel which can be directed into small openings, such as pillbox windows and apertures. The fuel sticks to and builds up on the target burning from 2 to 6 minutes. It burns with a temperature of 2400° Fahrenheit.

82. TRAINING.

a. Prior to any firing, personnel should receive three hours of preliminary training. This should include mechanical training, fuel preparation, positions, aiming and safety precautions.

b. During initial phases of training water may be used instead of fuel to acquaint flame gunners with the fundamentals of operation and safety precautions when firing the portable flamethrower.

c. All live firing is done under the supervision of a safety officer. Strict safety precautions must be observed when firing the portable flamethrower. Reference AR 385-63 and FM 20-33.

83. CONCLUSION. Flame is an effective and devastating weapon. Use it and capitalize on the enemy's psychological fear of fire.

84. GENERAL (M4 INCENDIARY BURSTER).

a. During the Korean conflict flame expedients were used successfully to stop massed enemy attacks. These expedients were made with any available firing device, detonator and improvised containers. They were, in some cases, ineffective and unsafe.

b. For standardization, uniformity, and safety, the Army developed the M4 incendiary burster which is designed to spread burning thickened fuel over a large area.

85. COMPONENTS.

a. The M4 burster weighs 2 1/4 lbs and consists of two concentric tubes.

(1) The inner tube contains the explosive charge tetryl.

(2) The space between the inner and outer tube contains a pyrotechnic ignition mixture.

b. It may be fired electrically or nonelectrically using any standard firing device.

c. The M4 burster can be used in any size container from a 5 gallon can to a large container. For example:

(1) A 5-gallon container will cover an area approximately 20 to 30 meters in diameter. (Use one M4 Burster.)

(2) A 55-gallon drum will cover an area approximately 80-90 meters in diameter. (Use two M4 bursters.)

CHAPTER 3

MACHINEGUN 7.62MM, M60
AND
BROWNING MACHINEGUN CALIBER .50, HB M2

Section I. INTRODUCTION

86. PURPOSE AND SCOPE.

a. This chapter provides the student with a working knowledge of the characteristics, capabilities, mechanical aspects, marksmanship, technique of fire, and employment of the 7.62mm M60 machinegun, and the Browning Machinegun Caliber .50, HB, M2.

b. Sections II-IX are devoted to a discussion on the 7.62mm M60 machinegun; and section X is devoted exclusively to specific information on the caliber .50 machinegun, HB, M2. Discussions in sections II-IX which are applicable to the caliber .50 machinegun, such as marksmanship and techniques of fire are made reference to appropriately.

87. ROLES. The 7.62mm M60 and Browning caliber .50 machineguns support the rifleman in both offensive and defensive operations with a heavy volume of controlled accurate fire that is far beyond the capability of individual weapons. They provide the rifleman with the close continuous supporting fire necessary to accomplish his mission in the attack; while defensively, their long range, close defensive and final protective fires comprise the framework around which the defensive posture of the small unit is built.

Section II. 7.62MM MACHINEGUN M60

88. GENERAL. The M60 machinegun (fig. 12) is an air-cooled, belt-fed, gas-operated automatic weapon and fires from the open-bolt position. Ammunition is fed into the gun by a disintegrating metallic split-link belt. The M60 features fixed headspace which permits rapid changing of barrels. A spare barrel is issued with each weapon.

89. DESCRIPTION.

a. Basic Data.

Ammunition	7.62mm (ball, tracer, armor piercing, armor piercing incendiary, blank, dummy. Armor piercing and armor piercing incendiary are not authorized for training.)
Length of gun	43 1/2 inches
Weight of gun	23 pounds
Weight of tripod mount M122 with traversing and elevating mechanism and gun platform	39.5 pounds
Maximum range	3,725 meters
Maximum effective range	1,100 meters
Height of gun on tripod Mount M122	16 1/2 inches
Rates of Fire:	
Sustained	100 rounds per minute (change barrel every 10 minutes)
Rapid	200 rounds per minute (change barrel every two minutes)
Cyclic	550 rounds per minute (change barrel every one minute)
Basic load of ammunition (on crew)	600 to 900 rounds
Gunner carries three 100-round bandoleers (one attached to weapon)	
Assistant gunner carries three 100-round bandoleers	
Ammunition bearer, when present, carries three 100-round bandoleers per gun.	
Maximum extent of grazing fire obtainable over level of uniformly sloping terrain	600 meters
Elevation, tripod controlled	+ 200 mils
Elevation, tripod free	+ 445 mils
Depression, tripod controlled	- 200 mils
Depression, tripod free	- 445 mils

Traverse, controlled by traversing and elevating mechanism . . . . . 100 mils

Normal sector of fire . . . . . 875 mils (with tripod)

Tracer burnout. . . . . Approximately 900 meters

b. Sights. The M60 has a front sight permanently affixed to the barrel. The rear sight leaf is mounted on a spring-type dovetail base (fig 13). It is folded forward to the horizontal when the gun is being moved. The adjustable range plate on the rear sight leaf is marked for each 100 meters from 300 meters to the maximum effective range of 1100 meters. The top left edge of the rear sight slide serves as an index for setting ranges. Range changes may be made by using the slide release or the elevating knob. The slide release is used for making major changes in elevation. The elevating knob is used for fine adjustments, such as when zeroing. Four clicks on the elevating knob are equal to a one mil change in elevation. The rear sight is adjustable for windage five mils right and left of zero. The windage knob is located on the left side of the sight. One click on the windage knob is equal to a one mil change in deflection.

Section III. MECHANICAL FEATURES

90. TYPES OF DISASSEMBLY AND ASSEMBLY.

a. There are two types of disassembly and assembly with the M60--general and detailed. The M60 machinegun can be disassembled and assembled without the use of force. The only tool required is a pointed object which is used to depress the stock latch when removing the stock group, and the combination wrench used in disassembling the gas system. Before disassembling the weapon, it must be cleared. This is accomplished by pulling the bolt to the rear, placing the safety on safe, raising the cover, visually inspecting the feed tray, receiver and chamber, placing the safety on fire, then pulling the trigger to release the bolt to go forward. As the M60 is disassembled, beginning with the stock, the parts are placed in the order in which they are removed on a clean flat surface, such as a table or shelter half. In assembly, the parts are replaced in the reverse order.

b. General disassembly and assembly. This involves removing and replacing the six major groups of the weapon which are: the stock group, buffer group, operating group, trigger housing group, barrel group and receiver group (fig. 14).

c. Detailed disassembly and assembly. This involves removing and replacing the component parts of the major groups. The operating group consists of: the operating rod and bolt assembly, drive spring guide and drive spring. The bolt assembly consists of: the bolt plug assembly, cam roller assembly, firing pin spring, firing pin bearing and firing pin. The trigger housing group (fig. 15) consists of: the trigger housing pin, leaf spring and the trigger housing assembly. The trigger housing assembly consists of: the sear pin, sear plunger, sear spring, trigger pin, trigger and trigger housing. The barrel group (fig. 16) consists of: the gas system, and barrel and bipod assemblies. The gas system consists of: the cylinder nut, gas piston, gas port plug and gas cylinder extension. The receiver group consists of: the cocking handle, cocking handle guide, forearm assembly, cover assembly, feedtray and receiver. The cover assembly and feedtray, if damaged, are turned in as a unit for replacement.

91. MOUNTS.

a. Bipod mount. The bipod mount is an integral part of the barrel group. It is not removed at unit level. The bipod yoke fits around the barrel and is held in position by the flash suppressor (fig. 12).

b. Tripod mount. The M122 tripod mount consists of the tripod assembly, the traversing and elevating mechanism, and the platform and pintle assembly (fig 13).

(1) The tripod assembly consists of the tripod head with the pintle bushing and the pintle lock, one front and two rear legs, and a traversing bar. The traversing bar connects the two rear legs and supports the traversing and elevating mechanism. Engraved on the bar is a scale which is divided into 100-mil divisions and 5-mil subdivisions, 450 mils to the left and 425-430 mils to the right of center. Sliding sleeves connect the traversing bar and the rear legs to permit folding the legs. Position stops are provided to stop the traversing bar in the open or closed position. The traversing bar sleeve latch on the right rear leg secures the traversing bar when in the open position.

(2) The traversing and elevating mechanism consists of--

(a) The elevation adapter which connects to the mounting plate on the bottom of the receiver.

(b) The traversing handwheel which has a mil-click device build into it. One click equals a 1-mil change. Engraved on the traversing handwheel is a scale which is divided in 1-mil increments with a total of 25 mils.

(c) The elevating handwheel, and the upper and lower elevating screw. The elevating handwheel has a mil-click device built into it. One click equals a 1-mil change. Engraved on the handwheel is a scale which is divided into 5-mil major divisions and 1-mil subdivisions. The upper elevating screw has an elevating screw plate which is graduated into 50-mil increments.

(d) The traversing slide and the traversing slide lock lever. These allow rapid lateral adjustments along the traversing bar.

(3) The platform and pintle assembly consists of the gun platform, to which the gun is attached, and the pintle, which is secured to the tripod assembly.

92. FLASH SUPPRESSOR. The flash suppressor consists of five (5) metal ribs. The vibration of the metal ribs disperses the flash and smoke when firing.

93. SAFETY. The safety lever is located on the left side of the trigger housing group. If the lever is on the "S" (safe) position, the bolt cannot be released to go forward; nor can it be pulled to the rear. If the safety lever is on the "F" (fire) position, the bolt will go forward when the trigger is pulled; the bolt can also be pulled to the rear by pulling the cocking handle rearward. Each time that the bolt is manually pulled to the rear, the cocking handle must be returned to the forward position.

94. LOADING. To load the M60 the bolt must be to the rear and the safety on the "S" position. The cover is raised and the first round of the belt is placed in the groove of the feedtray. The cover is then closed and the safety is placed on the "F" position. The weapon is then ready to fire.

95. MALFUNCTIONS AND STOPPAGES.

a. A malfunction is a failure of the gun to function satisfactorily. Defective ammunition or improper operation of the gun by a crew member is not considered a malfunction of the gun. Two of the more common malfunctions of the M60 machinegun are sluggish operation and runaway gun.

b. A stoppage is any interruption in the cycle of functioning caused by faulty action of the gun or faulty ammunition. Stoppages are classified by their relationship to the cycle of functioning.

96. IMMEDIATE ACTION. Immediate action is the action taken to reduce the stoppage without investigating the cause. This action must be accomplished within 10 seconds, including waiting time, when the barrel is hot enough to cause a cookoff.

a. If a stoppage occurs, wait five seconds, retract cocking handle to rear insuring that the operating rod remains to the rear.

b. If the round is ejected, return cocking handle to forward position, relay on the target and attempt to fire. If the weapon does not fire it must be cleared and the weapon and ammunition inspected to determine the cause of stoppage.

c. If the round is not ejected, move the safety to the "S" (safe) position, return cocking handle to forward position and raise the cover. Remove ammunition and links, raise the feed tray and inspect the receiver and chamber as outlined below.

(1) If the receiver and chamber are clear, re-load, relay on target and attempt to fire.

(2) If a round is present in the chamber, close the cover, move the safety to "F" (fire) position, and attempt to fire. If the weapon fires and ejects, re-load, relay on target and continue to fire. If the round does not fire and the barrel is considered hot enough to cause a cookoff (200 rounds fired within two minutes) wait five minutes, with the bolt in the forward position. Remove the round. Re-load, relay on the target and continue to fire.

NOTE: Disregard the five minute wait if the weapon is not hot enough to cause a cookoff.

(3) If a round is extracted, or when a round is removed from the chamber, inspect the weapon and the ammunition to determine the cause of the stoppage.

d. After clearing the weapon, reload, relay on the target, and attempt to fire.

97. MAINTENANCE. The maintenance of the weapon consists of two basic actions which are cleaning and lubricating. A properly equipped spare barrel case (fig. 17) permits this to be accomplished under field and garrison conditions. To insure a properly functioning weapon, the following steps must be performed.

a. Before firing:

(1) Run a dry patch through the bore.

(2) Check and tighten the gas port plug, gas cylinder extension, and nut.

(3) Lightly oil or lubricate the bolt and receiver rails.

b. During extended firing:

(1) Keep the moving parts lubricated.

(2) Change barrels at proper intervals.

c. After firing:

(1) Remove powder residue and foulings from all parts.

(2) Swab the bore with bore cleaner.

(3) Run the soft copper bore brush completely through the barrel several times.

(4) Run dry patches through the bore until they come out clean.

(5) Lightly oil the bore.

(6) Remove carbon from the face of the bolt and the bolt locking recess in the barrel socket.

(7) The gas system is disassembled and cleaned only if the gun operates sluggishly, the piston fails to slide freely within the cylinder (due to build-up of excessive carbon) or after firing approximately 500 rounds of blank ammunition.

Section IV, MACHINEGUN MARKSMANSHIP TRAINING

98. GENERAL. Machinegun marksmanship training includes training on both the basic (10 meter) and transition ranges. During this training a gunner is taught the fundamentals of machinegun marksmanship with the bipod and tripod mounted machinegun. This training is conducted in three phases: bipod instructional firing on the basic (10 meter) range, tripod instructional and record firing on the basic (10 meter) range, and bipod instructional and record firing on the transition range. During basic marksmanship training, the objectives and fundamentals of machinegun marksmanship are taught and applied during dry and live fire exercises. The objectives of machinegun marksmanship are--

a. Obtaining an accurate initial burst.

b. Traversing and searching the gun.

c. Observation and adjustment of fire.

d. Operating with speed.

99. OBTAINING AN ACCURATE INITIAL BURST. To obtain an accurate initial burst, the fundamentals of position and grip, sight alignment and sight picture, trigger manipulation, and zeroing must be properly applied.

a. Position and Grip. The gunner is in a prone position directly behind the gun so that an imaginary line drawn through the gun would bisect his right shoulder and his right buttock. (Fig. 18)

(1) Bipod mounted gun. When firing the bipod mounted gun, the hinged shoulder rest is up; the gunner has his right hand on the pistol grip, his left hand on the cover; and with both hands he pulls down and to the rear. To make minor changes in direction he shifts his shoulders. To make minor changes in elevation he moves his elbows closer or further apart (fig. 18). To make major changes he realigns his body behind the gun.

(2) Tripod mounted gun. When firing the tripod mounted gun, the shoulder rest is down, the gunner's right hand is on the pistol grip, his left hand is on the elevating handwheel; and with both hands he applies a constant downward pressure. To adjust the lay of the gun (traverse or search the gun), the gunner manipulates first the traversing handwheel and then the elevating handwheel.

b. Sight Alignment and Sight Picture.

(1) Sight Alignment. To obtain correct sight alignment, the gunner centers the front sight blade horizontally in the aperture of the rear sight slide with the top of the front sight blade even with the top of the rear sight slide (fig. 19).

(2) Sight picture. To obtain correct sight picture, the gunner centers the target over the front sight blade so that it appears to rest on top of the front sight blade and on top of the rear sight slide (fig. 19).

c. Trigger Manipulation. When firing the M60 machinegun, the trigger is not squeezed as with other small arms. It is pulled straight to the rear and then released. This aids the gunner in controlling the number of rounds in each burst and prevents excessive wear to the sear and sear notch.

d. Zeroing. This is adjusting the rear sight until the strike of the projectiles coincide with the point of aim at a given range, and then adjusting the range plate to reflect the range.

100. TRAVERSING AND SEARCHING THE GUN. Machinegun targets may have width and depth which requires the gunner to make changes in elevation, direction, or both in order to distribute fire throughout the target area.

a. Traversing. This is moving the muzzle of the weapon to the left or right to distribute fire laterally.

b. Searching. This is moving the muzzle of the weapon up or down to distribute fire in depth.

101. OBSERVATION AND ADJUSTMENT OF FIRE. Gunners must be taught to observe and rapidly adjust their fire.

a. Observation of Fire. Machinegun fire is observed by noting the strike of the projectiles in the target area, by observing tracers in their flight; or, in the case of the 10 meter range, by noting the holes made in the target.

b. Adjustment of Fire. When firing the bipod mounted gun, fire is adjusted by changing the gunner's body position. When firing the tripod mounted gun, fire is adjusted by manipulating the traversing and elevating handwheels.

102. OPERATING WITH SPEED. Gunners must be capable of delivering effective fire onto a given target with speed. Initially, however, emphasis must be placed upon attaining proficiency in the first three objectives; speed will come as a by-product.

103. CHARACTERISTICS OF FIRE (fig. 20). Since a machinegun is fired in bursts, there is vibration and some movement in the weapon. Consequently, each round in a burst follows a slightly different trajectory. The pattern formed by these rounds is called the cone of fire when in the air, and the beaten zone once it strikes the ground. The beaten zone is long and narrow when firing at short ranges over level or uniformly sloping terrain, but it becomes shorter and wider as the range exceeds 500 meters. The space between the gun and the target where the trajectory does not rise above the average height of a standing soldier is called danger space.

104. CLASSES OF FIRE. Machinegun fire is classified with respect to the ground, target, and gun.

c. Fire with Respect to the Ground (fig. 21) is--

(1) Grazing when the center of the cone of fire does not rise above one meter. When firing over level or uniformly sloping terrain, a maximum of 600 meters of grazing fire can be obtained.

(2) Plunging when the danger space is practically confined to the beaten zone. Plunging fire occurs when firing at long ranges, when firing from high ground to low ground, and when firing into abruptly rising ground.

b. Fire with Respect to the Target (fig. 21) is--

(1) Frontal when the long axis of the beaten zone is at a right angle to the front of the target.

(2) Flanking when delivered against the flank of a target.

(3) Oblique when the long axis of the beaten zone is at an angle other than a right angle to the target.

(4) Enfilade when the long axis of the beaten zone coincides with the long axis of the target. This type of fire is either frontal or flanking and is the most desirable type of fire with respect to a target because it makes maximum use of the beaten zone.

c. Fire with respect to the gun (fig. 21). There are six types of fire with respect to the gun: fixed, traversing, searching, traversing and searching, swinging traverse, and free gun.

(1) Fire with respect to the gun is--

(a) Fixed when delivered against point targets which require a single aiming point.

(b) Traversing when distributed in width by successive changes in direction of the gun. With the tripod mounted gun, the changes are made in 4 to 6 mil increments on the traversing handwheel. To insure adequate target coverage, a burst is fired after each direction change.

(c) Searching when distributed in depth by successive changes in elevation. When firing the tripod mounted gun over level ground, the changes are made on the elevating handwheel in 2 mil increments. If the terrain slopes up from the gun position, more than two mils of change is required. If the terrain slopes down, less than two mils is required.

(d) Traversing and searching when distributed in width and depth by successive changes in direction and elevation. With the tripod mounted gun, the changes in direction are made in 4 to 6 mil increments on the traversing handwheel. The amount of elevation change is determined by the slope of the terrain and the obliquity of the target.

(e) Swinging traverse when delivered against targets too wide to cover with the traversing handwheel and targets moving so rapidly across the gunner's front that he cannot maintain effective fire while using the traversing handwheel. To deliver this type of fire, the gunner loosens the traversing bar slide lock lever to allow the traversing and elevating mechanism to slide freely on the traversing bar.

(f) Free gun when delivered from the tripod mount against targets requiring rapid, major changes in direction and elevation which cannot be applied with the traversing and elevating mechanism, and when delivered from a pedestal mount against targets which cannot be adequately covered by selecting a series of aiming points. To deliver this type of fire from the tripod mount, the gunner loosens the traversing slide lock lever and lifts the traversing and elevating mechanism from the traversing bar to allow the gun to be moved freely in any direction.

(g) With the bipod, fixed fire is delivered by firing a series of bursts at a single aiming point. To deliver traversing, searching, or traversing and searching fire, the gunner selects a series of successive aiming points on the target and fires a succession of aimed bursts.

Section V. TECHNIQUE OF FIRE DURING PERIODS OF GOOD VISIBILITY

105. GENERAL.

a. Each member of the machinegun crew must be trained in standard methods of applying fire either as a crew or an individual, and must perform his assigned task automatically and effectively.

b. The easiest, quickest and most effective means of delivering fire with the gun mounted on its bipod, tripod or pedestal mount, is by aligning the sights of the weapon on the target and properly applying fire. This technique of fire is called direct laying.

c. At times, techniques of fire other than direct laying are more appropriate and effective. When delivering overhead fire, fire from position defilade and fire in the assault, the gunner must use the appropriate techniques described in paragraphs 29, 30 and 31.

106. TYPES OF TARGETS. Targets presented to the machinegunner(s) during combat will in most cases consist of enemy personnel in various formations which require distribution and concentration of fire. These targets have width and depth, and the application of machinegun fire is designed to thoroughly cover the area in which the enemy is known or suspected. These targets may be easily distinguishable or may be indistinct and difficult to locate.

a. Point targets are targets which require the use of a single aiming point. Enemy bunkers, weapons emplacements, vehicles, small groups of personnel, and aerial targets such as helicopters or descending paratroopers are examples of point targets.

b. Linear targets have sufficient width to require traversing fire and no more depth than can be effectively covered by the beaten zone.

c. Linear targets with depth are targets which have sufficient width to require traversing fire and depth which requires searching fire. They require a combined change in direction and elevation (traversing and searching fire) to maintain effective fire on them.

d. Deep targets have depth but very little width, and can be effectively covered by searching fire.

e. Area targets as discussed in this text have considerable width and depth and require extensive traversing and searching fire. This type target exists when the enemy is in a certain area but his exact location is not known. An objective, such as a hilltop, is a typical area target.

107. APPLICATION OF FIRE (TARGET ENGAGEMENT - DIRECT LAY). When machinegun fire is under direct control of a leader, he designates the midpoint and flanks or ends of a target unless these are obvious to the gun crew(s). When a target other than a point target is engaged by two gunners, it is always divided. Each gunner applies his fire to that portion of the target corresponding to his position with relation to the other gun. In order that the machinegunners remain constantly aware of the portion of a given target that they would engage, their positions are numbered. The gun position on the right is the number one position, and the gun position on the left is the number two position (Figure 22).

a. Point targets. A point target is engaged with fixed fire. If it moves after the initial burst, the gun crew(s) keeps fire on the target by following its movement with the gun(s).

b. Linear targets. Linear targets are engaged with traversing fire.

(1) Two guns.

(a) Normal division. The target is divided at the midpoint; gun No. 1 firing on the right half, and gun No. 2 firing on the left half. The point of initial lay and adjustment for both guns is on the midpoint of the target (Figure 22).

(b) Special division. If one portion of the target presents a greater threat than another portion, fire can be concentrated on that portion by dividing the target unevenly.

(2) One gun. A single gunner must engage the entire width of a linear target. The point of initial lay is on the midpoint or on that portion of the target presenting the greatest threat. The gunner then manipulates in either direction to a flank and reverses his direction of manipulation to cover the rest of the target (Figure 22).

c. Deep targets. Deep targets are engaged with searching fire. When range is announced, it is given to the midpoint of the target.

(1) Two guns. The point of initial lay for both guns is on the midpoint which is also the point of division (Figure 22). Gun number one searches down, gun number two searches up.

(2) One gun. A single gunner initially lays on the midpoint of a deep target unless another portion of the target is more critical. The gunner then searches down to the near end and back up to the far end (Figure 22).

(3) Indistinct deep targets. The center mass of indistinct deep targets may be designated by using reference points in the same manner as for linear targets, except that the extent (depth) of the target is always given in meters.

d. Linear targets with depth. Linear targets with depth are engaged with traversing and searching fire. When range is announced, it is given to the midpoint.

(1) Two guns. In this method of division, the point of initial lay and adjustment and the extent of manipulation for both guns is the same as that prescribed for linear targets (Figure 22).

(2) One gun. A single gunner initially lays and adjusts on the midpoint of a linear target with depth unless some other portion of the target presents a greater threat. The gunner then traverses and searches to the near flank, then back to the far flank (Figure 22).

e. Area targets. The leader designates an area target by indicating to the gun crew(s) the width and depth of the target. Area targets are engaged with traversing and searching fire.

(1) Two guns. The target is divided at the center of mass; gun No. 1 fires on the right half and gun No. 2 fires on the left half. After adjusting fire on the center of mass of the area, fire is distributed by determining the size of the beaten zones and applying direction and elevation changes that cause the most effective coverage of the target area.

(2) One gun. A single gunner engages an area target by laying and adjusting on the center of mass, then traversing and searching to either flank. Upon reaching the flank, direction is reversed and the gun is traversed and searched in the opposite direction.

f. Aerial targets. Aerial targets are engaged using the hip firing position, or free gun from the tripod and pedestal mounts. Solid tracer ammunition should be used whenever possible for ease of observation and adjustment of fire. To obtain hits on an aerial target, the gunner must aim in front of the target at a point that will cause the target and projectiles to meet at a common point simultaneously.

Section VI. TECHNIQUES OF ENGAGING VISIBLE TARGETS DURING PERIODS OF LIMITED VISIBILITY

108. GENERAL. A gunner's ability to detect and identify targets during periods of limited visibility will vary depending upon the amount of natural and artificial illumination. Complete definition of these targets as to the exact size and flanks will in many cases be questionable.

109. TYPES OF TARGETS. Normally two types of targets will appear in the machinegunner's sector of fire during periods of limited visibility.

a. Enemy personnel in platoon or squad size formations which will be deep, linear, or linear targets with depth.

b. Supporting automatic weapons and assaulting enemy personnel which will be point targets.

110. TARGET ENGAGEMENT.

a. Solid tracer ammunition will enable a gunner to more effectively engage visible targets during periods of limited visibility and should be used when possible. Gunners must be trained to fire low initially, and adjust up when engaging targets during periods of limited visibility. This aids in overcoming the tendency to fire high during these conditions.

b. When engaging linear, linear targets with depth, and deep targets, no attempt is made to divide these targets as is done during periods of good visibility. During periods of limited visibility, the center and flanks of these targets will not be clearly defined, therefore, each gunner observes his tracers and covers what he believes to be the entire target. To effectively engage--

(1) Linear targets, the gunner(s) lays on what he considers to be the center of mass of the target and using swinging traverse fire, maintains his beaten zone on the base of the target.

(2) Linear targets with depth, the gunner(s) lays on what he considers to be the center of mass of the target, then traverses and searches it, first covering the side which is closest to his position.

(3) Deep targets, the gunner(s) lays on what he considers to be the center of mass of the target, then searches it. The direction of search is down to what is considered the near end, then up to what is considered the far end.

c. The types of point targets with which machinegunners will be concerned during periods of limited visibility, particularly at night, are enemy automatic weapons and assaulting enemy personnel.

(1) Enemy automatic weapons. Point targets, such as automatic weapons, may be identified during conditions of limited visibility by their muzzle flashes. To effectively engage these targets, field expedients are used to aid in aligning the weapons sights on these targets (fig. 23).

(2) Assaulting enemy personnel. During the final stage of an enemy assault, machineguns normally fire final protective fires; however, it may be necessary to engage individual enemy soldiers if they are observed in the proximity of the gun position and present a clear threat to continued operation of the gun.

111. TECHNIQUES OF DELIVERING PREPLANNED FIRES. In addition to engaging appropriate visible targets, the machinegunner must be able to deliver preplanned fires during periods of limited visibility. These fires are used to cover target areas of tactical significance such as routes, avenues of approach, anticipated enemy supporting weapons positions, probable enemy assault positions, and to establish sectors of graze and final protective lines.

112. OBTAINING GRAZING FIRE. For maximum effect in all preplanned target areas, grazing fire should be obtained when possible. Grazing fire must be obtained for final protective fires, sectors of graze, and areas of graze. Grazing fire may be obtained within a sector of fire over various types of terrain.

a. Obtaining the maximum extent of grazing fire over level or uniformly sloping terrain (fig. 24). To obtain the maximum extent of grazing fire with the M60 machinegun, the gunner sets the rear sight at 600 meters, selects a point on the ground which he determines to be at a range of 600 meters, and lays, fires and adjusts on this point. At no time will the center of the cone of fire rise more than one meter above the ground.

b. Obtaining the maximum extent of grazing fire over irregular terrain (fig. 25). If the gunner concludes that he cannot obtain 600 meters of grazing fire because of a major break in the ground at a range of less than 600 meters, he places the range to the break on his rear sight and lays, fires and adjusts on the break. At no time will the center of the cone of fire rise more than one meter between the gun and point of lay of the weapon.

c. Determining the amount of grazing fire on a final protective line. The amount of grazing fire on the final protective line is determined using the techniques described in items a and b above. Any intermediate break in the terrain along this line which cannot be covered by grazing fire from a gun firing along the line is considered as deadspace (fig. 26) and includes streams, ravines, and shell craters. The location and extent of deadspace may be determined in two ways--

(1) Walking the final protective line.

(2) Observing fire.

d. Determining the amount of grazing fire in a sector of graze. A sector of graze exists over uniformly sloping or level terrain anytime the machinegun is fired at a target which can be engaged with a sight setting of 600 meters or less. The ranges to the extent of grazing fire in a sector of graze are determined by observation of the terrain and by observation of the tracer stream from behind the gun or from a flank of the gun. Normally the extent of grazing fire within this area will be much less than on a final protective line and will form an irregular pattern.

e. Determining the amount of grazing fire in an area of graze. The same procedures used in a and b above are used in determining the extent of grazing fire in an area of graze. The ranges to areas of grazing fire are determined by observing the flight of tracer ammunition from behind or from the flank of the gun position. The gunner determines the lateral extent of areas of graze by selecting and engaging successive aiming points in the area believed to afford grazing fire, using the same range setting as when determining the range to the extent of grazing fire.

113. METHODS OF LAYING THE GUN. The technique of laying the gun to engage preselected target areas during periods of limited visibility is effective only if the data are correct. These data are determined from the lay of the gun on targets. If possible, the lay is verified by firing and adjusting on these selected targets. There are two methods of determining data necessary to engage selected targets during periods of limited visibility: readings taken from the traversing bar and traversing and elevating mechanism, and by the use of field expedients.

a. Traversing bar and traversing and elevating mechanism method. Direction and elevation readings constitute the data necessary to engage preselected target areas during periods of limited visibility. These readings are measured by and recorded from the traversing bar and traversing and elevating mechanism. All measurements are recorded in mils.

(1) Direction readings. Direction readings are obtained and recorded to all targets within the primary sector of fire with the exception of the final protective line. To obtain direction readings to targets other than the final protective line--

(a) Loosen the traversing slide lock lever, and slide the traversing slide along the traversing bar until the gun is laid on the center of a point and on either flank of a linear target. Read the direction reading from the scale on the traversing bar (fig. 27), using the left side of the traversing bar slide as an index.

(b) When the left edge of the traversing bar slide is on a graduation to the left of the "0" graduation on the traversing bar, the direction reading is recorded as RIGHT that number of mils. (The muzzle of the weapon moves to the right.) When the left side of the slide is to the right of the "0" graduation, the direction reading is recorded as LEFT that number of mils. (The muzzle of the weapon moves to the left.)

(c) After having taken a direction reading of a linear target, the width of the target is measured in mils by traversing across the target using the traversing handwheel. The traversing mechanism must be recentered before moving to another target.

(2) Elevation readings. After obtaining the direction reading to a target, an elevation reading is obtained before moving to another target. To obtain this reading the gun is laid on the base of the target and the elevation reading is obtained from two scales. The first portion of the reading is taken from the engraved scale on upper elevating screw plate. The second portion is taken from the engraved scale on the top of the elevating handwheel, using the indicator as the index (fig. 27). The two portions of the elevation reading are separated by a slash (/) when they are recorded. An elevation reading is valid on only one mechanism. If data are placed on another mechanism using the same mount and gun, the data could be inaccurate. To insure a correct elevation reading to a target, the gunner should fire and adjust on this target.

b. Laying the machinegun by the use of field expedients. Field expedients include the use of stakes and other devices to engage preselected target areas. Proper use of one or a combination of the field expedient techniques will aid the gunner considerably in employing the machinegun in its predetermined fire role. These techniques may be used in conjunction with the traversing bar and traversing and elevating mechanism method. The field expedient method serves to supplement and enhance the employment of the gun in engaging preselected target areas. This method is not as effective as the traversing bar and traversing and elevating mechanism method and requires additional material. Field expedients serve as a primary means of engaging preselected target areas in a secondary sector during periods of limited visibility, and they may be used as a primary means in the primary sector until time or conditions of visibility permit recording data from the traversing bar and traversing and elevating mechanism. If a gun crew is replaced for any reason, field expedients being employed must be explained to the relieving crew.

(1) The aiming stake technique. The principal advantage of this technique is that no light is required at the gun position at night. This technique is not effective when visibility is so limited that aiming stakes cannot be observed.

(2) The base stake technique. This technique is used to define sector limits and may provide the lay for the final protective line or other preselected target areas which exist along a primary or secondary sector limit. The base stake method is effective in all conditions of visibility and requires a minimum of additional material.

(3) The notched stake or tree crotch technique. The notched stake or tree crotch technique is used with the bipod mounted gun to engage preselected target areas within a sector or to define sector limits. This method is effective in all conditions of visibility and requires a minimum of additional material.

(4) The horizontal log or board technique. This technique is used with the bipod or tripod mounted machinegun to mark sector limits and provide sector of graze fire. The horizontal log or board technique is effective in all conditions of visibility.

114. RANGE CARDS. A range card is a record of firing data necessary to engage preselected target areas within a sector(s) of fire during periods of limited visibility. Such areas are suspected of being tactically significant during conditions of limited visibility. These areas include likely avenues of approach, anticipated enemy supporting weapons positions, probably enemy assault positions, final protective lines, and sectors of graze. The range card may also be used as a reference to engage targets during periods of good visibility, and it aids the platoon leader in preparing his fire plan.

a. Data to areas within the primary sector are of primary concern. The tripod mounted gun is habitually employed covering the primary sector of fire. Preselected targets in the secondary sector are engaged during periods of limited visibility by the use of field expedients.

b. A range card consists of two parts: a sketch of the sector(s) of fire containing drawings of targets, and a data section which lists data necessary to engage these targets during periods of limited visibility. The sketch is not drawn to scale, but the data referring to the areas are accurate.

Section VII. SPECIAL TECHNIQUES OF FIRE

115. OVERHEAD FIRE. Overhead fire is delivered over the heads of friendly troops. During training it is used only when troop safety has been proven. The terrain and visibility dictate when overhead fire can be delivered safely. Overhead fire cannot be safely delivered on a target at ranges less than 350 and greater than 850 meters from the gun, and it is not delivered over level or uniformly sloping terrain. Overhead fire is delivered with guns on tripod because of the greater degree of stability and accuracy and the limited capability of measuring vertical mil angles by using the elevating mechanism. Ideally, overhead fire is delivered when a depression in the terrain exists between the gun position and the target. The depression should be such that the gunner's line of aim is well above the heads of friendly troops. Control is normally accomplished by the weapons squad leader. He lifts or shifts the fire when the feet of the troops in the element being supported reach an imaginary line drawn parallel to the target where further fire would cause casualties to friendly troops. This imaginary line is called the safety limit. In some instances the leader of the element being supported will direct lifting of fire at the proper time by prearranged signals which can be transmitted by radio, wire, or visual means.

116. POSITION DEFILADE. In order to achieve maximum effectiveness, the machinegun(s) must be employed using the technique of direct lay; however, at times it may be desirable to employ guns from position defilade. A machinegun is in position defilade when the gun and its crew are hidden from enemy ground observation by a land mass such as the crest of a hill. The position may be on the reverse side of the mask or the forward slope of the next high ground in the rear of the mask or in a small fold in the ground. The machinegun on bipod mount is not fired from position defilade due to the difficulties encountered in adjusting fire when the gunner cannot see the target.

117. ASSAULT FIRE. Machineguns need not always be limited to supporting fire roles in the attack. In many situations the leader can obtain maximum effect from the machineguns by placing them on line in the assault. The procedures described in this section are used when assaulting in a line such as during a night attack or during the final stages of a day assault when fire superiority has been gained. There are three firing positions which may be used when firing the gun in the assault. Use of each of the positions at the proper time will enable gunners to place accurate fire on the enemy without aligning the sights. With all assault firing positions, the gunner adjusts his fire by observing the tracers and the impact of the projectiles in the target area. To provide support for the gun in the assault, a sling is attached to the weapon and placed over the gunner's shoulder. It is primarily used to support the weapon when carried or fired in the underarm and hip positions.

a. Hip Position (Figure 28). The hip firing position is used when a heavy volume of fire is desired in the target area and rapid movement is not essential. The hip firing position provides good stability but is awkward to use while moving. Not less than nine rounds are fired in each burst.

b. Shoulder Position (Figure 29). The shoulder firing position is used when the gunner desires to hit specific points in the target area and rapid movement is not essential. He pauses momentarily and fires a burst after every two to four steps as the left foot strikes the ground (right handed). A maximum of six rounds is fired in each burst. This position provides the greatest accuracy.

c. Underarm Position (Figure 30). The underarm position is used when closing with the enemy and when a heavy volume of fire and rapid movement are required. During periods of limited visibility this position is used during the entire assault. The gunner's movement is continuous and he fires a short burst each time his left foot strikes the ground. A maximum of six rounds is fired in each burst.

Section VIII. TACTICAL EMPLOYMENT

118. GENERAL. Seldom is there only one correct solution for a particular tactical situation, but a knowledge of the various choices and when they are most likely to work, is necessary to make an intelligent decision.

119. OFFENSIVE OPERATIONS. The choices for machinegun employment during offensive operations have increased with the advent of the M60's assault fire capability. The rifle platoon leader has three general alternatives when employing his two machineguns in the attack.

a. Both guns can be left on or in the vicinity of the line of departure to deliver supporting fire when the objective is in range and sight from the line of departure and the route of advancing troops is unobscured from the line of departure.

b. One gun can be left on or in the vicinity of the line of departure and one taken with the advancing troops when the objective is in range and sight from the line of departure; but a part of the route is obscured.

c. Both guns can be taken with the attacking element when the objective is not in range and/or sight from the line of departure and the route is obscured.

120. DEFENSIVE OPERATIONS. The defensive machinegun positions are located to cover likely avenues of enemy foot approach. Final decision is based on the best observation and fields of fire, available cover and concealment, obstacles, and how well each location would protect key terrain. Mutual support between automatic weapons, including those of adjacent units, is accomplished to the maximum extent possible.

Section IX. MARKSMANSHIP AND FIELD FIRING RANGES

121. BASIC (10 METER) MACHINEGUN RANGE. (Fig. 31)

a. On the basic range the gunners are taught the objectives of machinegun marksmanship, which are applied during dry and live fire exercises for the first half of record firing.

b. Two gunners, acting as gunner and assistant gunner, are assigned to each gun position.

122. TRANSITION RANGE. (Fig. 32)

a. Gunners are taught the techniques used to engage long range point targets. They fire for practice and for the remaining part of record qualification.

b. Three gunners, acting as gunner, assistant gunner, and ammunition bearer are assigned to each gun. There are two gun positions in each lane; and one gun dry fires while the other gun fires, during the conduct of each exercise. A standard transition range has ten lanes, and concurrent training stations are necessary to conduct training for a company-sized unit.

123. DAY DEFENSIVE FIELD FIRING RANGE. (Fig. 34)

a. The instruction on this range includes the organization of the weapons squad, fire control, classes of fire, and target engagement. Students fire the bipod and tripod mounted gun on this range.

b. Five gunners are assigned to each lane and they act as squad leaders, gunners and assistant gunners. There are two guns in each lane and they are employed singly and as a pair. A standard range has only five lanes; therefore, concurrent training is necessary for a company-sized unit.

124. PREDETERMINED FIRE FIELD FIRING RANGE (Fig. 35)

a. Gunners are taught how to obtain data to various targets, and how to prepare a range card.

b. Day and night firing.

(1) Day training. Three gunners acting in rotation as squad leader, gunner and assistant gunner are assigned to each gun position. They obtain data to various targets and prepare a range card.

(2) Night training. The gunners return to their gun positions, reapply the data, and engage their targets.

125. ASSAULT FIRE RANGE. (Fig. 33)

a. The assault firing positions and the principles of assault fire are demonstrated and explained on this range.

b. One gunner is assigned to each lane and is assisted by a lane NCO throughout the exercise. The gunner fires from the firing line using the hip firing position, and moves to the second control point while using the underarm firing position. A standard range has ten firing lanes and should be constructed on level or uniformly sloping terrain.

Section X. BROWNING MACHINEGUN, CALIBER .50, HB, M2

126. DESCRIPTION. The caliber .50 machinegun (fig. 36) is belt fed, recoil operated, and air cooled. It is a much heavier weapon than the M60 machinegun, weighing three times as much, when both guns are tripod mounted. This gun has the capability of semiautomatic as well as automatic fire.

127. BASIC DATA

Weight of gun	82 pounds
Weight of gun and tripod mount, M3	126 pounds
Rates of fire:	
Slow	40 rds or less per minute
Rapid	Over 40 rds per minute
Cyclic	450-500 rds per minute
Maximum range	6,800 meters
Maximum effective range - ground target	1,825 meters
Maximum effective range - aerial target	725 meters
Maximum distance of grazing fire (including the forward half of beaten zone)	1,000 meters

128. HEADSPACE. Headspace is the distance between the face of the bolt and the base of a cartridge fully seated in the chamber; however, unlike the M60, on a caliber .50 machinegun this must be adjusted periodically and always before firing. A headspace gage is provided for this purpose and consists of a GO end and a NO GO end. Basically, the barrel is simply screwed in or out until the GO end can be inserted between the bolt and end of the barrel, but the NO GO end cannot be inserted.

129. TIMING. Timing must always be checked after headspace is set. It is adjusting the gun so that during forward movement of the recoiling parts, actual firing takes place before the barrel extension rams the trunnion block, but not so soon as to prevent sufficient recoil for continued operation of the gun. Gages are provided to check this and are inserted one at a time between the barrel extension and the trunnion block. Timing is correct when the gun will fire with the FIRE gage inserted, but will not fire when the NO FIRE gage is inserted.

130. IMMEDIATE ACTION. The same problems of a possible hangfire or cook-off exist with the caliber .50 machinegun as they do with the M60 machinegun. After waiting five seconds, pull the bolt to the rear, release it, re-lay on the target and attempt to fire. If the round is not ejected in the second five-second period, wait five minutes before taking additional steps to reduce the stoppage.

131. TECHNIQUE OF FIRE. The background information located in Sections IV and VI pertaining to characteristics of fire, correct aiming, fire adjustment, classes of fire with respect to the gun, and range cards applies equally to the caliber .50 machinegun with only minor exceptions.

132. EMPLOYMENT.

a. The employment of the caliber .50 machinegun, HB, M2, is normally dictated by two factors. The major factor is the mission assigned the gun--participation in an attack, a defensive operation, a retrograde movement, or convoy protection. The second factor is the way in which the gun is mounted or can be mounted--pedestal mounted on an MICV, ring mounted on a truck, or ground mounted on its M3 tripod mount.

b. In all cases, the best use of the gun is achieved by exploiting as many of its fire-power characteristics as possible. The caliber .50 machinegun can:

(1) deliver automatic and semiautomatic flat trajectory fire.

(2) fire the slow rate for prolonged periods without overheating (40 rounds or less per minute).

(3) deliver accurate fires based on predetermined data (tripod mounts).

(4) successfully engage long range ground targets (1825 meters) and aerial targets (725 meters).

(5) penetrate limited amounts of armor or other protective materials.

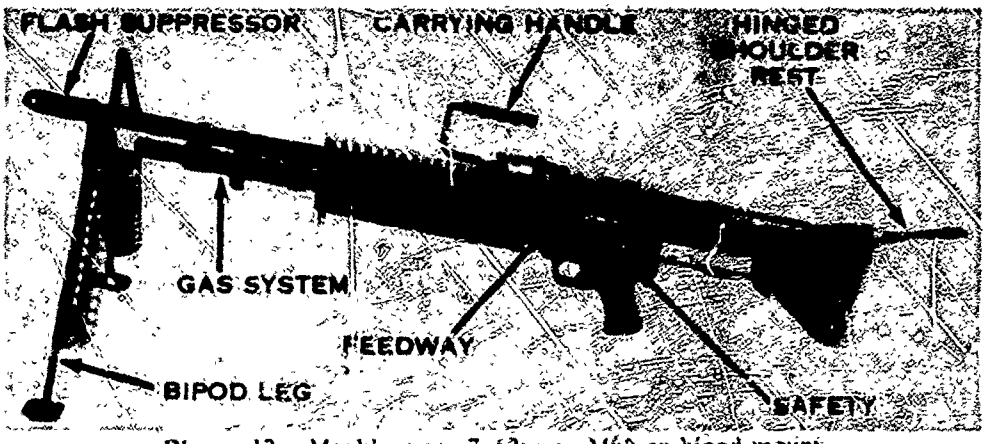


Figure 12. Machinegun, 7.62mm, M60 on bipod mount.

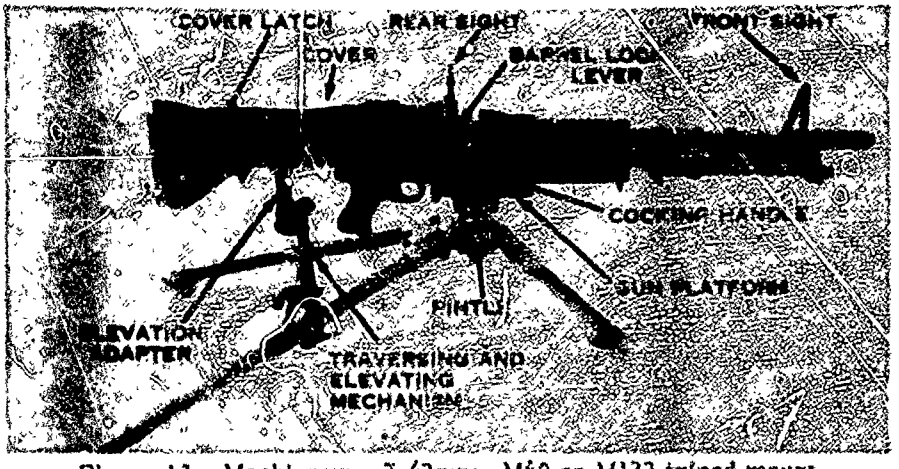


Figure 13. Machinegun, 7.62mm, M60 on M122 tripod mount.

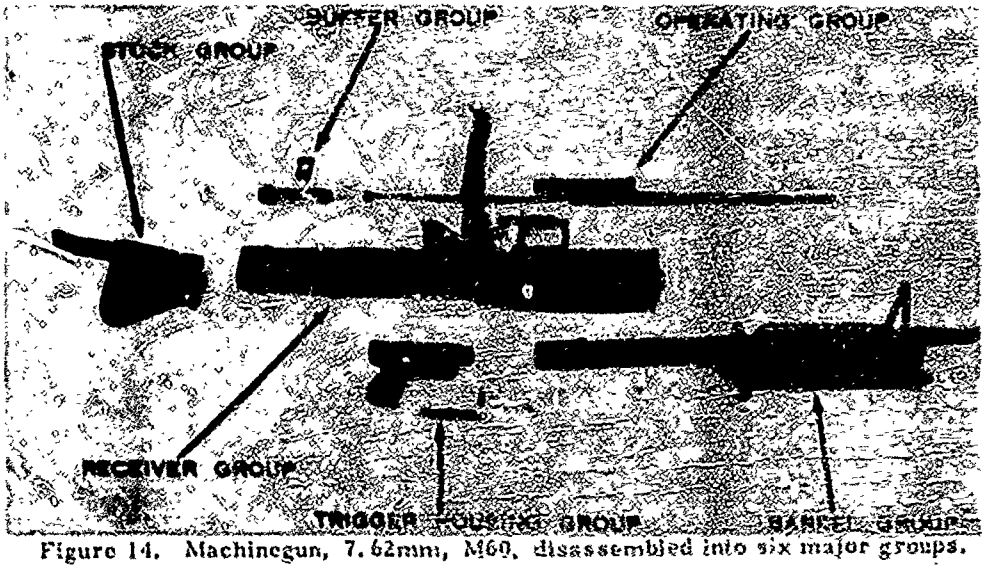


Figure 14. Machinegun, 7.62mm, M60, disassembled into six major groups.

Figure 15. Trigger housing group disassembled.

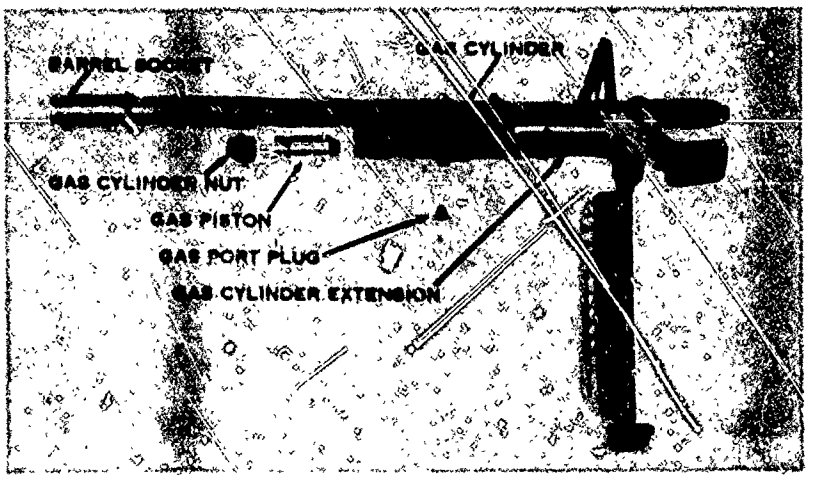


Figure 16. Barrel group disassembled.

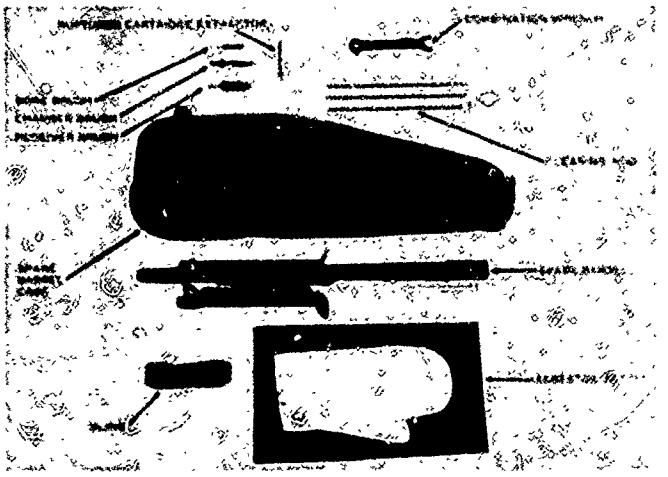


Figure 17. Maintenance equipment.

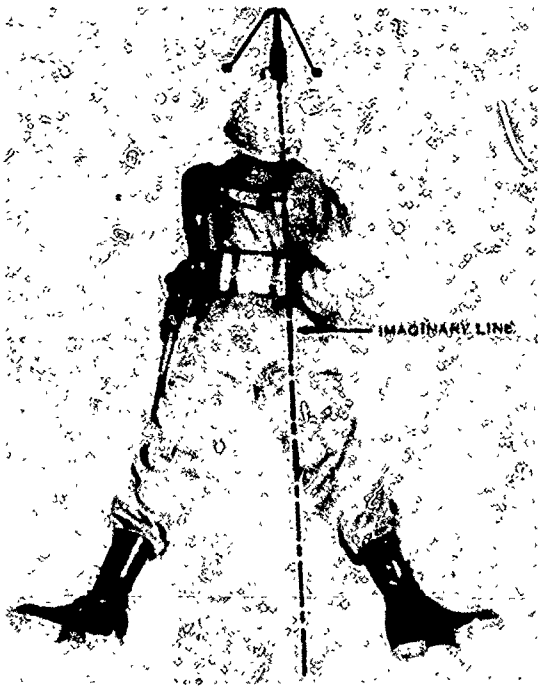
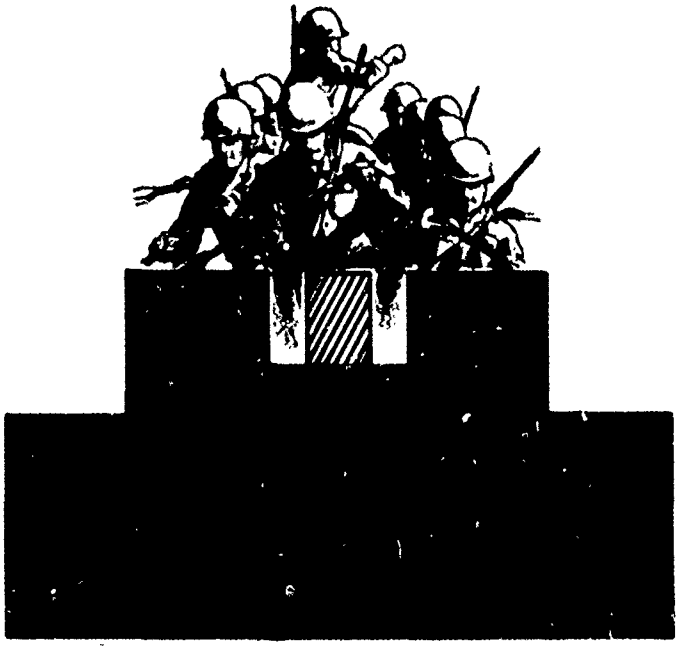
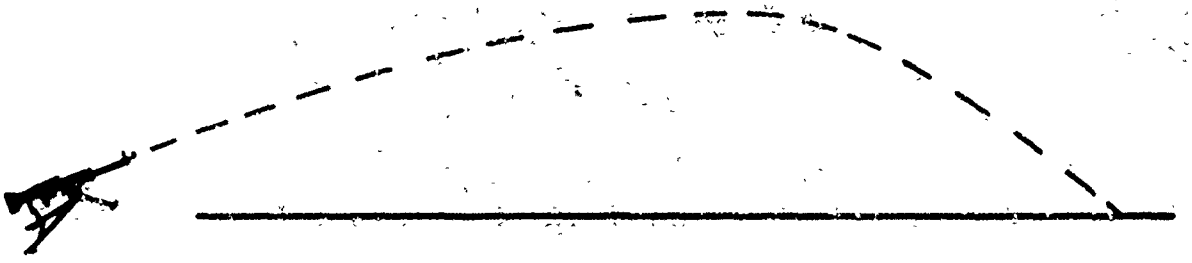


Figure 18. Prone position bipod mounted gun.

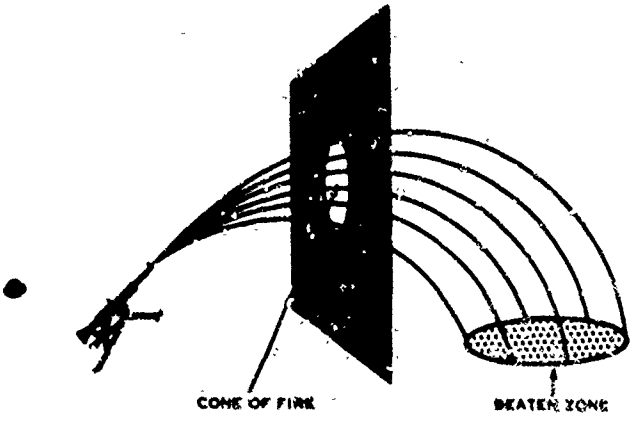


(AIM AT CENTER BASE OF TARGET)

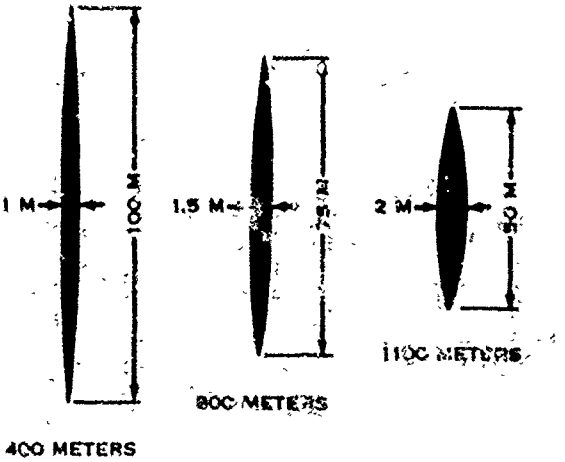
Figure 19. Correct sight alinement and sight picture.



Trajectory



Cone of fire



Beaten zone

Figure 20. Characteristics of fire.

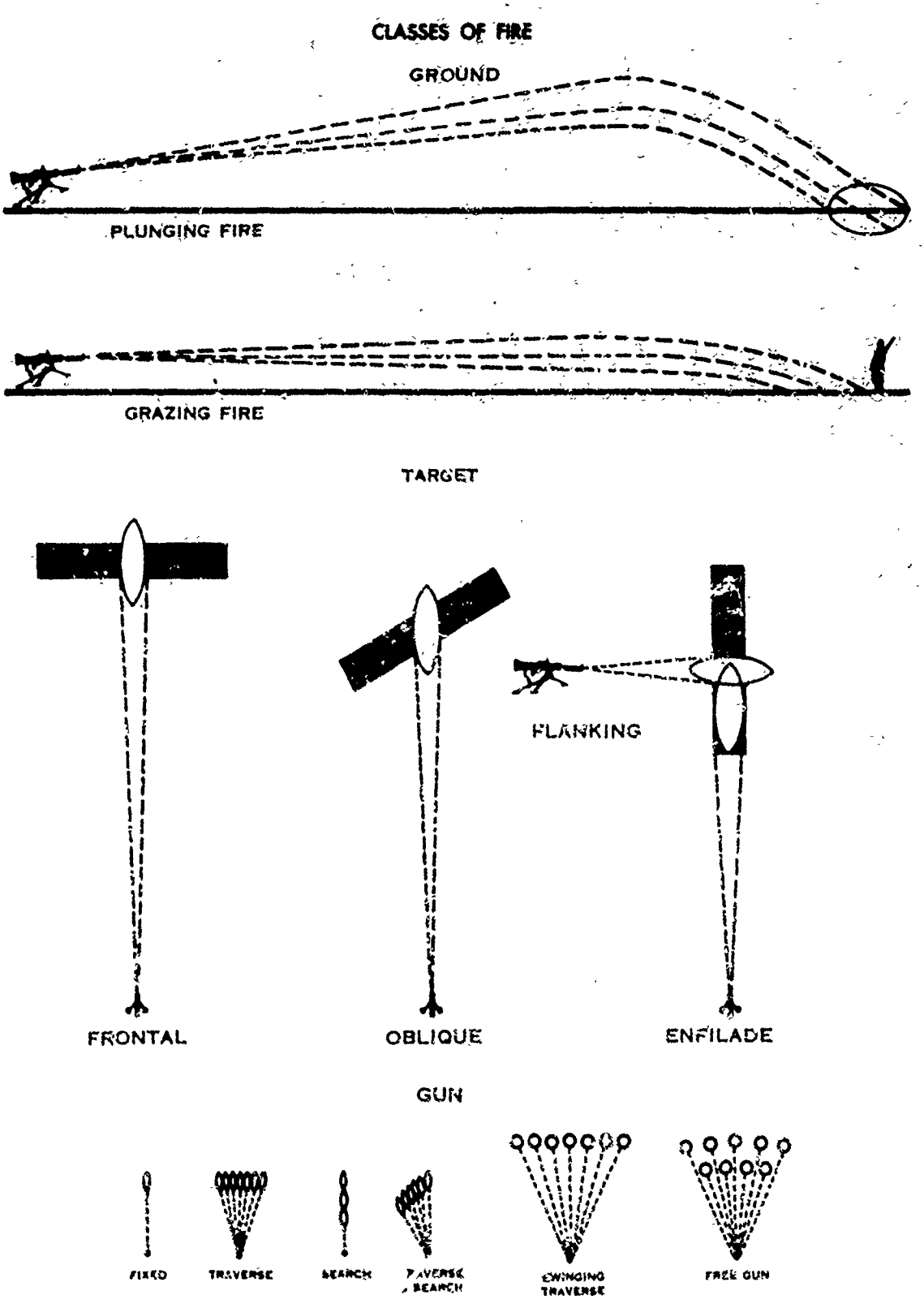
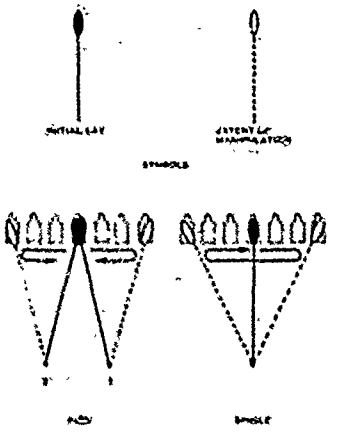
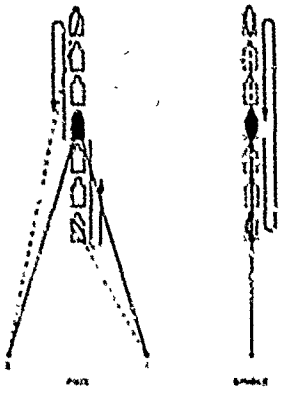


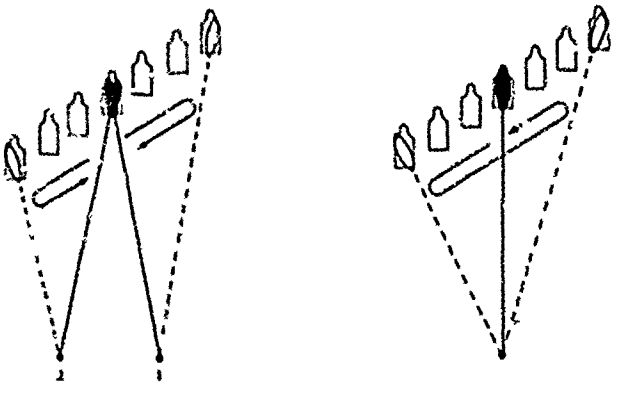
Figure 21. Class of fires.



Traversing fire



Searching fire



Traversing and searching fire

Figure 22. Target Engagement.

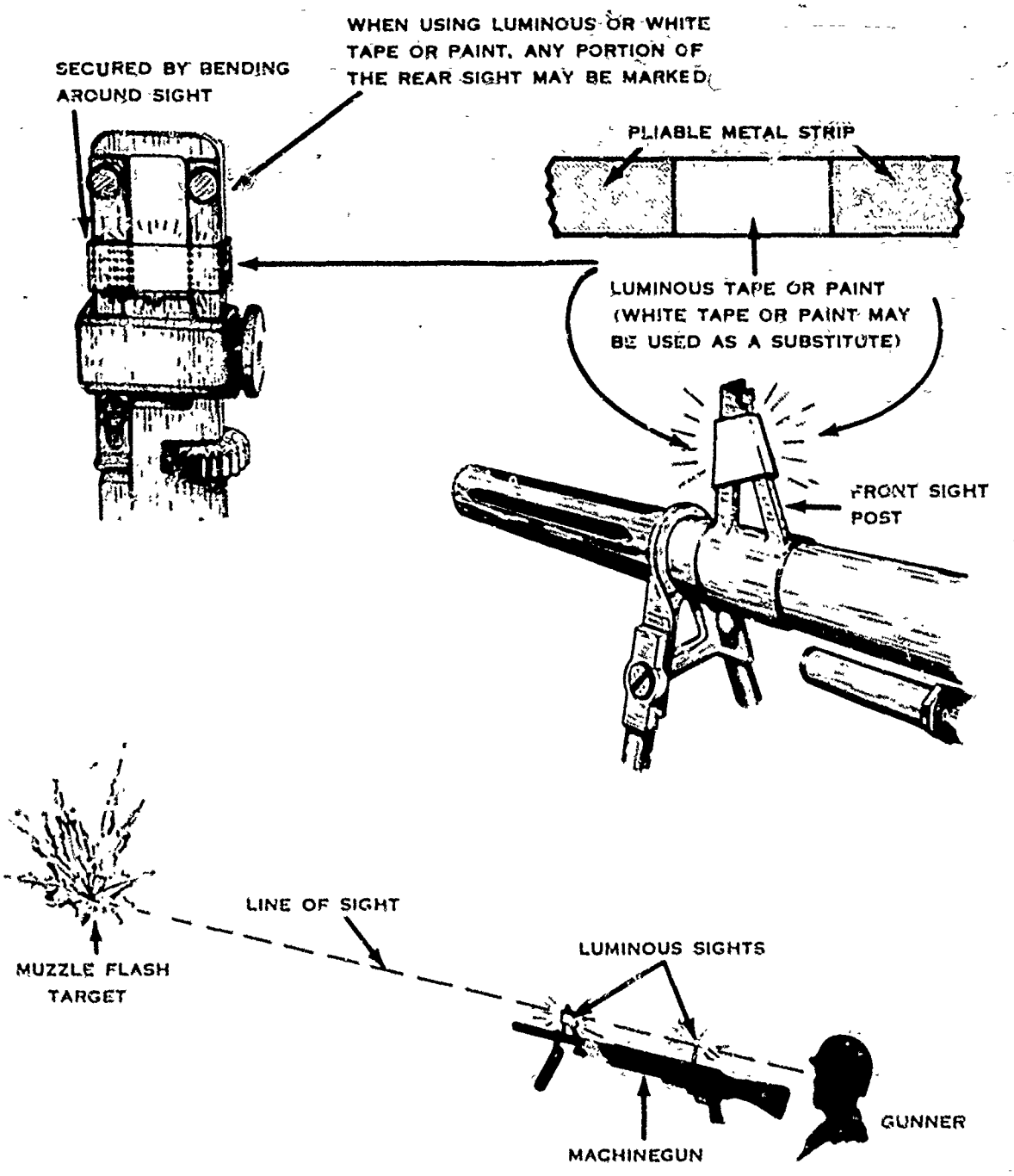


Figure 23. Field expedient night sight and sight picture for the M60, machinegun.

Figure 24. Method of laying gun for grazing fire when ground is level or uniformly sloping.

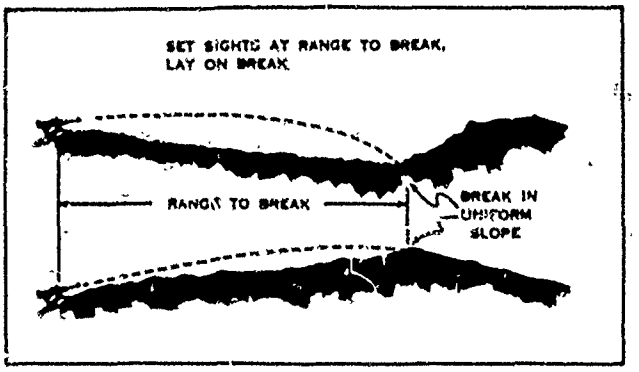


Figure 25. Method of laying gun when there are breaks in the ground at a range less than 600 meters.

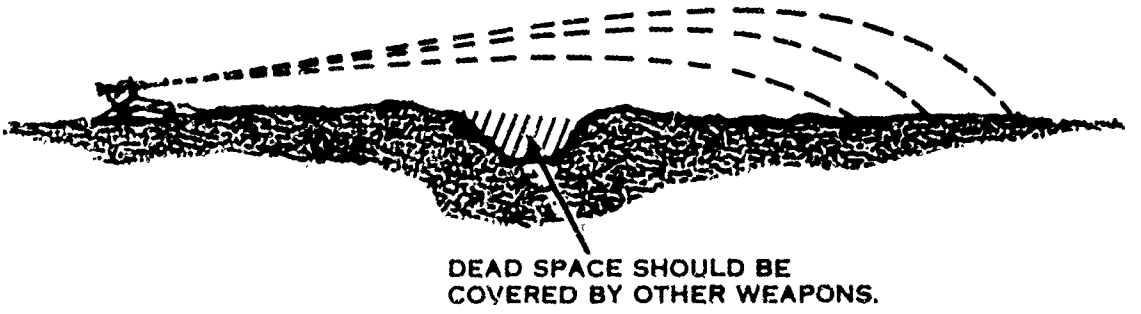


Figure 26. Dead space.

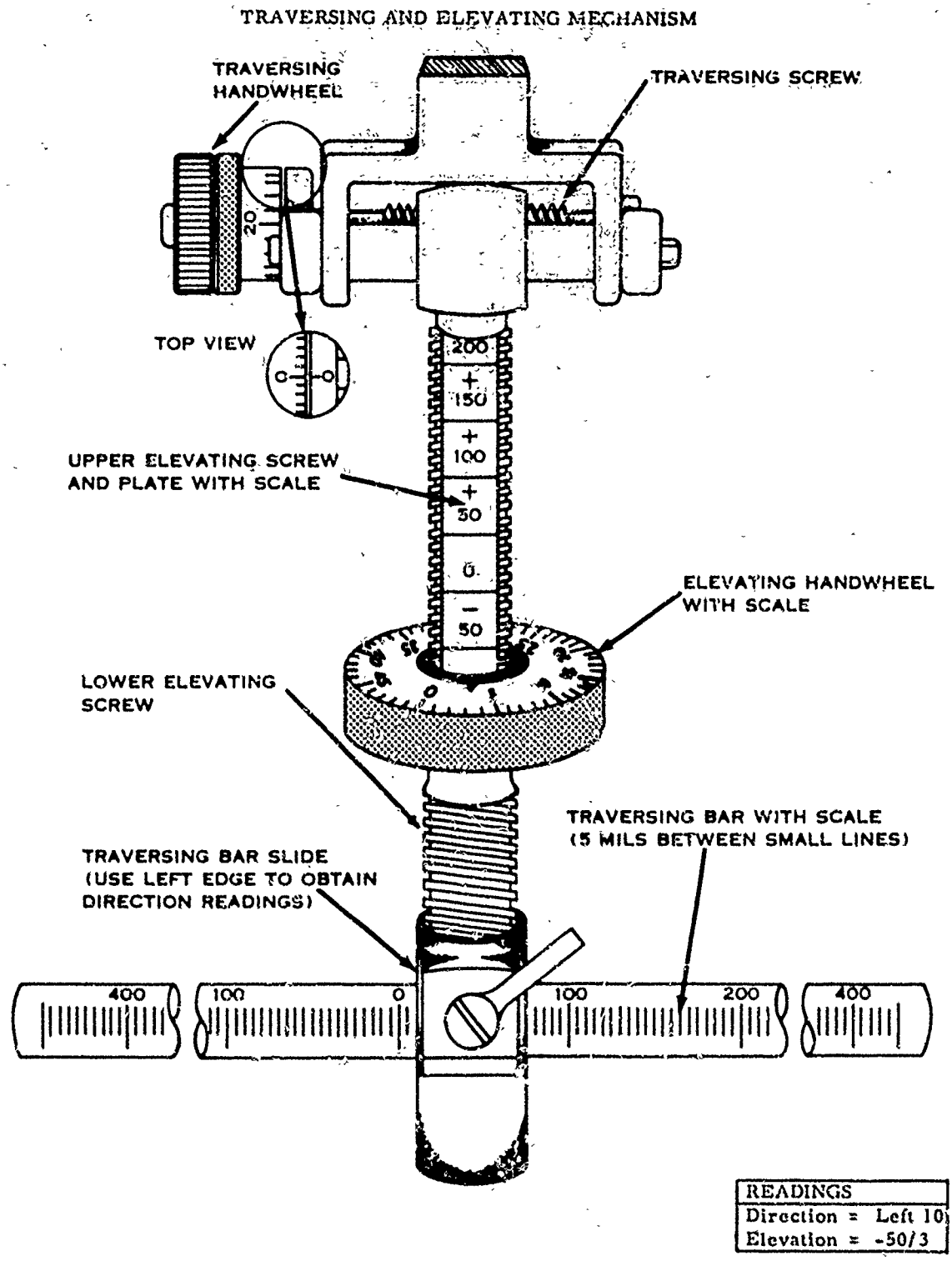


Figure 27. Traversing and elevating mechanism.

Figure 28, Hip Position.

Figure 29. Shoulder Position.

Figure 30. Underarm Position.

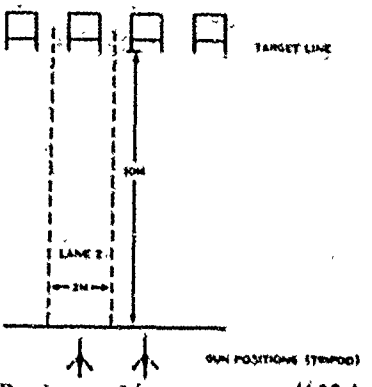


Figure 31. Basic machinegun range (100 lanes).

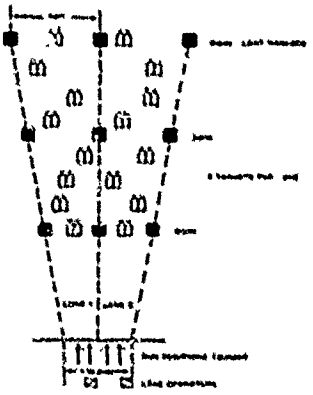


Figure 32. Transition range (10 lanes).

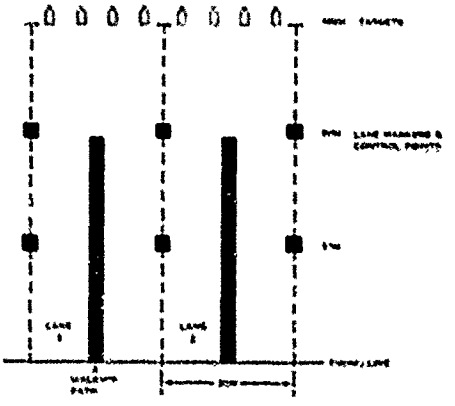


Figure 33. Assault fire range (10 lanes).

NOTE: The assault fire range (Figure 33) can be superimposed on the predetermined fire, field firing range (Figure 35).

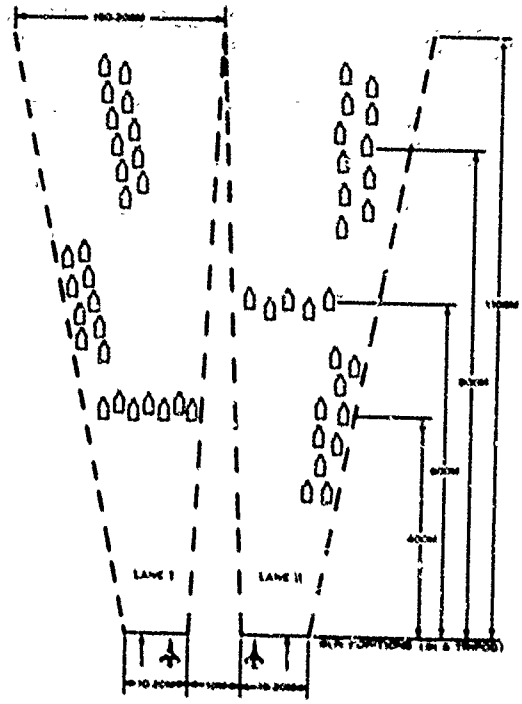


Figure 34. Day defensive field firing range (5 lanes).

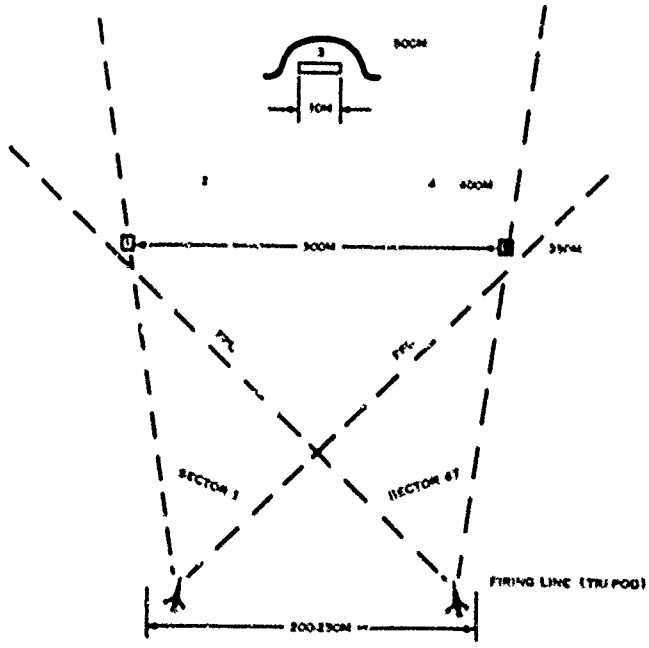


Figure 35. Predetermined fire field firing range (67 positions).

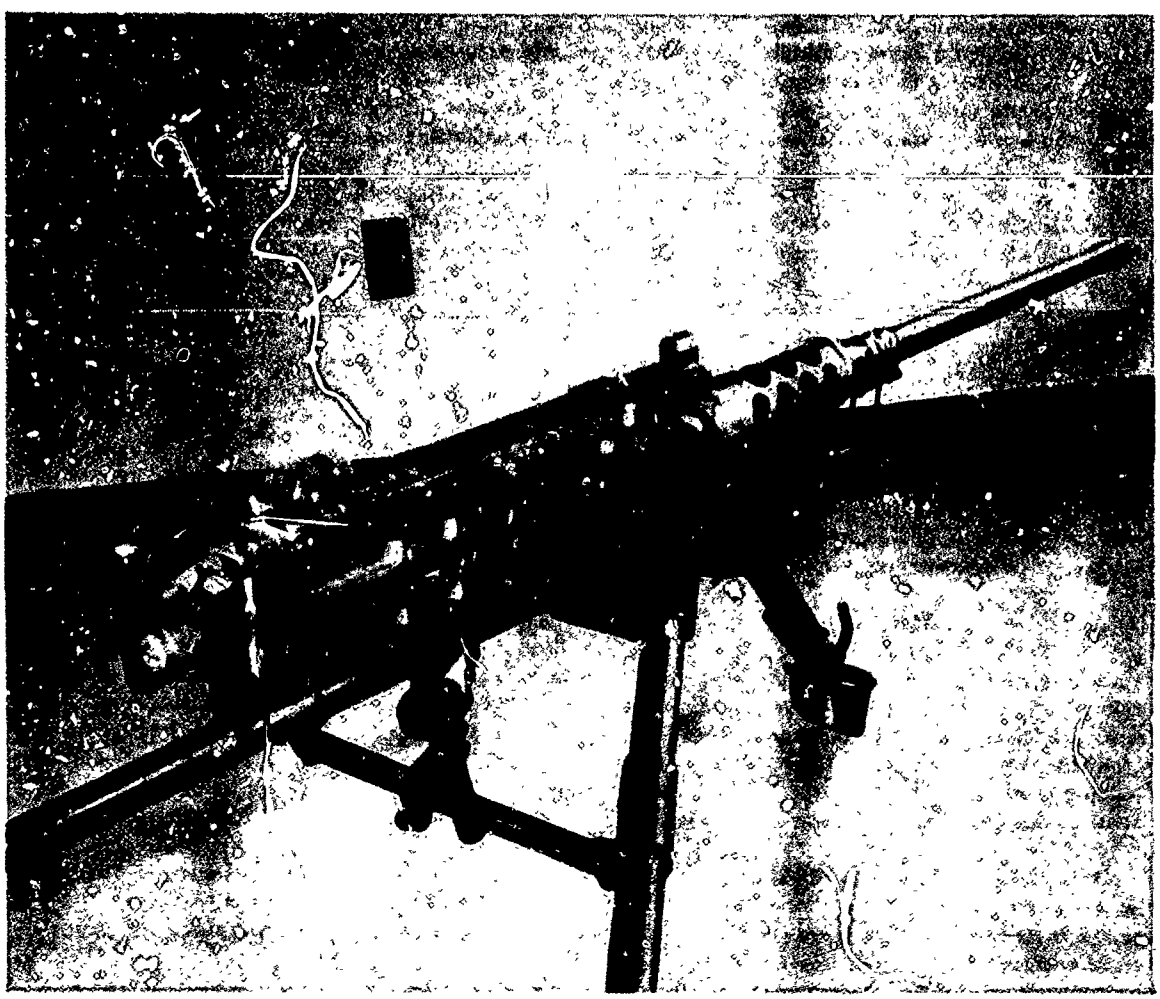


Figure 36. Browning machinegun, caliber .50, HB, M2.

CHAPTER 4

RIFLE SQUAD TECHNIQUE OF FIRE

Section I. INTRODUCTION

132. GENERAL. Tactical success in combat depends in large measure upon a unit's ability to apply and control its fires. Individual infantrymen must therefore be formed into effective fire units. The Rifle Squad is the basic infantry fire unit. Rifle squad technique of fire is the collective application and control of the fires of its members.

133. THE RIFLE SQUAD. The rifle squad consists of one squad leader, two team leaders, three riflemen, two automatic riflemen and two grenadiers. Frequently the squad is organized into two fire teams, the Alfa and Bravo teams. (See para 152a). When so organized the Alfa team consists of a team leader, rifleman, automatic rifleman, and grenadier; the Bravo team is the same except it has an additional rifleman. The Mechanized Infantry Rifle Squad is organized the same plus an additional member, the driver. In training it is advantageous to allow the squad leader to organize his squad for the particular mission assigned.

a. Squad Leader. The squad leader is responsible for all that the squad does or fails to do. In combat some of his responsibilities are fire control and employment of his squad. He positions himself where he can best observe and control the squad and carry out the orders of the platoon leader. He uses his weapon in combat only when his fires are more important than his control.

b. Fire Team Leader. The fire team leader participates in fire fights as a fighter - leader. He leads primarily by example and aggressively carries out the orders of the squad leader.

c. Automatic Riflemen, Grenadiers and Riflemen. These squad members are responsible for effective engagement of various targets using appropriate techniques and SOP's. They remain alert for orders and pass them on to other squad members. The riflemen assist the automatic riflemen and grenadiers in adjusting fire on targets as required.

Section II. RANGE DETERMINATION AND CHARACTERISTICS OF FIRE

134. GENERAL. The ability to determine range and a knowledge of the characteristics of rifle, automatic rifle, and grenade launcher fire are fundamental elements of rifle squad technique of fire. This section supplements paragraphs of other sections on the same subject, and amplifies the importance of range determination and characteristics of fire to rifle squad technique of fire. In the rifle squad, a knowledge and efficient use of these two fundamentals are preliminary to effecive application and control of rifle squad fire.

135. RANGE DETERMINATION. Range determination is the process of finding the distance between the firer's position and his target. All squad members must be able to determine range in order to (1) designate targets, (2) adjust their point of aim, and (3) place the proper sight setting on their weapons, if necessary.

a. Methods of Determining Range. Range can be determined by such means as measuring on maps or with range finders; but in combat, the methods most frequently used by the squad members are the 100-meter unit of measure and the appearance of objects methods (See paragraph 19, c, (3)). To become fully proficient, they must practice both of these methods on varied terrain and under various conditions of light and weather so they can learn how these factors affect their determination.

b. Lateral Distance Measurement. Because lateral measurements in a specific unit of measure are difficult and special instruments are not available to the squad, the members do not attempt to determine lateral distance in meters. Instead, the fingers are used to express lateral measurements. To measure the distance in fingers between a reference point and a target, extend the arm with the palm outward and the elbow locked. Close one eye and sight along the edge of the first finger, placing the edge of the finger along the flank of the target or reference point. Note the space remaining between the two points and then fill the space by raising fingers until the space is covered. The measurement is then stated as being one or more fingers.

136. CHARACTERISTICS OF FIRE.

a. Trajectory, Danger Space, Cone of Fire, Beaten Zone, and Casualty Radius. (See paragraph 103, figure 20, and paragraph 68a.) These characteristics of fire are, in effect, weapons characteristics. Each squad member must understand the capabilities of his weapon and the weapons of other squad members. For example, the slow muzzle velocity of the M79 grenade launcher results in a high trajectory and a longer time of flight. This longer time of flight must be considered when delivering surprise, simultaneous fire on a column of enemy, otherwise the M79 round will not burst in the target area until after rifle and automatic rifle fire has alerted the enemy.

b. Classes of Fire. The fires of the rifle squad are classified with respect to the ground and the target. Fire with respect to the ground is either grazing or plunging (See paragraph 104.a). Fire with respect to the target is frontal, flanking, oblique, or enfilade (See paragraph 104b). Against exposed targets grazing enfilade fire is the most effective, whereas, for dug-in targets plunging fire is most effective. An understanding of these classes of fire, combined with a thorough knowledge of his weapon, gives the squad member the know how to position himself, or allow the enemy to position themselves, so that the most effective type of fire can be attained.

Section III. DAYLIGHT DEFENSIVE TECHNIQUE OF FIRE

137. GENERAL. This section describes the techniques used by a rifle squad for surveillance of a defensive sector of fire, application of fire on combat targets in that sector, and fire control methods used in accomplishing this. It also includes a discussion of the employment of hand grenades by a rifle squad in the daylight defense. Application of Fire and Fire Control are two fundamentals of Technique of Fire, but when put into practice both must be exercised at the same time, supplementing on another, and are discussed accordingly herein. All methods of Fire Control described in FM 23-12 w/C1 should be used. The methods brought out in this text are felt to be most appropriate for a given type of target, but rifle squads are certainly not limited to them.

138. DAYTIME DEFENSIVE SURVEILLANCE. The squad deploys defensively whenever the situation becomes even temporarily static. This may be a halted patrol action, consolidating a seized objective, or providing security for an approach march. When deployed defensively, the squad immediately assumes responsibility for a squad sector of fire. In preparing a deliberate defense there may be ample time for a terrain walk, assignment of squad sectors and even individual sectors of fire. In more flexible situations and for general defensive action, squad members must deploy quickly, determine the sector limits themselves, and apply teamwork to set up a tight defense.

a. Individual Sectors of Fire. Team leaders and riflemen have a sector of fire that corresponds to their position in the squad (See figure 37). They have primary responsibility for, but are not restricted to, this individual sector, and will shift over it as necessary to fire on squad-size targets. They insure an overlap of sectors with one another and with adjacent squads.

The automatic riflemen and grenadiers cover the entire squad sector or they assume overlapping individual sectors. This is done to avoid restricting these key weapons and use their automatic or high explosive fire wherever needed.

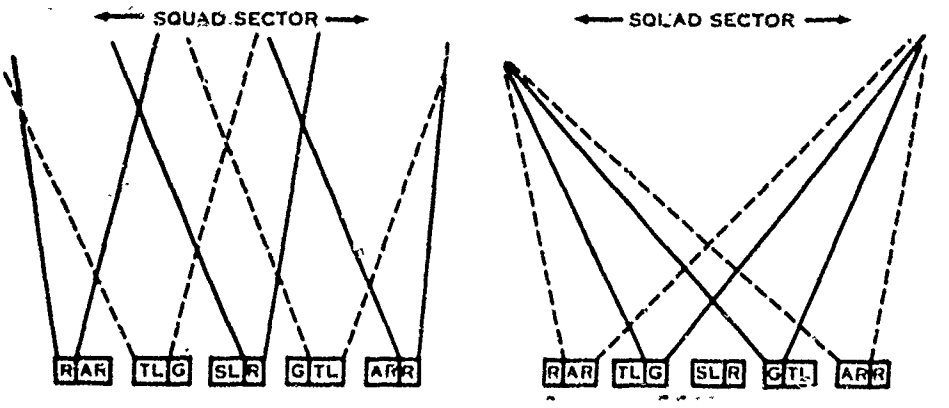


Figure 37. Individual Sectors of Fire.

b. Modified Individual Sectors. The surveillance procedure described in a above is the basic system and should be used wherever possible. However, it may be modified as necessary to fit terrain, vegetation or personnel shortages. For example, in heavily wooded or jungle country it may be necessary for all squad members to take individual sectors of fire or cover trails in order to achieve complete coverage. Grenadiers also might be used to cover avenues of approach or covered routes that are defiladed from rifle and automatic rifle fire. The purpose, whatever the necessary modification, remains the same; welding individual effort together into squad effort.

c. Control. The squad leader uses any or all methods of control to insure that this defensive preparation is effected quickly and properly. Squad members, immediately upon deploying defensively, should pass coordinating information down the line, call out and describe points of overlap to one another, talk it up and make sure they have unity of effort. Control by the squad leader and coordination between squad members is directed toward both proper techniques and a psychological feeling of squad unity.

139. COMBAT TARGETS. As the enemy puts pressure on the defensively deployed rifle squad, various targets will appear in the squad sector of fire. Combat targets for a defending rifle squad are, primarily, target areas that require distribution or concentration of fire and not individuals firing at individuals. Most combat targets consist of a number of men or objects irregularly deployed and using cover such as ground folds, hedges, and borders of woods or ditches. Combat targets are usually detected by smoke, flash, dust, noise or movement and are seen only fleetingly, being rarely visible except in a close assault or when caught in a column. Moreover, when engaging these targets squad members are under stress caused by fear, fatigue, hardship and battlefield noise. There may be a tendency for them to await and fire only at clear targets. They should certainly fire at clearly defined enemy, but they must also fire into clumps of brush, dark shadows, and other likely enemy locations. Technique of Fire emphasizes that effective fire is not gauged simply by the targets or enemy hit, but in large measure by the fear-creating psychological effect and movement-limiting tactical effect of fire on enemy formations. Therefore, target area coverage is emphasized with provisions made for the engagement of individual targets of opportunity when they do appear.

140. COLUMN TARGETS. It is quite consistent with the need for maintaing speed and control and with the tactical doctrine of potential adversaries to remain in column until forced to deploy. Since the advancing enemy wants to retain speed and good control until the last possible minute, the defending rifle squad should be prepared to engage column targets. The column is a movement rather than a fighting formation and the enemy, if caught in this formation, will be exposed and very vulnerable. It is a lucrative target because it permits enfilade fire, the most desirable with respect to the target. Also, the enemy column can be expected to take cover or change formation rapidly once brought under fire.

a. Application of Fire. The column has a center, front and rear which are used as rough approximations in dividing up the target for fire distribution. Squad members shift readily from their individual sectors of fire to engage this squad target. They do not attempt to draw aim on certain individuals in the enemy formation, but distribute fire over their portion of it. (See figures 38 and 39.) Automatic riflemen and grenadiers fire at the center, relying on their beaten zone and casualty radius for distribution.

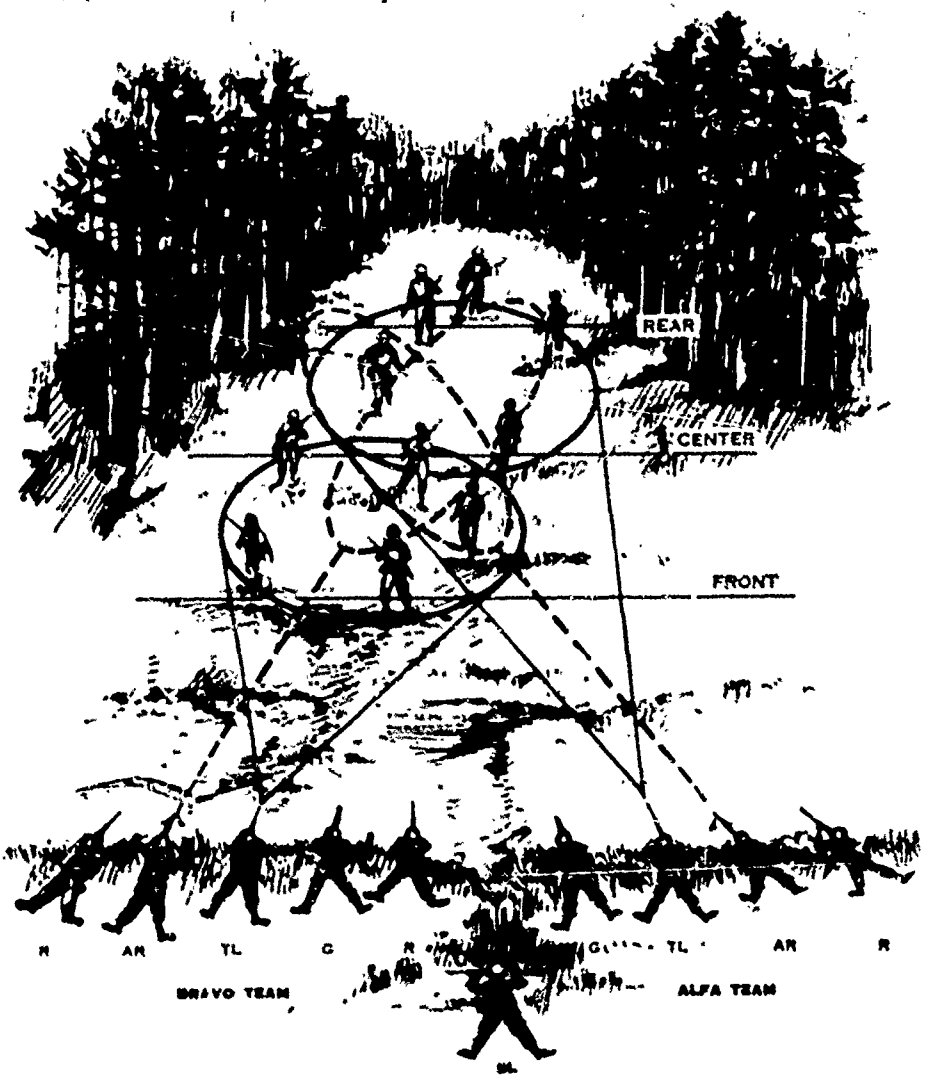


Figure 38. Application of Fire by Team Leaders and Automatic Riflemen on a Column Target.

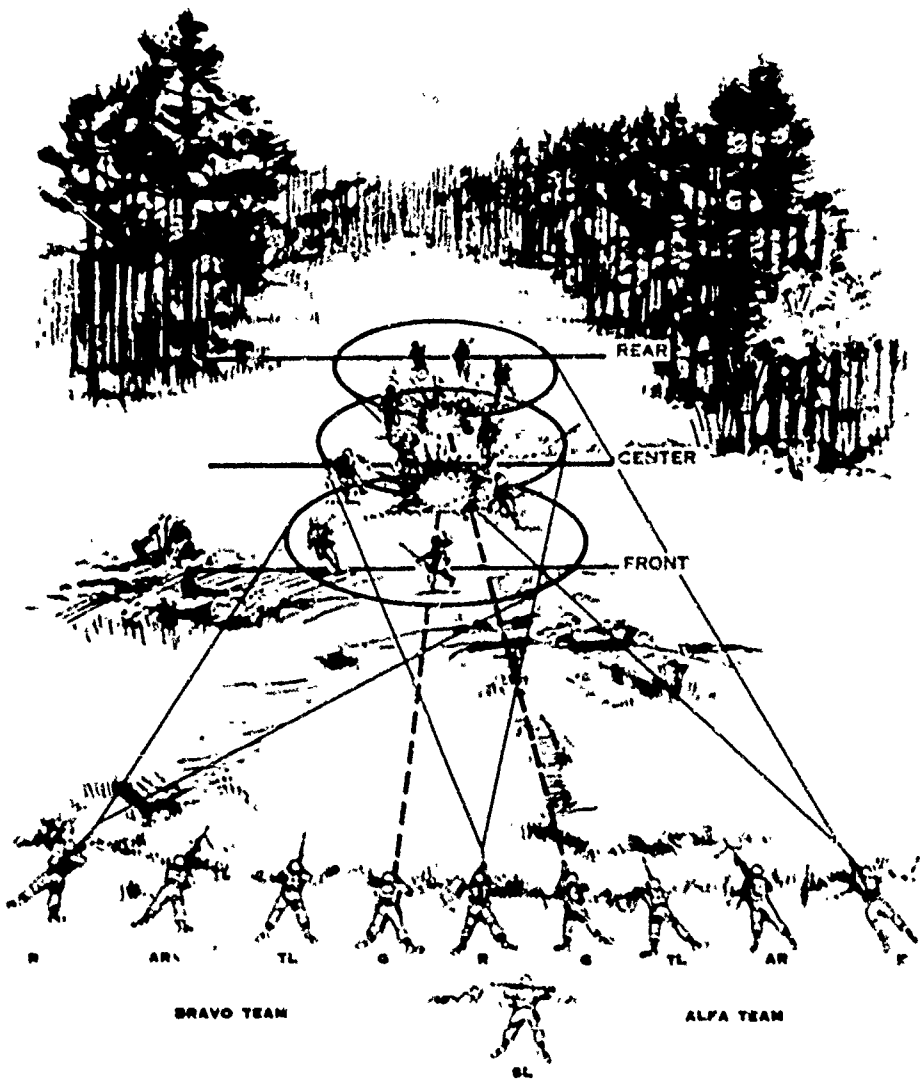


Figure 39. Application of Fire by Grenadiers and Riflemen on a Column Target.

b. Fire Control. The squad leader should exercise close control with signals and subdued voice commands to avoid alerting the enemy into premature deployment, thus losing this lucrative column target. Squad fire should not build up gradually or sporadically, but be delivered in an initially heavy well distributed volume. To achieve this, the signal for opening fire is preceded by any necessary information to insure an almost simultaneous first burst. A good technique is to have the grenadiers fire first and the rifles and automatic rifles open up when the HE bursts on target. Control should also be exercised so that squad members cease fire when the column has been destroyed or dispersed, avoiding wasted fire on dead bodies or open terrain.

141. POINT TARGETS. To cover his deployment and enable attack elements to get in close, the enemy will employ key weapons. The most common point target for a defending rifle squad will be a hastily emplaced supporting automatic weapon. This target would consist of an automatic rifle or machinegun with several crew members nearby. It is potentially very dangerous to the squad and requires quick response and a heavy volume of fire to neutralize it.

a. Application of Fire. Automatic riflemen and grenadiers have primary responsibility for engaging these enemy supporting weapons. The beaten zone and casualty radius of these weapons provide the type of fire needed on such a target. It will probably be detected by sound or flash, with perhaps some movement nearby, and the area coverage of these weapons provides a volume of fire over the target location. Though automatic rifle or grenade launcher fire is most effective, riflemen and team leaders may be used if the other weapons seem unable to neutralize the target. Rifle fire, however, should be used as an expedient measure only.

b. Fire Control. Standing operating procedures are the best method of control on point targets, specifying which squad member will engage enemy supporting weapons when they go into action. This is a combination of the return-fire SOP and a squad SOP designating who will return the fire, depending only on location of the target. If automatic riflemen or grenadiers cannot locate the target and a team leader or rifleman can, these individuals should call out and fire marking rounds. The object is to bring about quick response with an SOP, but the teamwork of all squad members supplements or enforces the SOP. The squad leader should not have to exercise point target control personally unless there is a breakdown in SOP's and teamwork.

142. LINEAR TARGETS. As pressure builds up on a defending rifle squad the enemy will deploy into a fighting formation. He will begin using fire and movement to close in, or attempt to get an assault line moving. The enemy is now getting maximum fire to the front and will present the squad with a linear target. It will not be a parade-ground line formation, but will have more width than depth with the enemy moving, appearing and disappearing, and returning the squad's fire. Fire distribution must be stressed against a linear target.

a. Application of Fire. The center and flanks of the line divide it into two team targets. Squad members distribute their fire over their portion of the squad target, firing at known or suspected enemy locations (See figures 40 and 41.) Automatic riflemen begin at the center and move to the flanks and grenadiers begin at the flanks and move to the center. As on a column, squad members do not hesitate to shift out of their individual sector of fire to engage this squad target, but they check their individual sector frequently for targets of opportunity. The rate of fire against a linear must be rapid enough to gain fire superiority and destroy the enemy or deny him freedom of movement. Once this has been accomplished, the rate may be reduced and individuals will begin picking out known enemy locations rather than distributing fire. By fire superiority is meant that the enemy line has been damaged or immobilized to the point where their return fire or movement no longer poses a serious threat to the defending squad.

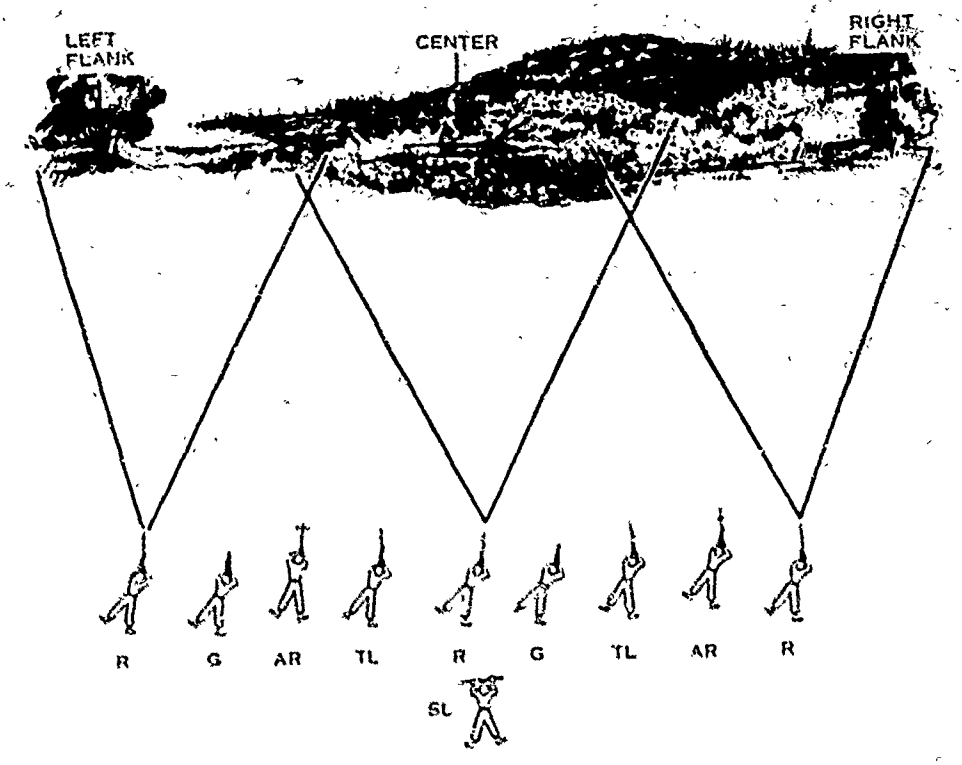


Figure 40. Application of Fire by Riflemen on a Linear Target.

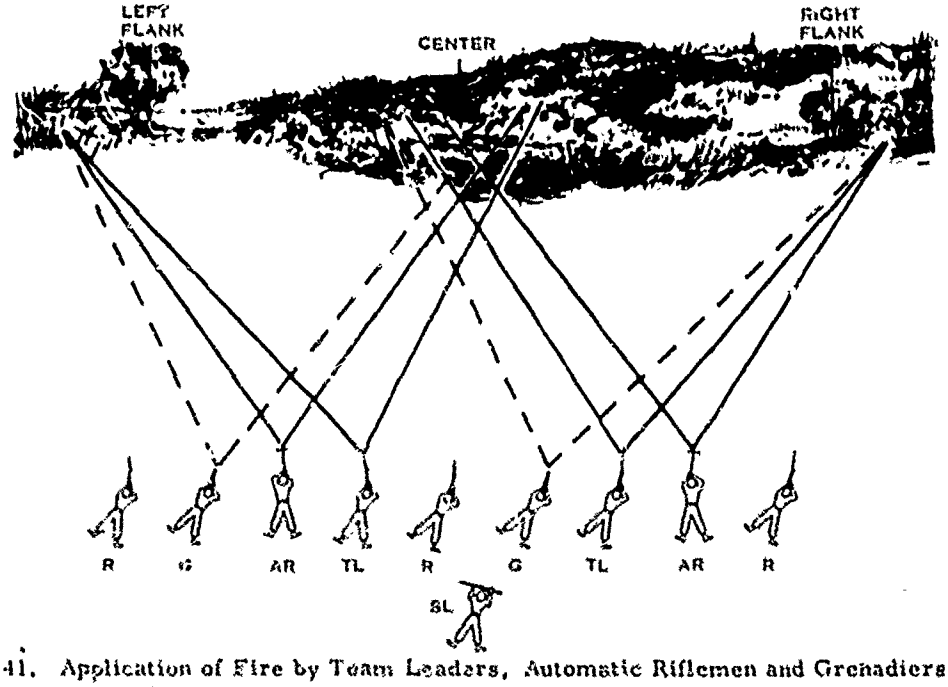


Figure 41. Application of Fire by Team Leaders, Automatic Riflemen and Grenadiers on a Linear Target.

b. Fire Control. Fire on linear targets is controlled primarily by SOP's, heavily supplemented by squad leader personal contact, signals, and orders for readjustment. When the squad engages a linear target they are definitely in a firefight and fire control becomes quite difficult. To eliminate the need for too much movement and control by the squad leader, teamwork should be stressed. One SOP essential to teamwork is the search-fire-check procedure. This means that each squad member applies a continuous cycle of searching, firing, and checking with other squad members, team leaders, and the squad leader to give or receive information and orders. When a 10-man rifle squad can apply this basic procedure effectively we have a fire unit and squad action rather than ten isolated individuals.

143. SHIFTING FIRE. Additional point targets in the form of supporting automatic weapons may be presented to the squad while it is heavily engaged with an enemy line. The squad must redistribute its fire to cover such a target and still maintain coverage of the enemy line. Figures 42 through 44 illustrate alternate procedures that can be used to accomplish this. An individual target of opportunity is engaged by the rifleman in whose sector of fire it appears. Squad members must avoid concentration of fire on such targets and leave them for individual riflemen. A target of opportunity such as an individual enemy moving in the open may be only a diversion to draw fire, and excessive firing on it could lead to loss of fire control.

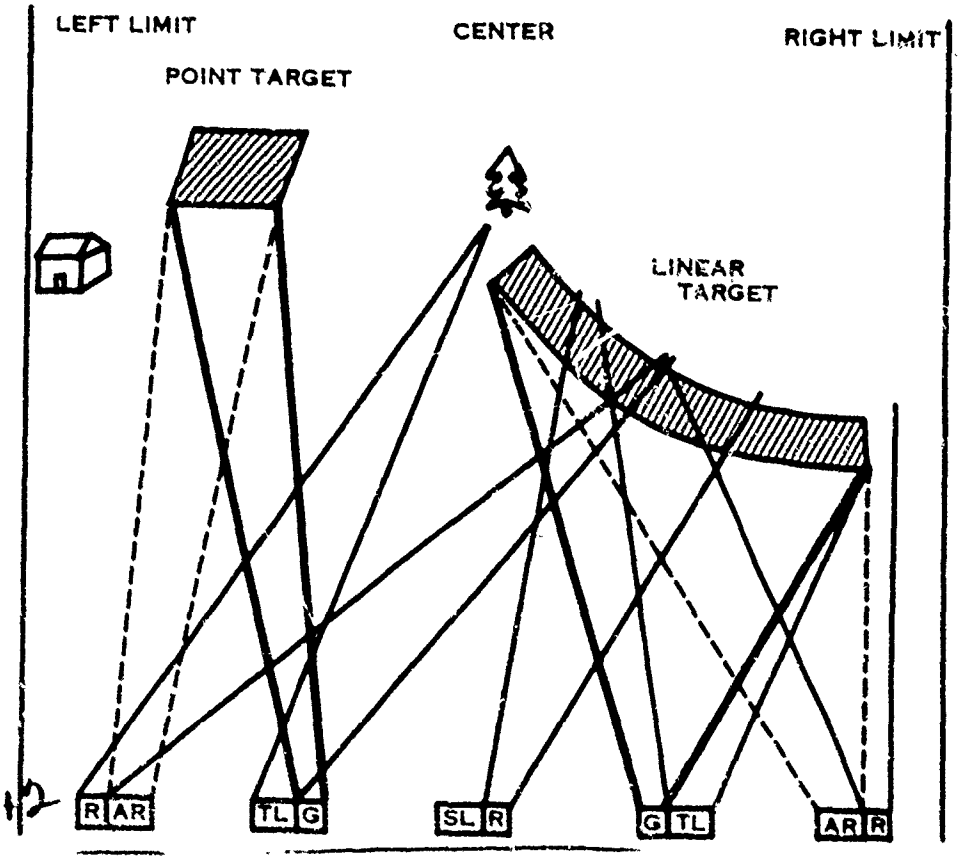


Figure 42. Shifting Fire (Bravo Team Automatic Rifleman and Grenadier Shift to Point Target, Alfa Team Automatic Rifleman and Grenadier Shift to Entire Linear Target.)

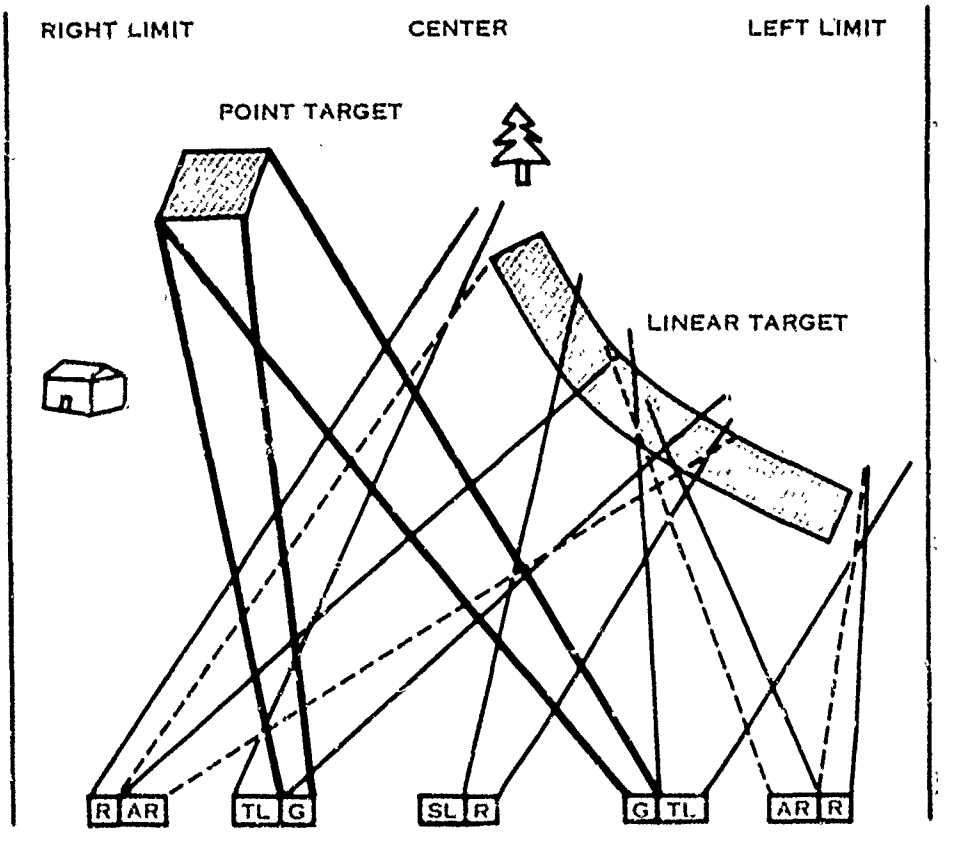


Figure 43. Shifting Fire (Both Grenadiers Shift to Point Target, Automatic Riflemen Continue Firing on Linear Target).

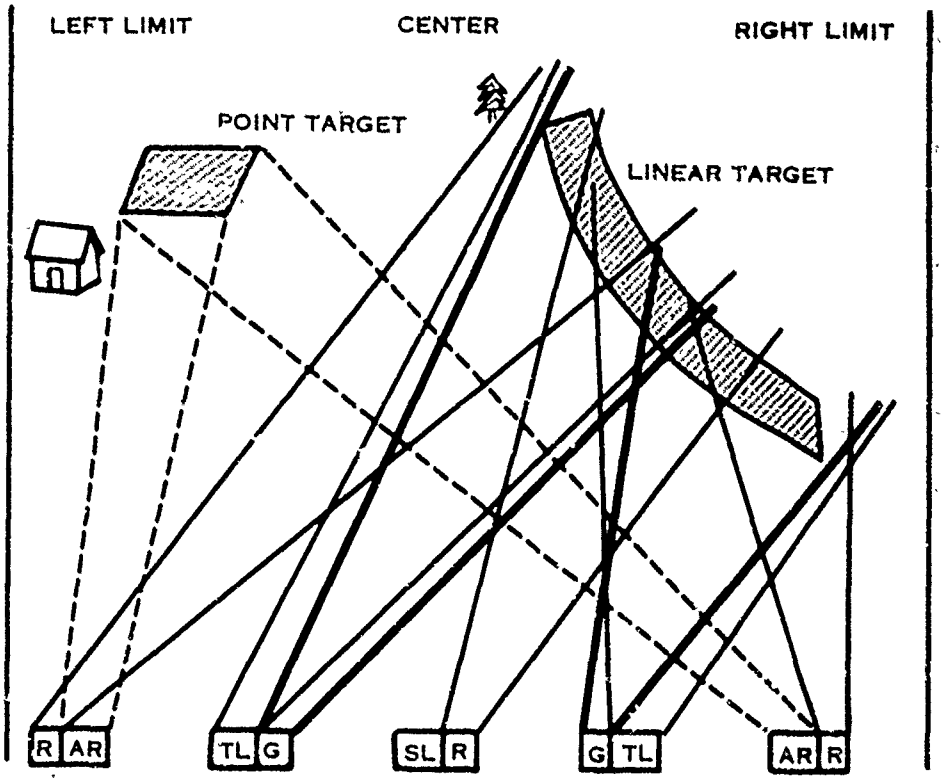


Figure 44. Shifting Fire (Both Automatic Riflemen Shift to Point Target, Grenadiers Continue Firing on Linear Target).

144. DAYLIGHT DEFENSIVE HAND GRENADE TECHNIQUES. The hand grenade is most effective when flat trajectory fire does not bring a decision. That is, if the enemy is using depressions or ground folds which render direct fires at close ranges ineffective. The hand grenade is not used as a separate weapon, but is used in conjunction with other fires. As a general rule, if the enemy is in the open---fire, if he has taken cover or gone to ground---throw. Specific individuals within teams or between buddies do the throwing, with the thrower always covered by a firer. This precludes a man being caught in the act of throwing by an enemy rush. Extra grenades should be located where they will be most needed, such as covered or concealed routes into the squad's position, and the best throwers designated if possible. Grenade fire, just as all rifle squad fire, should be controlled so as to avoid wasting grenades on inappropriate targets or with poor throws.

Section IV. DEFENSIVE TECHNIQUE OF FIRE DURING PERIODS OF LIMITED VISIBILITY

145. GENERAL. Since artificial illumination will not always be effective, available or desirable, the squad must be able to apply and control its fires at night and during daytime operations when visibility is limited by smoke, fog, or snow. During these periods of limited visibility no single individual can see the entire squad front; when targets are detected there will not be time to alert other squad members; most of the methods of fire control used during periods of good visibility cannot be used; and at night there is a tendency for the squad members to fire indiscriminately at noises, shadows, and targets which are not appropriate for their fires.

146. SURVEILLANCE.

a. Team Leaders and Riflemen. Each team leader and rifleman searches that portion of the squad sector which corresponds to his position in the squad out to the limits of visibility. The occupant(s) of a foxhole is (are) responsible for insuring continuous contact between foxholes or with adjacent squads. See fig 45. This insures complete surveillance of the squad sector out to the limits of visibility and prevents undetected enemy penetration between individual or squad positions.

b. Automatic Riflemen and Grenadiers. The automatic riflemen and grenadiers are responsible for engaging targets anywhere in the squad sector. They are not, therefore, normally assigned an individual sector of surveillance. They watch for and fire on targets which become visible anywhere in the squad sector.

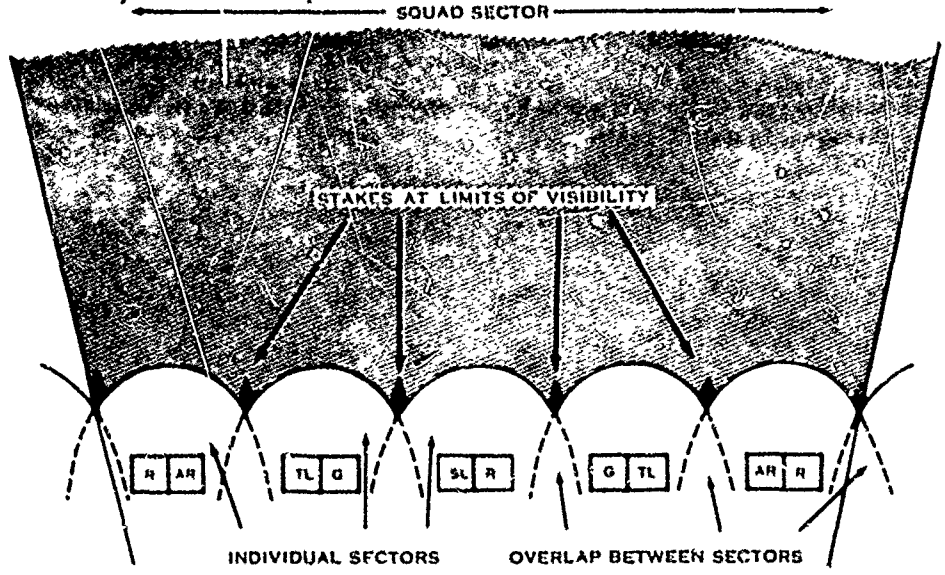


Figure 45. Surveillance by Team Leaders and Riflemen During Periods of Limited Visibility

147. APPLICATION OF FIRE.

a. Visible Targets. In order to obtain the most effective engagement of visible targets and prevent indiscriminate firing, the following techniques are applied:

(1) Team Leaders and Riflemen. Team leaders and riflemen, using the pointing technique, fire only at assaulting enemy they can see well enough to aline their weapons on. They do not fire at the flashes of enemy automatic weapons unless ordered to do so by the squad leader.

(2) Automatic Riflemen. The primary targets for automatic riflemen are enemy automatic weapons in the squad sector that are firing effectively on the squad or other friendly elements from a fixed position. The field expedient sight illustrated in figure 46 must be used to effectively engage such targets. Using the muzzle flash of an enemy automatic weapon as their aiming point and firing in three to five round bursts, the automatic riflemen can place a heavy volume of fire in the area of the enemy weapon. Automatic riflemen fire at visible assaulting enemy first if they pose a greater threat to the squad than enemy automatic weapons.

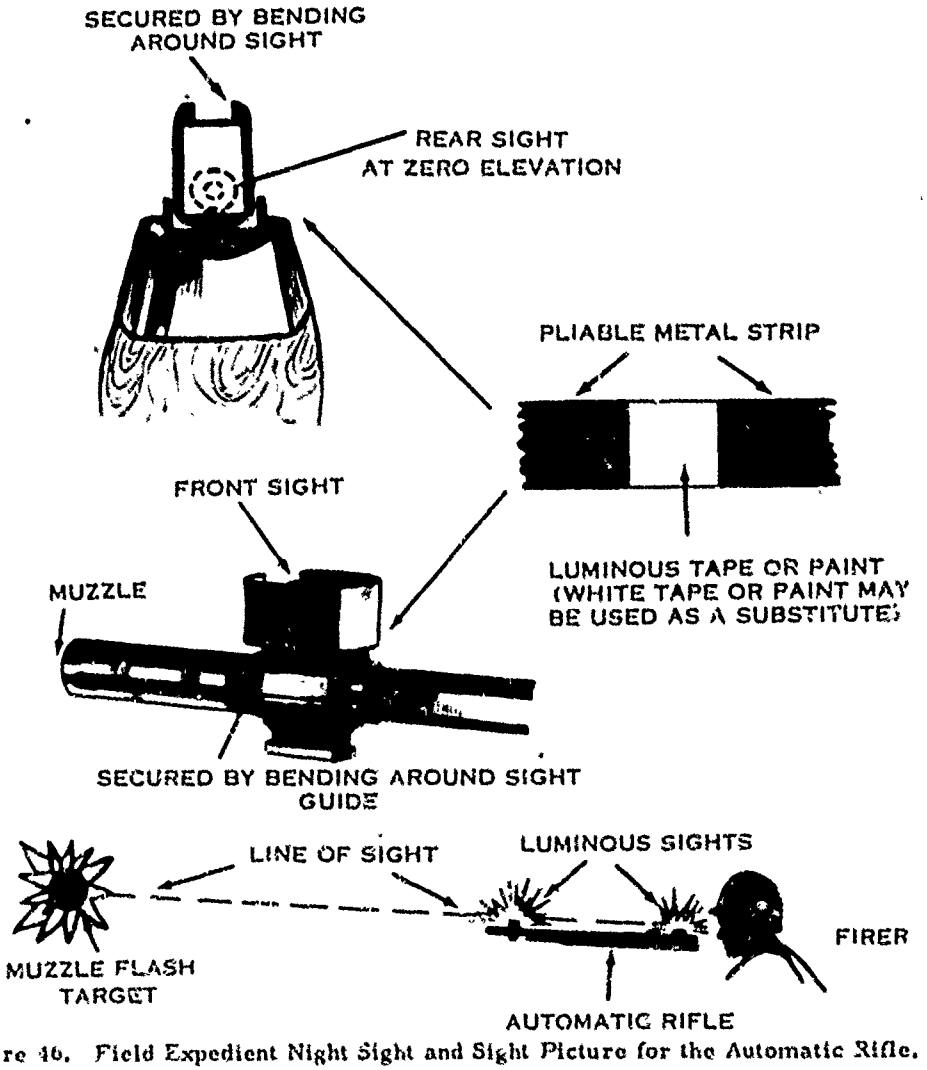


Figure 46. Field Expedient Night Sight and Sight Picture for the Automatic Rifle.

(3) Grenadiers. The primary targets for grenadiers are enemy automatic weapons. The grenadiers must have sufficient visibility to determine the range and adjust their fires if their fire is to be effective against muzzle flash targets. In the absence of primary targets or sufficient visibility the grenadiers use the pointing technique to fire at assaulting enemy. The grenadiers fire at assaulting enemy first if they pose a greater threat to the squad than enemy automatic weapons.

b. Preplanned Fire. Preplanned fires are delivered beyond the limit of visibility on the enemy before his attack reaches the assault stage. These fires are planned during daylight to cover likely avenues of approach, anticipated enemy automatic weapons positions, and probable enemy assault positions during periods of limited visibility. The field expedients for delivery of preplanned fires are emplaced and their alinement verified during daylight. Figure 47 shows the expedients used to deliver preplanned fires.

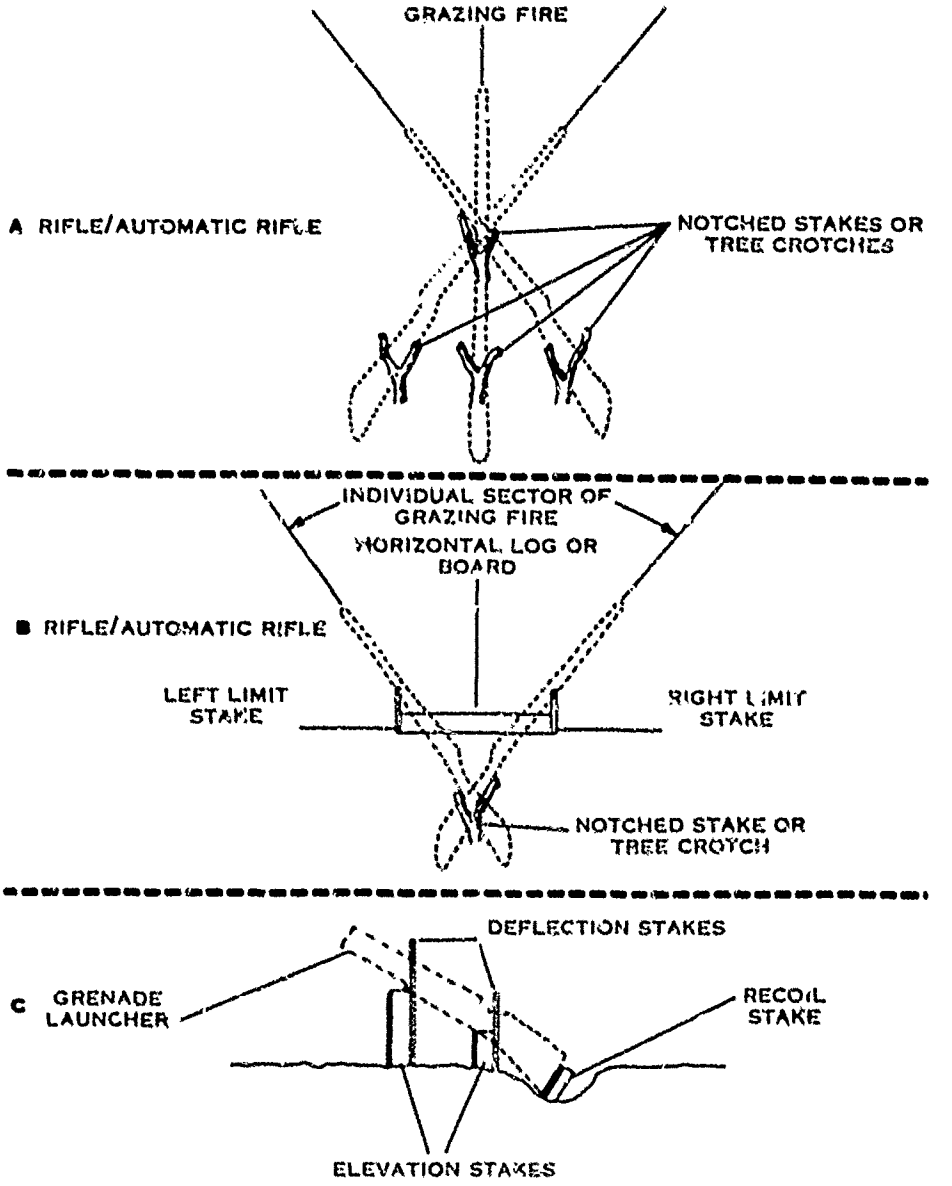


Figure 47. Field Expedients for Delivery of Preplanned Fires.

148. FIRE CONTROL. Many of the methods of fire control used during periods of good visibility will not work during periods of limited visibility. The squad leader cannot see his men, the terrain, or the enemy except in his immediate vicinity. For these reasons special techniques have been developed to control squad fire. ----------THEY MUST BE KNOWN AND PRACTICED BY THE RIFLE SQUADS.----------

a. Opening Fire. Each squad member opens fire without command when he sees an appropriate target. Team leaders and riflemen do not fire at noises or muzzle flashes unless ordered to do so by the squad leader. They fire at observed enemy personnel only. Automatic riflemen and grenadiers open fire without command on enemy automatic weapons or on observed enemy personnel. All squad members deliver preplanned fires on order ONLY.

b. Distributing Fire. With each rifleman and team leader searching his sector and opening fire when an enemy appears or when ordered to deliver preplanned fire, fire distribution will be automatically achieved against the enemy both beyond and within the limit of visibility.

c. Shifting and Concentrating Fire. The squad members who observe no enemy in their sectors during an attack should check adjacent sectors. If they observe targets there, they shift their fire to these targets and after several rounds check their sectors of surveillance.

d. Ceasing Fire. The squad members should cease fire without command when they no longer see appropriate targets. The squad members cease delivering preplanned fires on command, when a visible target appears or when a planned number of rounds have been fired.

149. AMMUNITION CONSERVATION. Proper application of fire and fire control automatically conserves ammunition in that indiscriminate firing will be prevented.

150. CONTROL BY THE SQUAD LEADER. The squad leader must continually supervise to insure these techniques are being applied properly. During a fire fight he must move to a position where he can best influence the action, exerting his leadership in every way possible. When necessary he supplements the techniques of applying and controlling fire with appropriate orders.

Section V. ASSAULT TECHNIQUE OF FIRE

151. GENERAL. The rifle squad must be able to move and to deliver effective fire during fire and movement, and to execute a rigorous, rapid assault delivering a heavy volume of well distributed fire. The differences between the assault during daylight and during periods of limited visibility are minor.

152. FIRE AND MOVEMENT. The rifle squad uses fire and movement when it cannot sufficiently reduce the effectiveness of the enemy fire for the employment of assault techniques. Fire and movement occurs when one element of the squad fires on the objective while the other element advances toward the objective, and these elements rotate the functions of firing and moving.

a. Organization for Fire and Movement. The two fire teams of the rifle squad provide the squad leader with the two elements for executing fire and movement. However, the organization of the fire support and the movement elements is not necessarily fixed to the fire team.

b. Fire Support Element. The fire support element covers the movement element in its advance by engaging all known or suspected targets. This element is aggressive in its action and continues to move closer to the objective if such action is possible without reducing the volume of fire. See Figures 48 and 49.

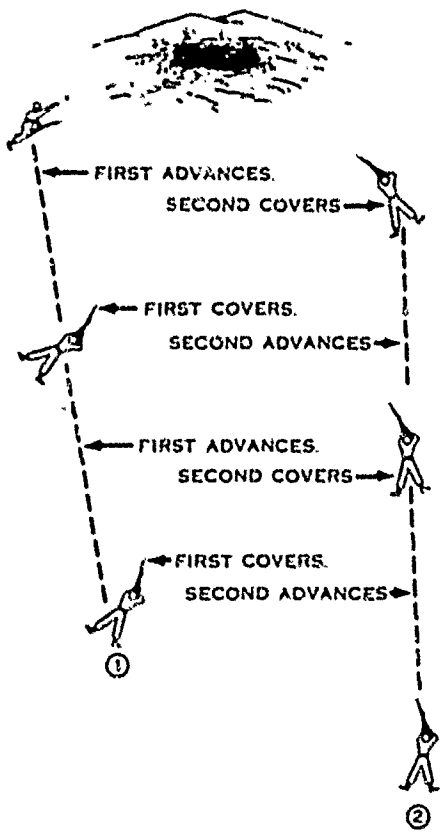


Figure 48. Individual Fire and Movement.

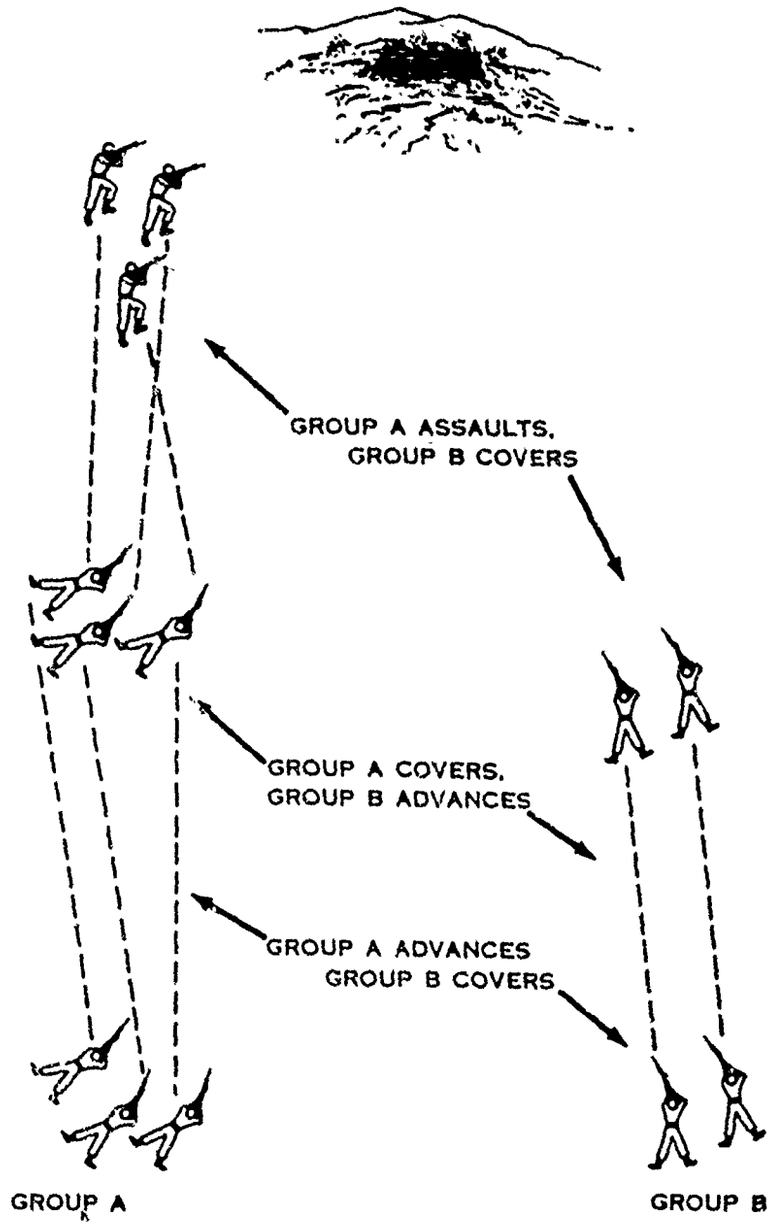


Figure 49. Group Fire and Movement.

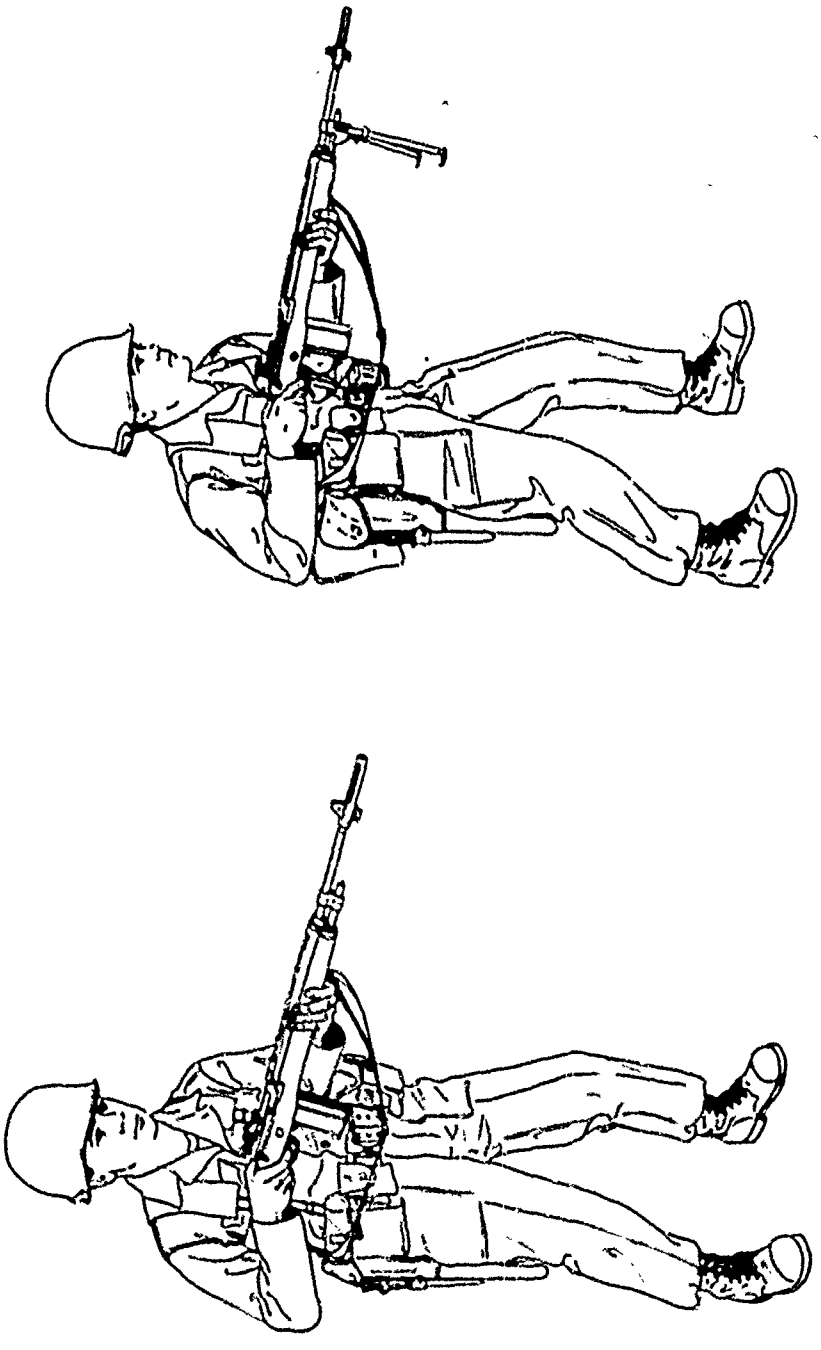


Figure 50. The Underarm Firing Position.

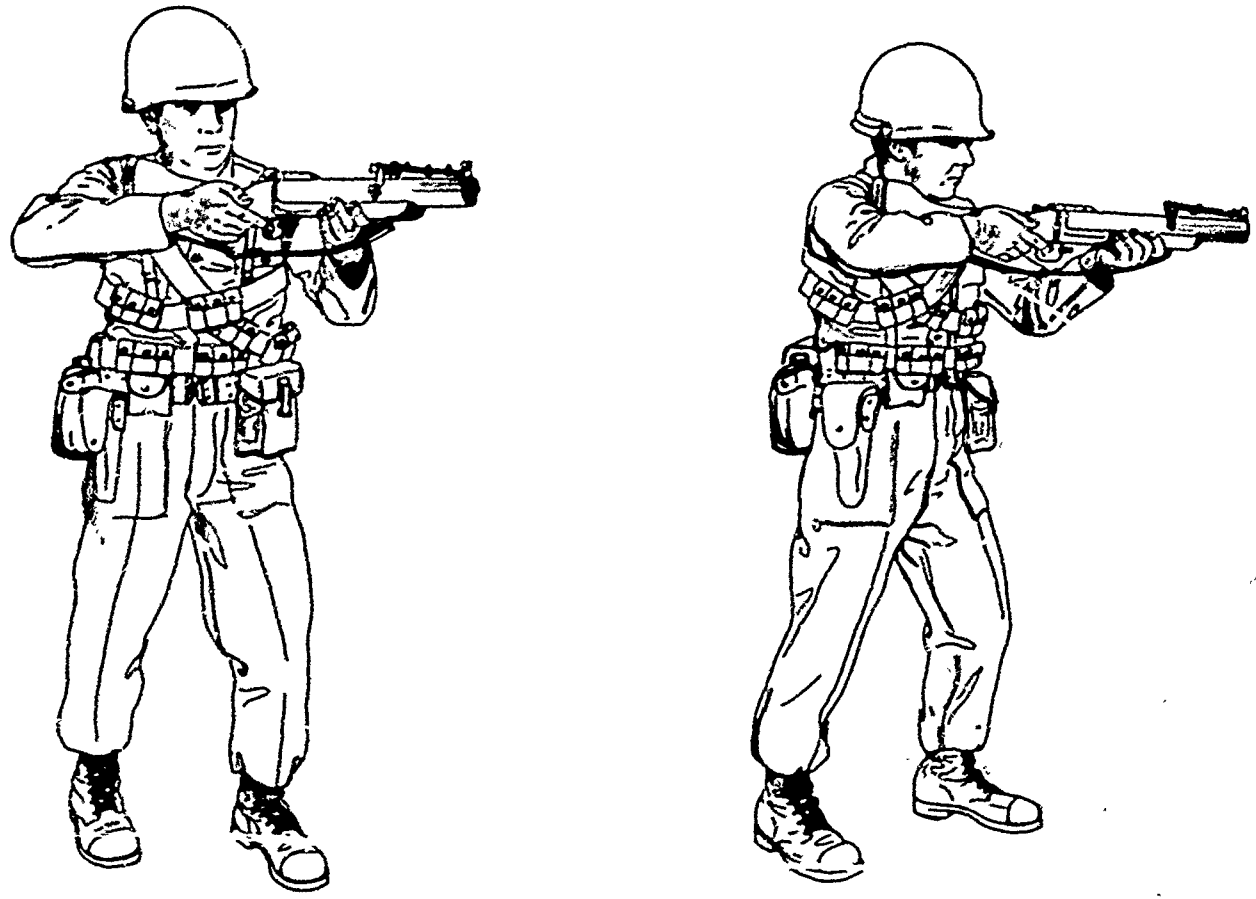


Figure 51. Grenadiers Firing Positive.

153. ASSAULT. Once started the assault must be rapid and aggressive. It is characterized by volume and accuracy of fire and violence of action. The squad members shout and create as much noise as possible. All available weapons to include hand grenades and bayonets are used to destroy the enemy. The assault will be conducted during daylight after the squad crosses the final coordination line and when the fires of the enemy have been neutralized or sufficiently reduced. During periods of limited visibility the assault commences when the squad(s) are on line, at or beyond the Probable Line of Deployment, and receive effective enemy fire.

a. Firing Position. The team leaders, riflemen, and automatic riflemen use the underarm firing position. (Figure 50). During daylight the riflemen and team leaders fire well directed shots from the shoulder or from the underarm firing positions. The grenadiers use the pointing technique illustrated in Figure 51.

b. Movement and Alinement.

(1) The squad moves as rapidly as possible consistent with its ability to fire effectively and maintain alinement.

(2) A base man or a base fire team is designated in each squad. During periods of limited visibility the base man is extremely important to alinement. All squad members guide on the base. By controlling the speed of the base man or fire team, the squad leader can control the speed and direction of the squad.

(3) Contact is maintained between all squad members. The interval between squad members is determined by the terrain and the degree of visibility. During periods of limited visibility the interval will seldom exceed 10 meters.

(4) The squad members maintain alinement by visual contact and, at night, sensing muzzle flashes to their flanks.

(5) Squad members DO NOT STOP during the night assault.

c. Reloading. The squad members must reload rapidly to avoid lulls in firing. Rapid reloading is achieved by applying the following:

(1) Prior to the assault, squad members check their ammunition to be sure it is clean and serviceable. Magazines are inspected to insure they are clean and will work in the magazine recess.

(2) Ammunition is carried in a manner which will facilitate rapid reloading. All ammunition pouches are cleared of material which may interfere with the handling of magazines. Magazines are placed in the pouches for easy insertion in the magazine recess. When bandoleers are used to carry ammunition, all wrappings are removed.

(3) Squad members must retain their empty magazines. This can be accomplished by either placing them inside their jackets, in empty sandbags, or other containers attached to their belts.

(4) Grenadiers remove the plastic protective cups from the grenade launcher rounds and carry them loose in the ammunition pouches.

d. Keeping Fire Down. The squad members must make an initial bold depression of the muzzles of their weapons to overcome their tendency to fire high. During periods of limited visibility the use of tracer assists in adjustment of fire and has a demoralizing effect on the enemy.

c. Fire Distribution. See Figure 52.

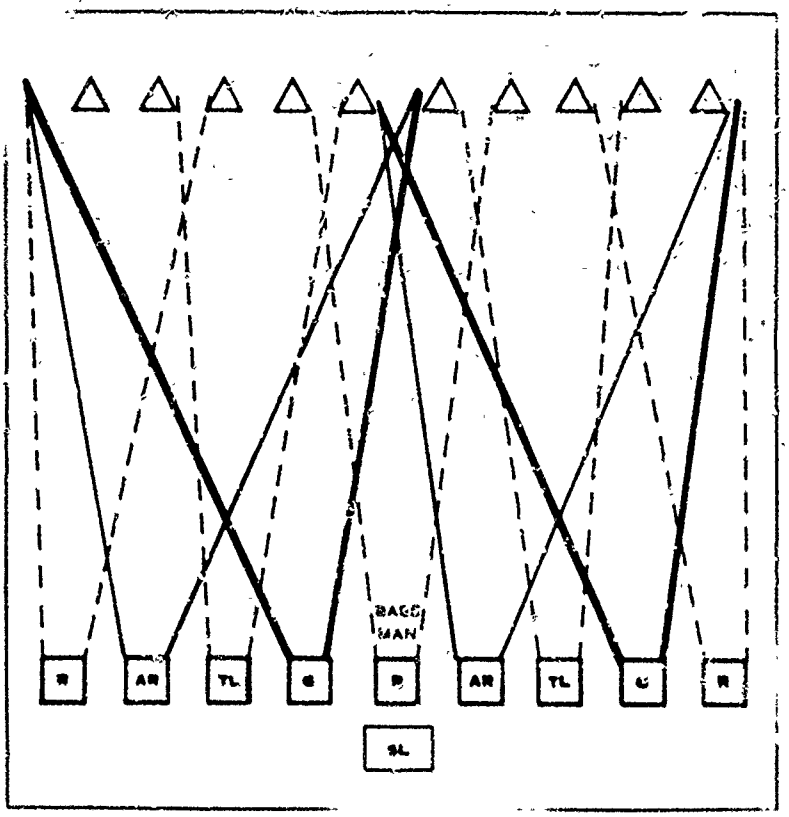


Figure 52. Assault Fire Distribution.

Section VI. TRAINING AND TARGET DEVICES

154. TRAINING.

a. Characteristics of Rifle Squad Technique of Fire Training. All rifle squad technique of fire training is characterized by:

(1) Development and application of standing operating procedures which will:

(a) Train the squad member to react automatically and without command.

(b) Assist squad leaders in controlling and directing their men more effectively.

(c) Provide leaders more time to concentrate on tactical matters during combat.

(2) Presenting realistic combat targets during live fire exercises.

(3) Objectively scoring all live fire exercises and conducting thorough and accurate critiques.

b. Training Conducted in Advance Individual Training. Department of the Army Training Circular 23-9 Technique of Fire and Tactics, Rifle Squad describes in detail 56 hours of training conducted in Advanced Individual Training (Army Subject Schedules 7-11 B, 7-11 C and 7-11 H). The objective of this block of instruction is to make the trainee an effective member of a rifle squad engaged in combat.

c. Training Conducted in Basic Unit Training. If the soldier's proficiency obtained in Advanced Individual Training is to be maintained, then it must be periodically reviewed in the unit to which he is assigned. It is essential to unit combat readiness that all rifle squads be capable of effectively applying and controlling their fires. Rifle squad technique of fire training is integrated with tactical training most efficiently in live fire tactical exercises.

155. TRAINING DEVICES.

a. Figures 53 through 56 illustrate the Standard target devices used in live fire exercises on permanent range facilities. These target devices are used primarily in Advanced Individual Training.

b. Figures 55 through 63 describe expedient and available standard target devices for use in the unit training cycle.

156. CHECKLIST. The following technique of fire checklists are recommended for use in tactical live fire exercises. (See pages 139-142.)

Figure 53
Target Holding Mechanism M-30. This is a motor driven device used as a target for automatic or semiautomatic fire. This device will accommodate a double target, "E" or "F" type silhouettes and has a hit-count-and-kill capability. This device is used on all rifle squad Technique of Fire and Tactical Ranges. For installation and operation, refer to FM9-6920-216-14.

Figure 54

Target Holding Mechanism M31A1. This is a motor driven device that will accommodate only one "E" or "F" type silhouette. This device has a kill capability only. The devices are used on Rifle Marksmanship Record and Field Firing ranges. For installation and operation, refer to TM 9-6920-203-34P.

Figure 55

Night Firing Target Mechanism M-40. This device is a portable, electro-mechanical training device used in night training for small arms. It simulates the flash of a gun and presents a barely discernible silhouette to the soldier(s) firing at it. The device will accommodate 15 target locations, and also a counting capability. The device is used on Rifle Squad Assault Technique of Fire Ranges. For installation and operation refer to TM 9-6920-205-14.

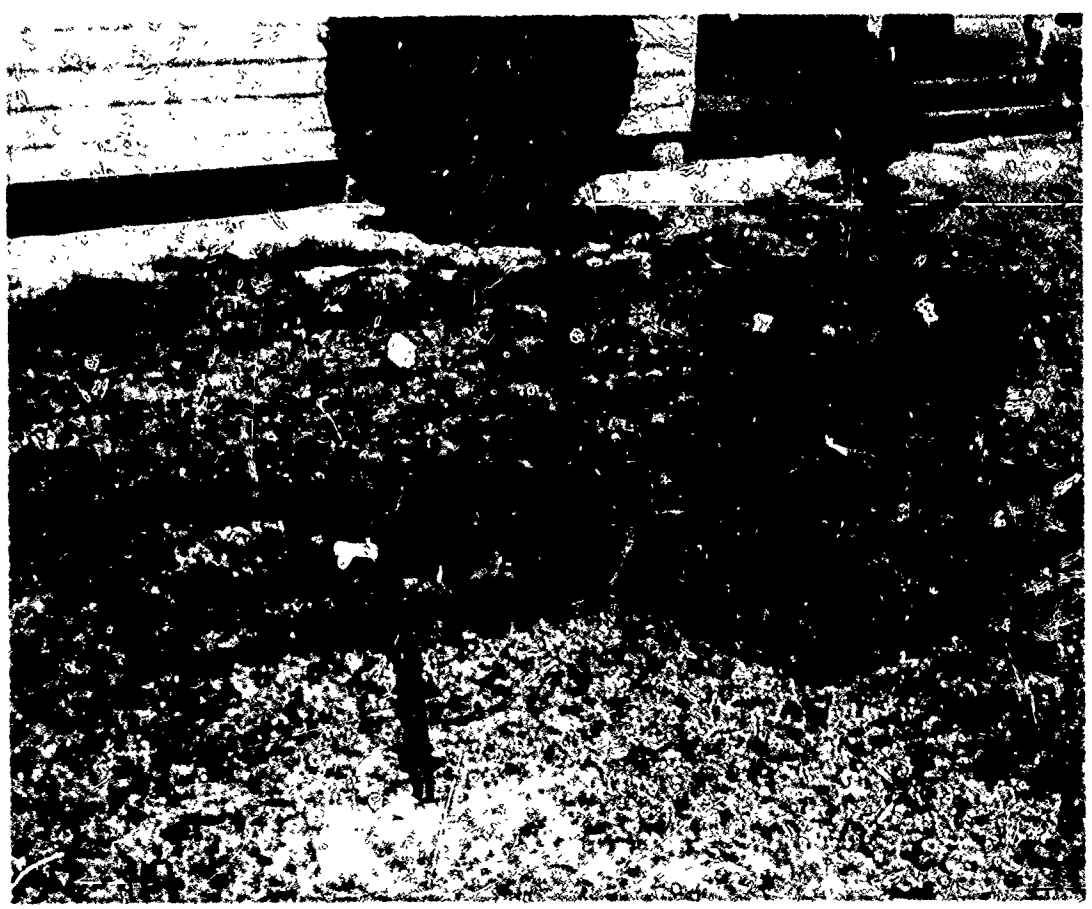


Figure 56

Small Arms Fire Simulator XM-2. The small arms fire simulator, XM-2, produces flash, noise and smoke to simulate either rifle or machine gun fire. This device can be used on assault, defense and technique of fire ranges. For installation and operation, refer to TM 9-6920-204-14.

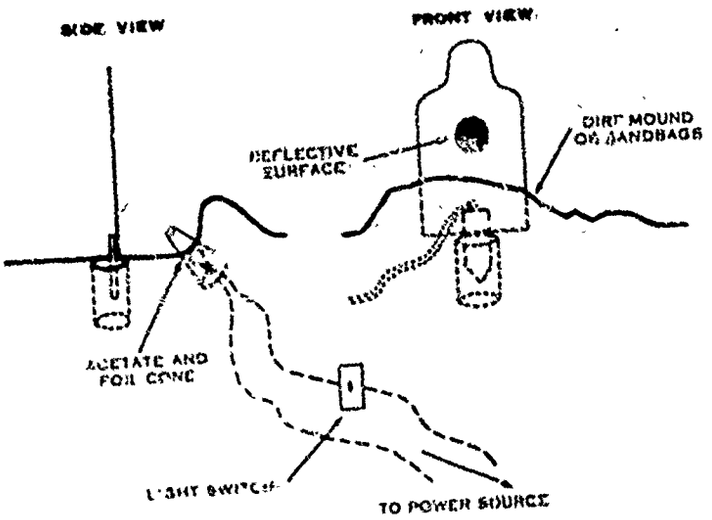


Figure 57

Flashing Target Device for night assault range. This flashing device is used on night assault ranges to simulate enemy small arms fire being placed on the assaulting squads. This flashing system can be used in conjunction with the device shown in Figure 55.

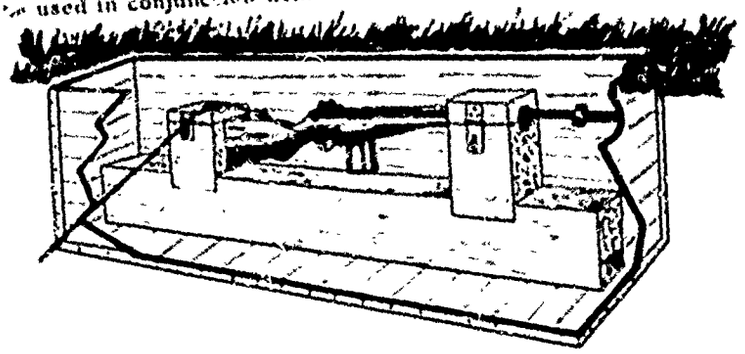


Figure 58

Rifle Mount for installation in a Pit. This Box with M-14 or M-1 Rifle can be used on all Rifle Squad Techniq e of Fire and tactical ranges. These boxes placed throughout various target situations can be used to simulate enemy small arms fire and add realism to problems. The weapons are fired by a pully and cable arrangement.

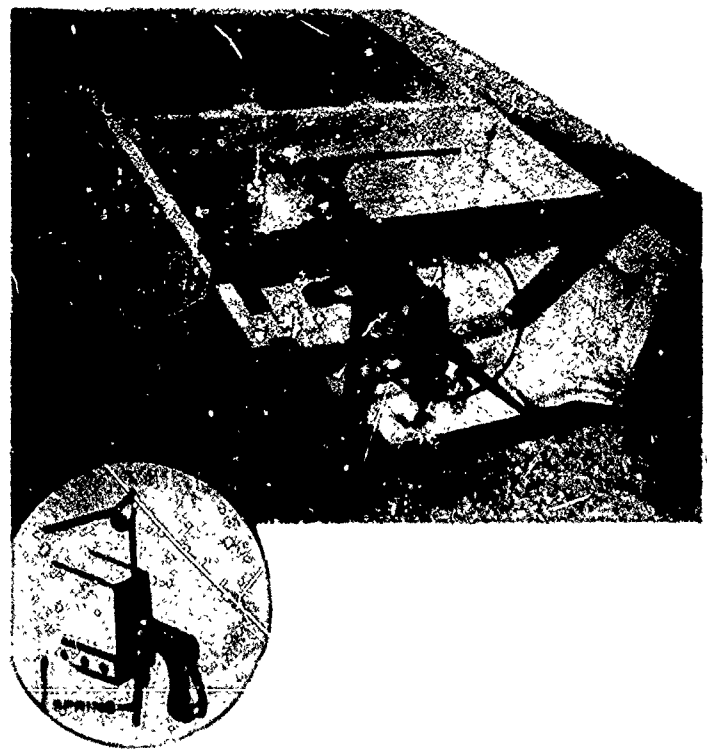


Figure 59

Detailed Cable Pully System for Firing Machinegun. This machinegun can be used to simulate enemy automatic weapons fire. The machinegun is fired by a cable, pully and spring hook-up. This setup can be used when the XM-2 is not available and can be used on all Rifle Squad Tactical Ranges.

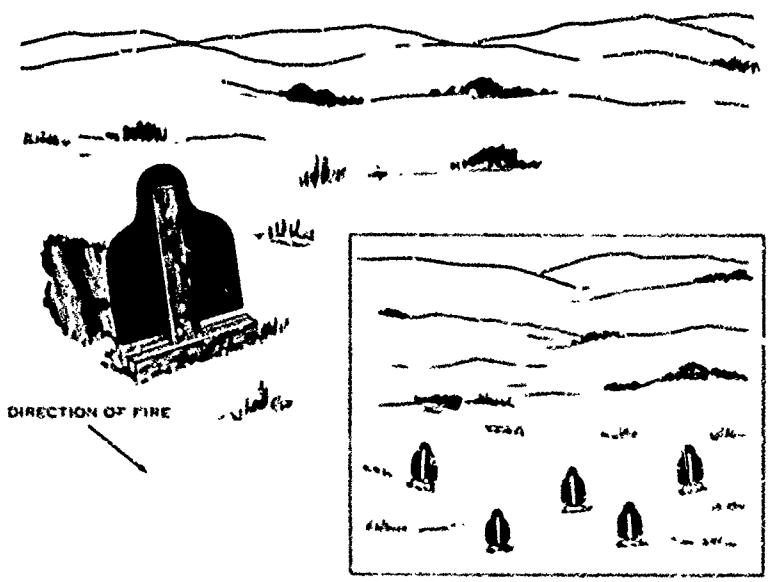


Figure 60

A method of setting up targets to represent a linear formation. This expedient method of setting up a linear target is used when Rifle Squad Technique of Fire Ranges are not available.

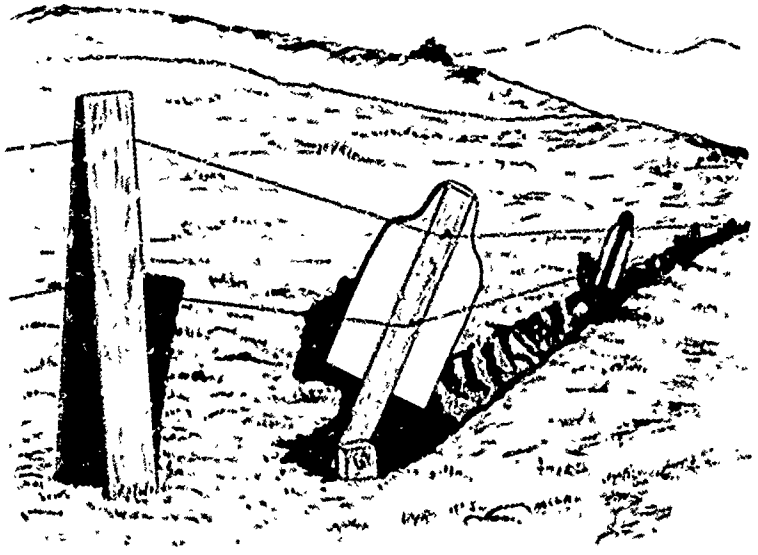


Figure 61. A method of raising a linear target.

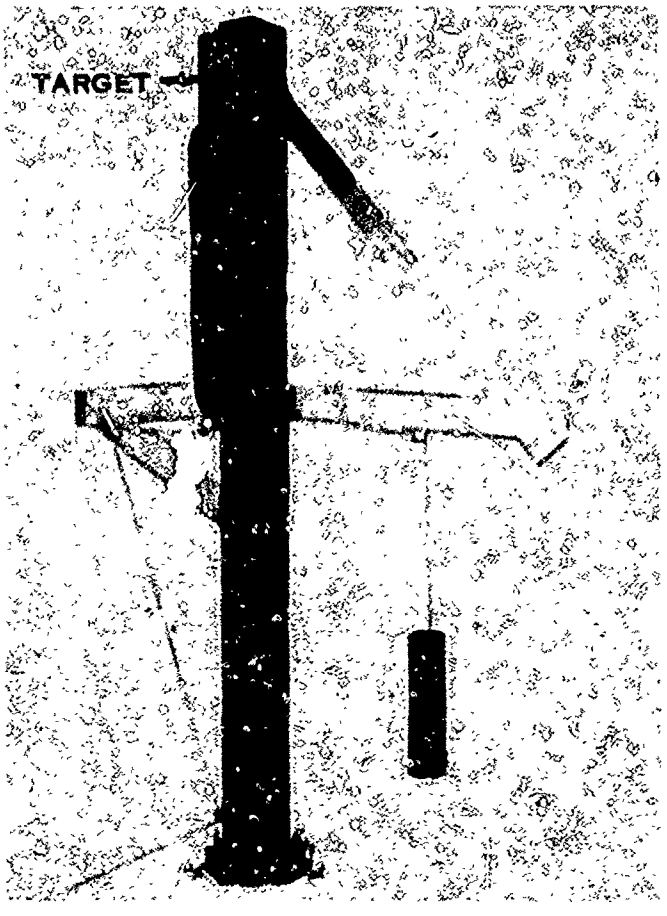


Figure 62. Sniper Target mounted on a post.

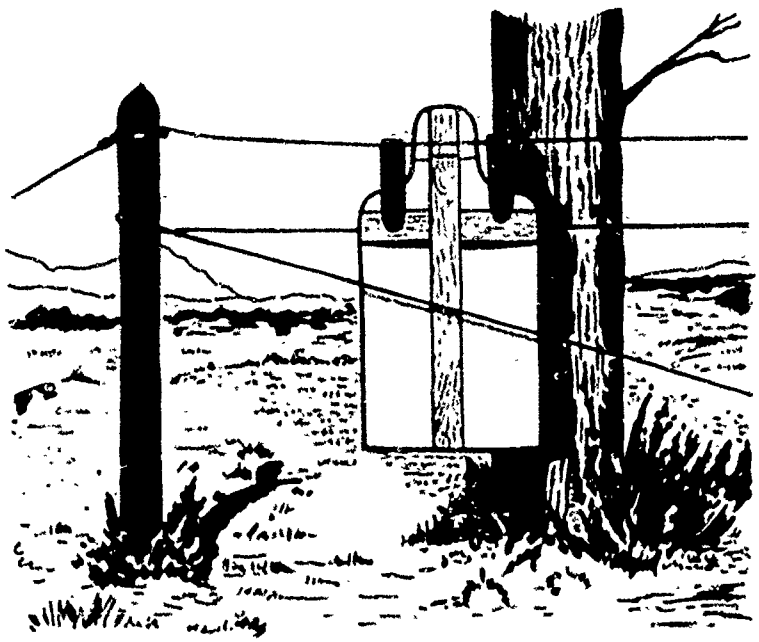


Figure 63
A method of moving a target along a horizonial line.

TECHNIQUE OF FIRE CHECKLIST

FIRE AND MOVEMENT AND ASSAULT

DAYLIGHT FIRE AND MOVEMENT AND ASSAULT	SAT	UNSAT
1. Assembly Area.		
a. Were individual squad members assigned sectors of fire or were they assumed by SOP?	___	___
b. Were maintenance checks made of weapons, ammunition, and ammunition carrying equipment?	___	___
c. Were hand grenadiers designated?	___	___
2. Firing.		
a. Fire During Movement.		
(1) When fired upon during the move was fire withheld unless the enemy fire was effective?	___	___
(2) When effective fire was received did the squad deploy and return fire effectively?	___	___
(3) Was fire and movement required? (See Fire in Attack)	___	___
b. Fire in the Attack.		
(1) When taken under fire prior to reaching the assault stage did the squad immediately deploy and return fire?	___	___
(2) Fire and Movement.		
(a) Did the squad leaders designate fire support and movement elements?	___	___
(b) As the movement element ceased fire did the fire support element increase the rate of fire and redistribute its fire to cover the entire squad target objective?	___	___
(c) Was there close coordination between the movement element and the fire support element as they interchanged roles thus maintaining a continuous volume of distributed fire on the enemy?	___	___
(d) Was fire delivered at known and suspected enemy locations?	___	___
(3) Assault.		
(a) Was the transition from fire and movement to the assault rapid and coordinated allowing continuous fire to be delivered upon the enemy position?	___	___
(b) During the assault was fire delivered from the shoulder or underarm position correctly depending upon the proximity to the defending enemy?	___	___
(c) Did the AR men and grenadiers engage targets correctly?	___	___
(d) Did the riflemen and team leaders distribute their fires correctly?	___	___
(e) Was fire distributed at known and suspected enemy locations?	___	___

DAYLIGHT FIRE AND MOVEMENT AND ASSAULT	SAT	UNSAT
(f) Was the rate of fire sufficient to maintain fire superiority?	____	____
(g) Was the speed of movement sufficient to maintain the momentum of the assault?	____	____
(h) Did the squad continue to deliver fire against the enemy as they swept the objective and moved to the forward military crest of the terrain?	____	____
3. Consolidation of the objective and Reorganization.		
a. Did squad members automatically assume responsibility for their respective areas of responsibility?	____	____
b. Were firing positions selected to best provide for fields of fire?	____	____
c. Did squad members engage fleeting targets if they were present?	____	____
d. Was ammunition redistribution effected during this phase?	____	____
e. Was ammunition re-supply conducted or considered?	____	____
f. Were targets engaged correctly with the techniques required?	____	____
NIGHT ASSAULT		
1. Was a base man designated in each squad and did squad members know who the base man was?	____	____
2. Did the assault personnel maintain a sufficient volume of fire to gain and maintain fire superiority?	____	____
3. Was alinement maintained?	____	____
4. Was the speed of the assault sufficient to maintain the momentum of the attack?	____	____
5. Were sufficient procedures used to insure that the ammunition was available for rapid reloading at night?	____	____
6. Was the fire kept down where it was effective?	____	____
7. Were the correct firing positions used by the squad members?	____	____
8. Was the fire of the squads distributed correctly?	____	____
9. Were the enemy positions and weapons engaged within the capabilities of friendly weapons?	____	____

TECHNIQUE OF FIRE CHECKLIST

DEFENSE

DAYLIGHT DEFENSE	SAT	UNSAT
1. Preparation.		
Did squad members make satisfactory inspections of ammunition, weapons, and ammunition carrying equipment?	____	____
2. Occupation of Position.		
a. Did squad leader point out squad sector to all squad members?	____	____
b. Were individual sectors of fire assigned or assumed by SOP?	____	____
c. Did squad leader plan and supervise the emplacement and zeroing of preplanned fires?	____	____
d. Were sectors of surveillance assigned for defense during periods of limited visibility?	____	____
e. Were preplanned fires established for the M79 Grenade Launcher?	____	____
f. Were multiple or alternate preplanned fire stakes prepared for required?	____	____
g. Did the squad leader establish control procedures for the following:		
(1) Initiating preplanned fires.	____	____
(2) Ceasing preplanned fires.	____	____
(3) Alerting the squad for visible target fires.	____	____
h. Were hand grenadiers designated?	____	____
3. Defensive Firing.		
a. Did AR men engage enemy automatic supporting weapons, if present?	____	____
b. Did the grenadiers engage enemy automatic supporting weapons, if present and within range?	____	____
c. In the absence of supporting enemy automatic weapons did the AR men distribute his fire correctly?	____	____
d. Was surveillance maintained in the individual sectors of fire while delivering fire in other areas?	____	____
e. Was fire delivered at known or suspected enemy locations?	____	____
f. In the absence of supporting enemy automatic weapons, did the grenadiers distribute their fire correctly?	____	____
g. Was the volume of fire sufficient to gain fire superiority?	____	____
h. Once fire superiority was gained was the rate of fire reduced to that required to maintain it?	____	____
i. Was ammunition redistributed as required?	____	____
j. Was ammunition resupply considered or conducted?	____	____
k. Did the squad leaders control the fires of their squads thus enabling the squads to shift and concentrate fire as required to engage enemy targets?	____	____

LIMITED VISIBILITY (NIGHT) DEFENSE	SAT	UNSAT
1. Planning and Preparation. Should be similar to daylight defense and, in fact, be executed during conditions of good visibility.		
2. Defensive Firing.		
a. Were preplanned fires delivered as required?	____	____
b. Did squad members use alinement stakes correctly?	____	____
c. Did the squad leader use a satisfactory method of ceasing preplanned fires.	____	____
d. Were preplanned fires concentrated as required?	____	____
e. Was the squad alerted of the probability of visible target engagement?	____	____
f. Did the individual members of the squads open fire when targets appeared in their sectors of surveillance?	____	____
g. Did squad members shift and concentrate their fire in other portions of the squad sector when no targets were available in theirs?	____	____
h. Did squad members who shifted their fire still maintain effective surveillance in their own sectors of surveillance?	____	____
i. Were expedient sights used by the AR men?	____	____
j. Did individual sectors of surveillance overlap within the squad and with adjacent squads?	____	____
k. Did the squad members control their fires? (No indiscriminate firing)	____	____
l. Was ammunition resupply considered or conducted?	____	____
m. Was ammunition redistributed if required during the fire fight?	____	____
NIGHT RELIEF		
1. Was preplanned fire information transfered from outgoing to incoming personnel to include sector sketches, if available?	____	____
2. Did the outgoing squad members briefly orient the incoming squad members concerning the terrain and enemy to his front and discuss his sector of surveillance briefly with the incoming member?	____	____

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