

CHAPTER 7

AUTOMATIC RIFLE MARKSMANSHIP

Section I. FUNDAMENTALS

7-1. General

This chapter is a guide for personnel conducting automatic rifle marksmanship. Since all M16A1 rifles have the capability of firing in the automatic mode merely by placing the selector switch on automatic, the information contained in this chapter will apply to riflemen firing in the automatic mode as well as automatic riflemen. The degree of proficiency attained during automatic rifle marksmanship training will depend on how well the soldier applies the fundamentals of automatic rifle marksmanship. Automatic fire is the firing of two or more consecutive rounds without releasing the trigger. Bursts of three rounds are usually fired to insure minimum dispersion. The fundamentals are as follows:

- a. The integrated act of automatic rifle shooting.
- b. Automatic fire positions.
- c. Magazine changing.
- d. Fire distribution.

7-2. The Integrated Act of Automatic Rifle Shooting

a. *Aiming.* The technique of aiming the weapon is the same as in semiautomatic rifle marksmanship. The soldier still applies the principles of sight alignment and proper placement of the aiming point.

b. *Steady Hold.* The steady hold factors for firing the M16A1 rifle in the automatic mode are slightly different from firing the weapon in the semiautomatic mode. The reason for this difference is twofold:

(1) The automatic rifle fired from the bipod is more stable due to the bipod.

(2) The recoil of each round in a burst of automatic fire causes a progressive displacement of weapon alignment on the target.

c. *Steady Hold Factors.* The eight steady hold factors discussed in the following paragraphs relate to firing the M16A1 rifle in the automatic mode from the bipod supported prone and bipod supported foxhole positions. Steady hold as it relates to other firing positions will be discussed during the various firing positions.

(1) *Grip of the left hand.* The firer initially forms a loop in the sling by sliding the keeper forward to a point approximately 5 inches from the upper sling swivel. He then inserts the fingers of the

left hand into the loop, the thumb on the outside, forms a clenched fist, and applies constant pressure downward and rearward. Ideally the firer's left arm should be straight and should not come in contact with the ground (fig 7-1); however, the firer's body conformation may necessitate modifying the position of the left arm. Altering the position of the left arm is acceptable as long as the firer is able to maintain a constant, firm, downward and rearward pressure.

(2) *Rifle butt in the pocket of the shoulder.* The firer must place the butt of the weapon firmly into the pocket of his right shoulder. Proper placement of the butt of the weapon reduces some of the effect of recoil and helps steady the weapon. It also prevents the butt of the rifle from slipping from the shoulder during firing.

(3) *Grip of the right hand.* The right hand grasps the pistol grip so that the pistol grip rests in the "V" formed by the thumb and forefinger. The forefinger (trigger finger) is placed on the trigger so that the finger does not touch the side of the receiver. The remaining fingers are wrapped tightly around the pistol grip. A firm rearward pressure must be exerted by the right hand to keep the butt of the stock in its proper position in the pocket of the shoulder and secure enough against the shoulder to minimize the effects of recoil.

(4) *Right elbow, stock weld, and breathing.* These three steady hold factors are the same for automatic fire as for semiautomatic fire described in chapter 3. The exact location of the right elbow varies in each firing position and is described in the explanation of the firing positions.

(5) *Muscular tension.* When firing the M16A1 rifle in the automatic mode, the firer must exert some muscular tension. The muscular tension is caused by the firer exerting a firm rearward pressure on the rifle with both hands. This pressure causes a certain tensing of the stomach and abdominal muscles. The difference between this tension and undue muscular tension (described in para 3-3 b (7)) is that the muscular tension is controlled and used to help the firer steady the weapon.

(6) *Trigger control.* If the firer were to employ trigger control, as discussed in chapter 3, while firing automatically, he would fire the whole



Figure 7-1. Bipod supported prone position.

magazine before he knew it. However, due to the fact that the recoil of each round in a burst causes a progressive displacement of weapon alignment on the target, the firer must attempt to fire a three-round burst.

Note. Testing has shown that, with the M16A1, rifle, a three-round burst creates the least amount of muzzle displacement (consistent with an acceptable beaten zone).

To obtain a three-round burst, the firer must press the trigger straight to the rear and quickly release it. To become and remain proficient in obtaining three-round bursts requires frequent practice.

7-3. Automatic Firing Positions

a. General. Position is an important fundamental of automatic rifle marksmanship. Without the proper firing position it is impossible for the rifleman (or automatic rifleman) to achieve consistent hits on the target during firing. After the first round of a burst has been fired, a correct sight picture is difficult to maintain. Therefore, to continue hitting the target with the remaining rounds in a burst, the firer must maintain the correct firing position. A burst of automatic fire is defined as a series of shots fired from an automatic weapon by one press of the trigger.

b. Five Positions. There are five principle positions from which the firer (automatic rifleman / rifleman) may deliver effective automatic fire: the prone supported, foxhole supported, kneeling supported, standing and underarm positions. Obviously, in any specific situation, one position may be more advantageous than another. The firer may be required to instinctively select and assume a specific automatic position. To do so he must have a thorough knowledge of all positions. The following paragraphs discuss positions, assuming positions, and applicability of each position.

(1) *Bipod supported prone position.* The bipod supported prone position (fig 7-1) is the most stable of the automatic firing positions and should be used whenever possible. To assume the bipod supported prone position, the firer stands facing his target, spreads his feet a comfortable distance apart, and drops to his knees. With his left hand positioned under the handguards and his right

hand at the heel of the stock, he places the butt of the rifle well out to his front on an imaginary line drawn between the target and his right knee. Using the butt of the weapon as a pivot, the firer rolls down onto his left side breaking his fall with left forearm. He places the butt of the stock into the pocket in his right shoulder with his right hand and then takes the proper grip on the pistol grip, lowering his right elbow to the ground. The firer takes the proper grip on the sling with his left hand. The firer's legs should be spread a comfortable distance apart and his heels should be as close to the ground as the conformation of his body will permit. For maximum stability his body should be directly behind the weapon. To complete the position, the firer obtains a stock weld.

(2) *Bipod supported foxhole position.* The bipod supported foxhole position (fig 7-2) is used whenever defensive positions have been prepared. To assume the bipod supported foxhole position, the firer places his rifle alongside the foxhole and then enters it. He adds or removes dirt or sandbags to adjust the foxhole to his height. The firer then grasps his rifle and places his chest against the forward wall of the foxhole, keeping the muzzle of his weapon pointed slightly up and down range. He positions the weapon and bipod far enough forward so as to allow him to maintain contact with the front wall of the foxhole and at the same time enable him to apply the steadyhold factors. He then grips the weapon in the same manner as he would in the bipod supported prone position.



Figure 7-2. Bipod supported foxhole position.

(3) *Kneeling supported position* (fig 3-16). This position provides the firer some stability and concealment and permits him to take advantage of available cover while at the same time enabling him to observe the target area better than he could from the prone or foxhole positions. The kneeling supported position assumed in the automatic mode is the same as that in the semiautomatic mode (chap 3).

(4) *Standing position*. The standing position (fig 3-17) assumed in the automatic mode is the same as that in the semiautomatic mode (chap 3). This position is used to engage targets at ranges less than 100 meters when no other position can be advantageously assumed, and during the assault. This position is more accurate than the underarm position when applying initial bursts on target, and therefore should be used when the firer has an option.

(5) *Underarm position*. The underarm (fig 7-3) is the least accurate of the automatic firing positions and therefore is the least desirable. However, there are situations which may necessitate the use of the underarm position (e.g., targets at close range, targets that are widely dispersed and require rapid engagement during the assault, and / or when time will not permit a well-directed shot from the shoulder). To assume the underarm firing position, the firer initially stands facing the target. He then spreads his feet approximately shoulder width apart and takes one half step forward with his left foot. The weight of his body should be equally distributed on both of his feet, and his knees should be slightly flexed as in a boxer's stance. The butt of the stock is positioned as nearly under the armpit as the conformation of his body will allow. His right arm is lowered so that the stock of the weapon is held firmly against his side by his upper arm. The left hand should grip the top of handguards firmly and be extended a comfortable distance forward to permit guiding the muzzle of the rifle. The muzzle of the weapon should be slightly depressed to minimize the natural tendency to overshoot a target, make maximum use of any ricochets, and adjust fire onto the target by observing the strike of the bullets on the ground. The right hand grips the pistol grip firmly.



Figure 7-3. Underarm automatic firing position.

Section II. MAGAZINE CHANGING

7-4. Magazine Handling

a. Due to the increased ammunition expenditure in the automatic mode, magazine changing becomes an important factor to the automatic rifleman.

b. Magazines are placed into each ammunition

pouch with the open end of the magazine down and the long portion of the magazine toward the body (fig 7-4). This method of placing the magazines into the ammunition pouches enables the firer to quickly remove the magazines.

c. Removing a magazine from the ammunition

pouch is the same whether using the right or left hand. To remove a magazine from the pouch, grasp the magazine on the long edge with the thumb and place the first and second fingers on the short edge (figs 7-5 and 7-6). Withdraw the magazine from the ammunition pouch and extend the arm forward, rotating the hand and wrist (figs 7-7 and 7-8) so that the magazine will be in position (open end up and long edge to the rear) to load into the weapon (figs 7-9 and 7-10). The magazine is loaded into the weapon by inserting the magazine straight up into the magazine well until it is seated. Strike the base of the magazine with the heel of the hand to insure that the magazine is fully seated.

7-5. Magazine Changing

a. *Removing the Empty Magazine.* When the ammunition in the magazine (in the rifle) has been expended, the firer removes the magazine from the weapon by pressing the magazine catch button with his right forefinger (fig 7-11) and allowing the magazine to drop, under its own weight. Empty magazines must be saved for reloading and later use.

Note. While in a static position (defense) saving the empty magazine for reloading and subsequent reuse is no problem for the soldier. On the other hand it does become a problem while on the offense (assaulting).



Figure 7-4. Proper method of carrying magazines.

For this reason the firer must have some means of saving and carrying the empty magazines with him for reloading and subsequent reuse once his element has taken the objective. To satisfy this requirement some form of a field expedient is required. Such items as a Claymore bandoleer, M60 machinegun ammunition bandoleer, or even an empty sandbag attached to the pistol belt will provide a means of carrying the empty magazines while moving.



Figure 7-5. Withdrawing magazine from the ammunition pouch (right side).



Figure 7-6. Withdrawing magazine from ammunition pouch (left side).



Figure 7-7. Rotating the hand and wrist (right side).



Figure 7-8. Rotating the hand wrist (left side).

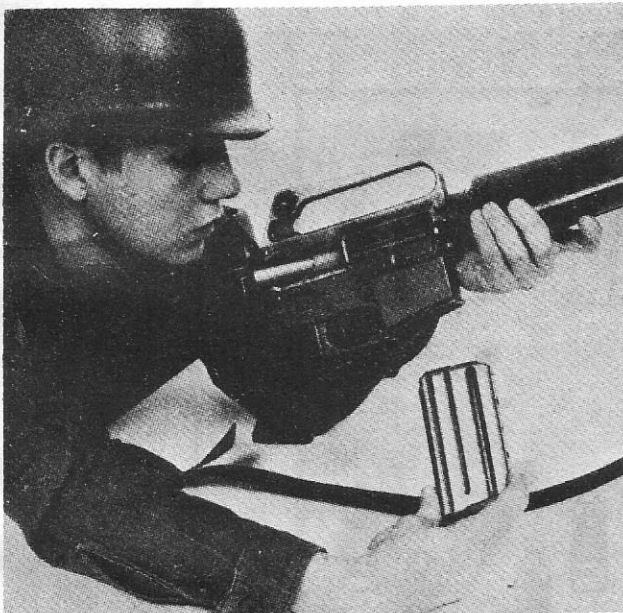


Figure 7-9. Magazine in position for loading (right side).

b. *Right-Side Load.* To load a magazine from the right side, the rifleman uses his right hand. After the empty magazine has been removed from the weapon, the firer loads a full magazine into the weapon using the procedure outlined in paragraph

7-4 c. To chamber a round the firer must pull back and release the charging handle with his right hand.

c. *Left-Side Load.* Once the empty magazine is out of the weapon, the firer secures and loads a full magazine into the weapon with his left hand using the procedure outlined in paragraph 7-4 c. He then returns his left hand to its original position and chambers a round in the same manner as when loading from the right side.



Figure 7-10. Magazine in position for loading (left side).



Figure 7-11. Releasing the magazine.

Section III. FIRE DISTRIBUTION AND CONDUCT OF TRAINING

7-6. Fire Distribution

a. *General.* The automatic rifleman must be trained to deliver fire at targets which have one or more selected aiming points. When fire is delivered at one aiming point or reference point, it is called

concentrated fire; when it is delivered at more than one aiming point or reference point, it is called distributed fire.

b. *Concentrated Fire.* Concentrated fire is fire directed at a specific point which requires a high

degree of accuracy. Rifle marksmanship training has taught the soldier to think *principally* in terms of concentrated fire; he must now be taught to apply the integrated act of automatic rifle shooting to *distribute* as well as to *concentrate* his fire.

c. *Distributed Fire.* Distributed fire is fire in depth and width so that an area target is effectively covered. The object of distributed fire is to place a heavy volume of fire between the known or suspected flanks of a target. The inability to see enemy personnel or positions should not be a reason for not firing into an area if there is reason to believe a covered or concealed target is present. Effective fire distribution is attained by the correct application of the eight steady hold factors and correct body position. Body alignment and the

position of the shoulders and right elbow become an area of major concern in distributing fire. Incorrect body alignment, and the position of the shoulders and the right elbow will cause distorted and erratic dispersion of fire. Where only small adjustments to the lay of the weapon are required, the automatic rifleman moves only his shoulders to the right or to the left. He must insure that the right elbow remains in place and that the shoulders remain parallel to the ground. If the lateral adjustment required is enough to require a movement of the elbows, the automatic rifleman must re-lay his weapon by shifting his entire body so that the shoulders are level and correct body alignment is maintained. When delivering automatic distributed fire, the first round of each burst is aimed. The

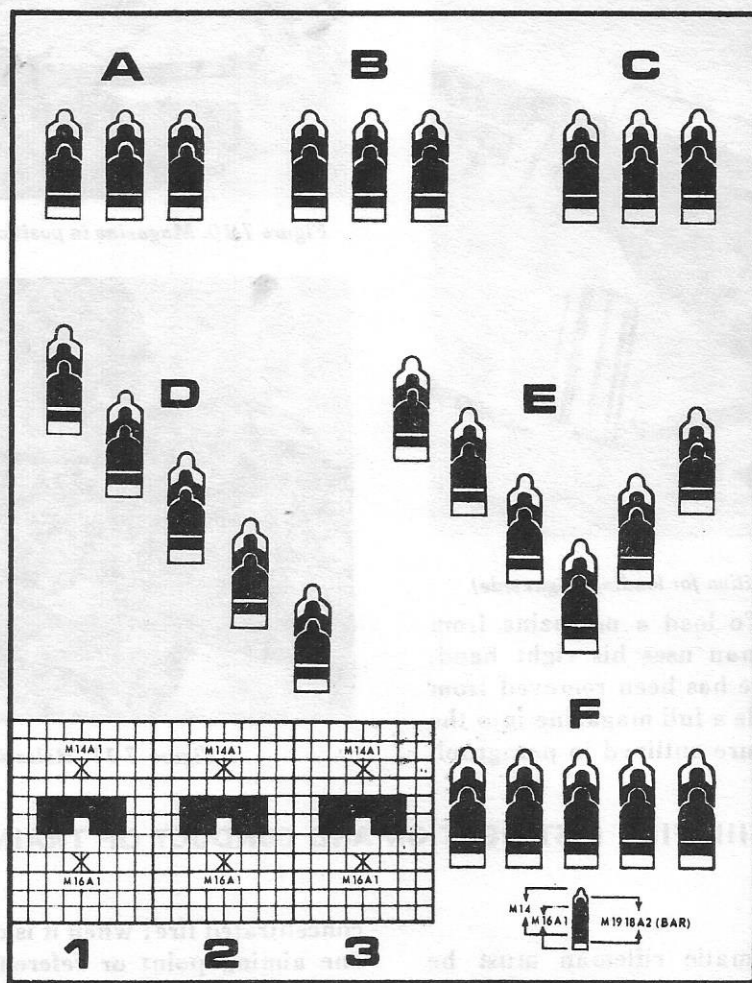


Figure 7-12. Standard 25-meter automatic rifle target.

automatic rifleman selects successive aiming points across the target and fires back and forth across the target in three-round bursts until fire superiority has been gained or the target has been neutralized.

7-7. Conduct of Training

a. General. The primary objective of automatic rifle marksmanship training is to produce combat proficient automatic riflemen. To accomplish this objective the training is conducted in a logical progression. A practical exercise should be conducted at the conclusion of each phase to determine the individual soldier's proficiency. A secondary objective is to provide all soldiers who are armed with the M16A1 the basic fundamentals which will enable them to apply effective automatic fire.

b. Battlesight Zero. The battlesight zero obtained during 25-meter semiautomatic firing may change when firing in the automatic mode from the bipod supported positions. The change, if any, is normally caused by the technique used to stabilize the weapon (application of a firm downward and rearward pressure). The degree of change will vary from one firer to another as a result of the amount of downward pressure exerted. However, the amount of change (if any) will have little effect out to a range of 300 meters and in many cases is offset by the beaten zone effect of automatic fire.

7-8. Twenty-Five-Meter Automatic Firing

a. General. Initial live fire training is conducted on the standard 25-meter range. The standard automatic fire target (FSN 6920-457-9361, fig 7-12) is the only target required to conduct 25-meter preparatory marksmanship training. Twenty-five meter firing is designed to develop proficiency in each of the fundamentals of automatic rifle marksmanship, prior to engaging targets under simulated combat conditions on the standard automatic rifle range (field fire range modified for automatic fire). This practical exercise is not scored.

b. Conduct of Fire. Twenty-five-meter firing is conducted in three phases.

(1) Fire two three-round magazines using a three-round burst at one of the zero targets (in the lower left hand portion of the standard 25-meter automatic fire target).

(2) Fire two six-round magazines using three-round bursts at configurations "B" and "C" on the standard 25-meter automatic fire target.

(3) Fire one 18-round magazine using three-round bursts at configuration "E" on the standard 25-meter automatic fire target.

7-9. Automatic Transition Firing

a. General. Automatic transition firing is a series of practical live fire exercises which require the soldier to apply all of the fundamentals of automatic rifle marksmanship learned in

preparatory marksmanship training. When automatic transition firing is correctly organized and conducted, the soldier will gain valuable experience toward becoming a proficient combat automatic rifleman. (Qualification ratings are important in motivating the soldier while simultaneously providing the commander with a means of identifying the more proficient automatic riflemen of his unit. This can be a significant consideration in the commander's assignment of personnel, as the better marksmen should be assigned evenly throughout all elements of a combat unit.)

b. Training Concepts. The most significant advantage afforded by the automatic transition course of fire, over previous automatic rifle courses of fire, is that the automatic transition course requires the automatic rifleman to fire at the types of targets he would be expected to engage in combat. It is on a standard automatic rifle range (or a field fire range that has been modified for automatic transition fire) that the automatic rifleman demonstrates his proficiency in automatic rifle marksmanship. The soldier applies the fundamentals of delivering fire using two methods: *concentrated fire against point targets*, and *distributed fire against linear or area targets*.

c. Range Facilities.

(1) The standard automatic rifle range (fig 7-13) consists of a minimum of ten firing lanes. Each lane is 5 to 10 meters wide at the firing line and 75 meters wide at a range of 800 meters. Odd numbered lanes are designated "lane A" and the even numbered lanes "lane B." A foxhole is constructed on each B lane. Target devices are installed at ranges from 100 to 300 meters. Four different target configurations are presented to the automatic rifleman during the conduct of transition firing: the small area, the large area, the linear, and the single F-type silhouette. Target configurations are shown in figures 7-14, 7-15 and 7-16. For the most efficient operation and scoring, the target holding mechanisms M30 / M31A1 are used. The score for each target exposure is determined by the number of targets downed after each exposure except for the small area target (fig 7-14) for which only one point is awarded. For exposure times, sequence, and range to the targets, reference the standard automatic fire scorecard (fig 7-17).

(2) When constructing a range or modifying an existing facility, the terrain should be left primarily in its natural state. Targets should be emplaced making the best use of available concealment and still be reasonably consistent with the ability of soldiers to detect targets during the conduct of firing. Where manually operated targets are used, inconspicuous bunkers should be constructed.

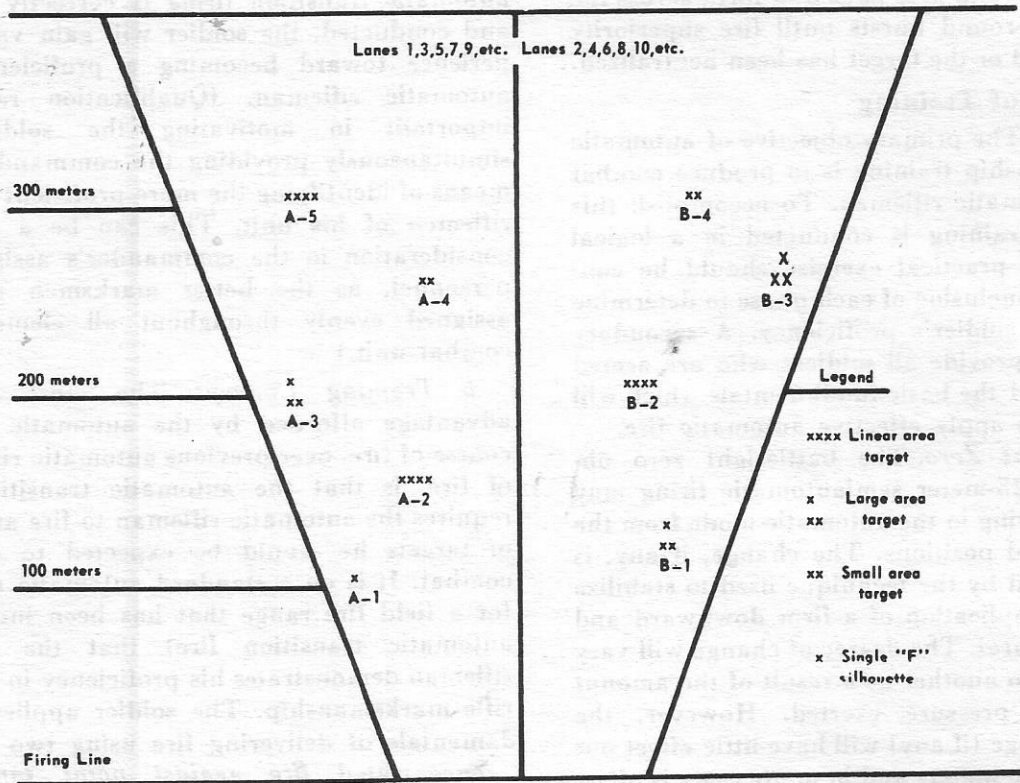


Figure 7-13. Standard automatic rifle range (schematic).

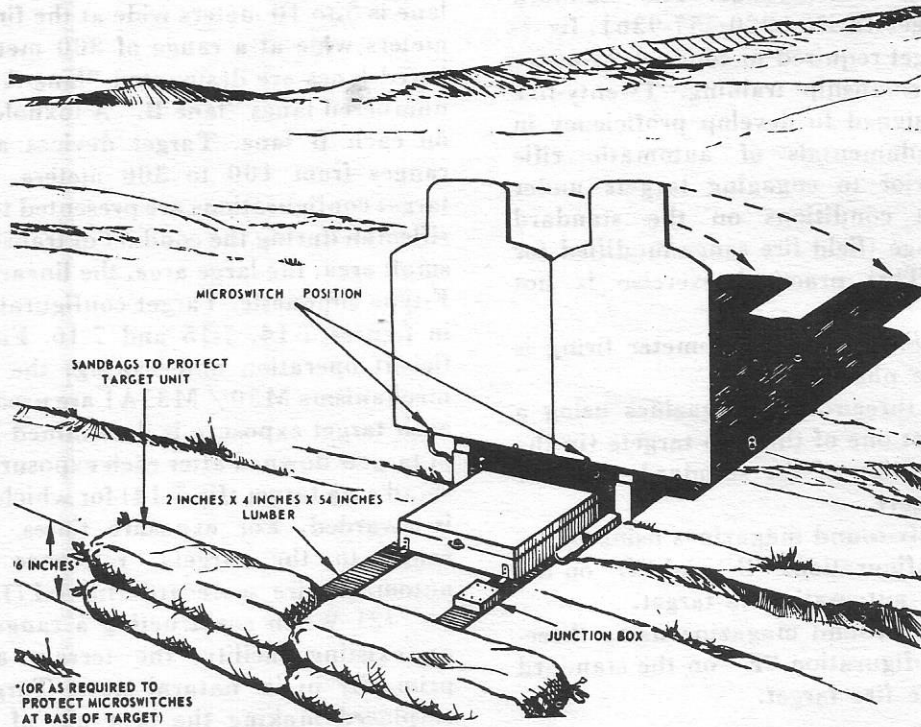


Figure 7-14. Small area target, standard automatic rifle range.

(3) If an acceptable standard automatic rifle range is not available, firing may be conducted on a field fire range that has been modified for

automatic fire (fig 7-18). For exposure times, sequence, and range to exposed targets, reference the alternate automatic rifle scorecard, figure 7-19.

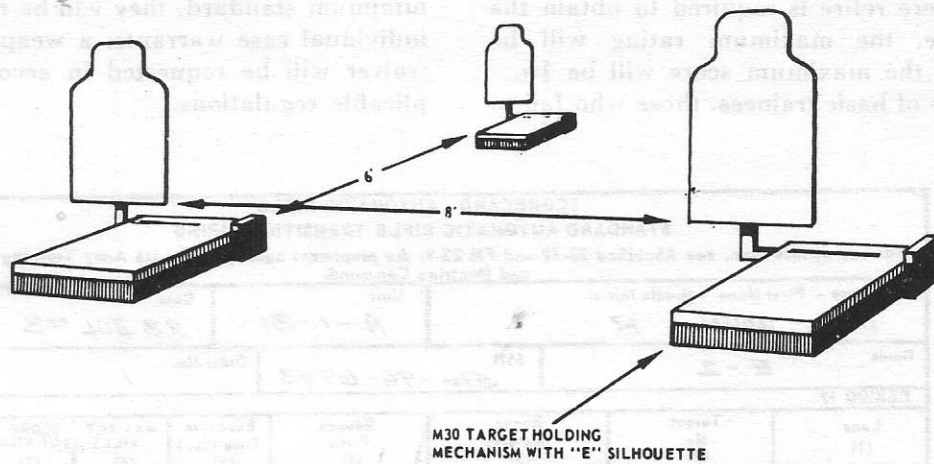


Figure 7-15. Large area target, standard automatic rifle range.

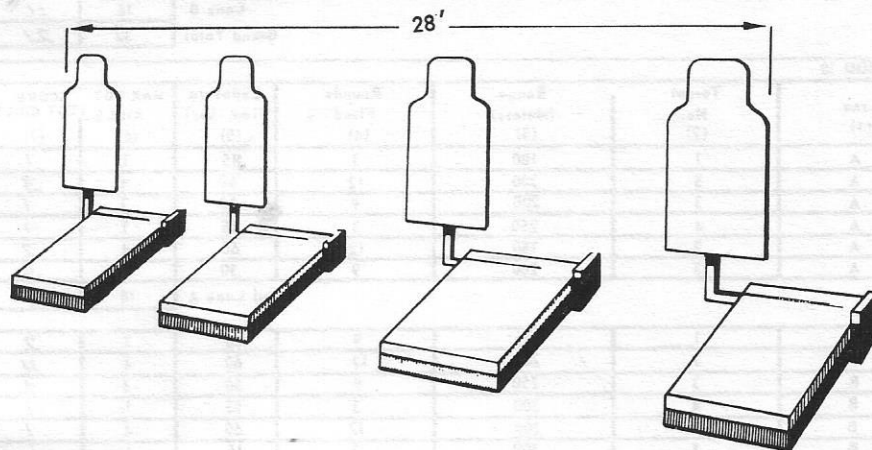


Figure 7-16. Linear target, standard automatic rifle range.

Each firing order fires sequence "A" from the bipod supported foxhole position and then sequence "B" fires from the bipod supported prone position.

7-10. Qualification Firing

At the completion of automatic transition firing the soldier's proficiency is tested by firing a qualification course of fire. The qualification course of fire is conducted on the same range as the transition firing. Exposure times, sequence, and

range to the targets are outlined in figure 7-17 (standard automatic scorecard) or figure 7-19 (alternate automatic scorecard).

a. Automatic rifle qualification scores (hits) and ratings are as follows:

| Rating | Number of hits |
|--------------------|----------------|
| Expert | 27-32 |
| Sharpshooter | 23-26 |
| Marksman | 16-22 |
| Unqualified | 15 and below |

b. Those soldiers who fail to meet the minimum standard of 16 may refire the qualification course. In all cases where refire is required to obtain the minimum score, the maximum rating will be marksman and the maximum score will be 16.

c. In the case of basic trainees, those who fail to

meet the minimum score will receive remedial training and be refired. If they still do not meet the minimum standard, they will be recycled or, if the individual case warrants, a weapons qualification waiver will be requested in accordance with applicable regulations.

| SCORECARD - AUTOMATIC RIFLE STANDARD AUTOMATIC RIFLE TRANSITION FIRING | | | | | | |
|--|----------------|--------------------|------------------|-------------------------|-------------------|-----------------------|
| For use of this form, see ASubjScd 23-72 and FM 23-9; the proponent agency is the US Army Training and Doctrine Command. | | | | | | |
| Last Name - First Name - Middle Initial DOE JOHN R | | | Unit A-1-31 | Date 23 JUL 73 | | |
| Grade E-2 | | SSN 576-96-6943 | Order No. 1 | | | |
| PERIOD 17 | | | | | | |
| Lane (1) | Target No. (2) | Range (Meters) (3) | Rounds Fired (4) | Exposure Time (Sec) (5) | MAX TGT KILLS (6) | SCORE (TGT KILLS) (7) |
| A | 1 | 100 | 3 | 15 | 1 | 1 |
| A | 2 | 150 | 12 | 60 | 4 | 2 |
| A | 3 | 200 | 9 | 30 | 3 | 2 |
| A | 4 | 250 | 3 | 15 | 1 | 1 |
| A | 5 | 300 | 12 | 60 | 4 | 3 |
| A | 3 | 200 | 9 | 30 | 3 | 1 |
| Total Lane A | | | | | 16 | 10 |
| B | 1 | 125 | 9 | 30 | 3 | 1 |
| B | 2 | 200 | 12 | 60 | 4 | 3 |
| B | 3 | 250 | 9 | 30 | 3 | 3 |
| B | 4 | 300 | 3 | 15 | 1 | 1 |
| B | 2 | 200 | 12 | 60 | 4 | 2 |
| B | 4 | 300 | 3 | 15 | 1 | 1 |
| Lane B | | | | | 16 | 11 |
| Grand Total | | | | | 32 | 21 |
| PERIOD 18 | | | | | | |
| Lane (1) | Target No. (2) | Range (Meters) (3) | Rounds Fired (4) | Exposure Time (Sec) (5) | MAX TGT KILLS (6) | SCORE (TGT KILLS) (7) |
| A | 1 | 100 | 3 | 15 | 1 | 1 |
| A | 5 | 300 | 12 | 60 | 4 | 3 |
| A | 3 | 200 | 9 | 30 | 3 | 1 |
| A | 4 | 250 | 3 | 15 | 1 | 1 |
| A | 2 | 150 | 12 | 60 | 4 | 2 |
| A | 3 | 200 | 9 | 30 | 3 | 3 |
| Total Lane A | | | | | 16 | 11 |
| B | 1 | 125 | 9 | 30 | 3 | 2 |
| B | 2 | 200 | 12 | 60 | 4 | 4 |
| B | 3 | 250 | 9 | 30 | 3 | 2 |
| B | 4 | 300 | 3 | 15 | 1 | 1 |
| B | 2 | 200 | 12 | 60 | 4 | 1 |
| B | 4 | 300 | 3 | 15 | 1 | 1 |
| Total Lane B | | | | | 16 | 11 |
| Grand Total | | | | | 32 | 22 |

DA FORM 3005-R, 1 Nov 73

REPLACES DA FORM 3005-R, 1 JUN 65; AND TOGETHER WITH DA FORM 3008-R, 1 NOV 73, REPLACES DA FORM 3691-R, 1 FEB 71, WHICH ARE OBSOLETE.

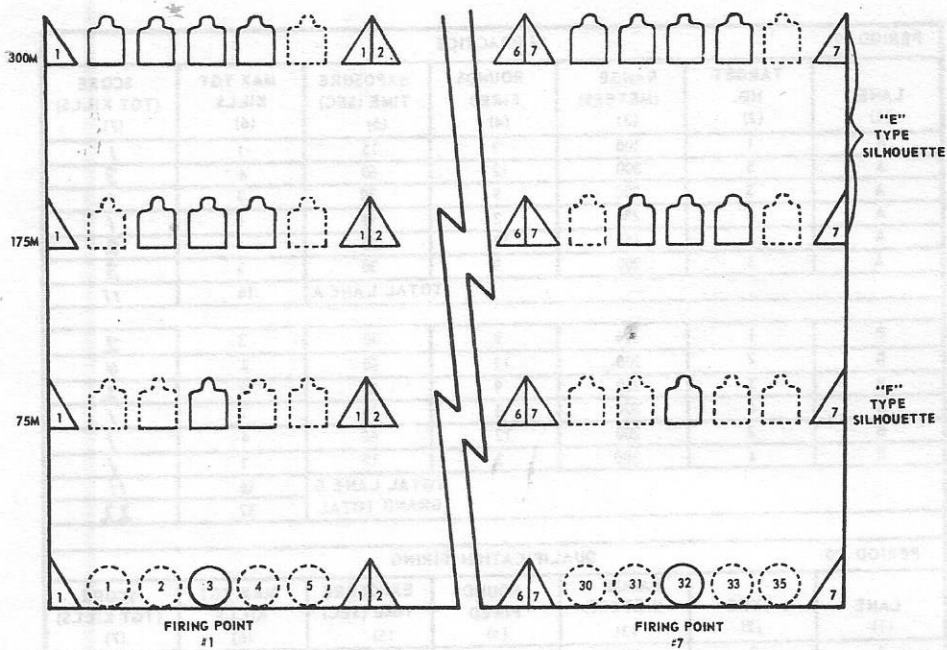
FRONT

Figure 7-17. Standard automatic rifle transition firing scorecard (DA Form 3005-R) with sample entries.

| PERIOD 19 | | | | | | | 2d PRACTICE | | | | | | |
|---|----------------|--------------------|------------------|-------------------------|-------------------|-----------------------|----------------------|--|--|--|--|--|--|
| LANE (1) | TARGET NO. (2) | RANGE (METERS) (3) | ROUNDS FIRED (4) | EXPOSURE TIME (SEC) (5) | MAX TGT KILLS (6) | SCORE (TGT KILLS) (7) | | | | | | | |
| A | 1 | 100 | 3 | 15 | 1 | 1 | | | | | | | |
| A | 5 | 300 | 12 | 60 | 4 | 3 | | | | | | | |
| A | 3 | 200 | 9 | 30 | 3 | 1 | | | | | | | |
| A | 4 | 250 | 3 | 15 | 1 | 1 | | | | | | | |
| A | 2 | 150 | 12 | 60 | 4 | 2 | | | | | | | |
| A | 3 | 200 | 9 | 30 | 3 | 3 | | | | | | | |
| TOTAL LANE A | | | | | 16 | 11 | | | | | | | |
| B | 1 | 125 | 9 | 30 | 3 | 2 | | | | | | | |
| B | 2 | 200 | 12 | 60 | 4 | 4 | | | | | | | |
| B | 3 | 250 | 9 | 30 | 3 | 2 | | | | | | | |
| B | 4 | 300 | 3 | 15 | 1 | 1 | | | | | | | |
| B | 2 | 200 | 12 | 60 | 4 | 1 | | | | | | | |
| B | 4 | 300 | 3 | 15 | 1 | 1 | | | | | | | |
| TOTAL LANE B | | | | | 16 | 11 | | | | | | | |
| GRAND TOTAL | | | | | 32 | 22 | | | | | | | |
| PERIOD 20 | | | | | | | QUALIFICATION FIRING | | | | | | |
| LANE (1) | TYPE (2) | RANGE (METERS) (3) | ROUNDS FIRED (4) | EXPOSURE TIME (SEC) (5) | MAX TGT KILLS (6) | SCORE (TGT KILLS) (7) | | | | | | | |
| A | 3 | 200 | 9 | 45 | 3 | 3 | | | | | | | |
| A | 1 | 100 | 3 | 15 | 1 | 1 | | | | | | | |
| A | 5 | 300 | 12 | 60 | 4 | 3 | | | | | | | |
| A | 4 | 250 | 3 | 15 | 1 | 1 | | | | | | | |
| A | 2 | 150 | 12 | 60 | 4 | 3 | | | | | | | |
| A | 3 | 200 | 9 | 45 | 3 | 2 | | | | | | | |
| TOTAL LANE A | | | | | 16 | 13 | | | | | | | |
| B | 2 | 200 | 12 | 60 | 4 | 3 | | | | | | | |
| B | 1 | 125 | 9 | 45 | 3 | 2 | | | | | | | |
| B | 4 | 300 | 3 | 15 | 1 | 1 | | | | | | | |
| B | 3 | 250 | 9 | 45 | 3 | 2 | | | | | | | |
| B | 4 | 300 | 3 | 15 | 1 | 1 | | | | | | | |
| B | 2 | 200 | 12 | 60 | 4 | 3 | | | | | | | |
| TOTAL LANE B | | | | | 16 | 12 | | | | | | | |
| GRAND TOTAL | | | | | 32 | 25 | | | | | | | |
| SIGNATURE OF SCORER <u>John Black</u> | | | | | | | | | | | | | |
| QUALIFICATION RATINGS (CIRCLE ONE) (TOTAL HITS) | | | | | | | | | | | | | |
| EXPERT ----- 27 - 32 | | | | | | | | | | | | | |
| MARKSMAN ----- 16 - 22 | | | | | | | | | | | | | |
| UNQUALIFIED ----- 15 AND BELOW | | | | | | | | | | | | | |
| SHARPSHOOTER ---23 - 26 | | | | | | | | | | | | | |
| SIGNATURE OF SCORER <u>Joe Smith 1LT Inf</u> | | | | | | | | | | | | | |

BACK

Figure 7-17—Continued.



LEGEND:

- TYPE TGT**
- 4 — LINEAR AREA TARGET 300 METERS
 - 2 — SMALL LINEAR TARGET 175 METERS
 - 3 — LINEAR/POINT TARGET 175 METERS/75 METERS
 - 1 — POINT TARGET 75 METERS

NOTE:

- REMOVE FROM M31A1 TARGET HOLDING MECHANISMS
- FOXHOLES NOT USED
- LANE MARKERS

Figure 7-18. Rifle marksmanship field fire range (modified for automatic rifle transition firing).

| SCORECARD-AUTOMATIC RIFLE | | | | | | |
|---|--------------|----------------------------|-----------------------|-----------------------|--------------------------|-------------------|
| ALTERNATE AUTOMATIC RIFLE TRANSITION FIRING | | | | | | |
| (MODIFIED FIELD FIRE RANGE) | | | | | | |
| For use of this form, see ASubjSecd 23-72 and FM 23-9; the proponent agency is the US Army Training and Doctrine Command. | | | | | | |
| LAST NAME - FIRST NAME - MIDDLE INITIAL <i>DOE JOHN R</i> | | | UNIT <i>A-1-31</i> | | DATE <i>23 JUL 73</i> | |
| GRADE <i>E-2</i> | | SS N <i>576-96-6943</i> | | ORDER NO. <i>1</i> | FIRING POINT <i>7</i> | |
| PERIOD 17 SEQUENCE A | | | | | | |
| POSITION | TYPE TARGET* | RANGE (M) | RDS FIRED | EXPOSURE TIME (SEC) | MAX TGT KILLS | SCORE (TGT KILLS) |
| FOX HOLE BIPOD SUPPORTED | 1 | 75 | 3 | 15 | 1 | 1 |
| " | 2 | 175 | 9 | 45 | 3 | 2 |
| " | 2 | 175 | 9 | 45 | 3 | 2 |
| " | 1 | 75 | 3 | 15 | 1 | 1 |
| " | 2 | 175 | 9 | 45 | 3 | 1 |
| " | 1 | 75 | 3 | 15 | 1 | 1 |
| SUB-TOTAL | | | | | 12 | 8 |
| SEQUENCE B | | | | | | |
| PRONE BIPOD SUPPORTED | 2 | 175 | 9 | 45 | 3 | 2 |
| " | 3 | 75/175 | 12 | 60 | 4 | 2 |
| " | 1 | 75 | 3 | 15 | 1 | 1 |
| " | 3 | 75/175 | 12 | 60 | 4 | 3 |
| " | 3 | 75/175 | 12 | 60 | 4 | 2 |
| " | 4 | 300 | 12 | 60 | 4 | 3 |
| SUB TOTAL | | | | | 20 | 13 |
| GRAND TOTAL | | | | | 32 | 21 |
| PERIOD 18 SEQUENCE A | | | | | | |
| POSITION | TYPE TARGET* | RANGE (M) | RDS FIRED | EXPOSURE TIME (SEC) | MAX TGT KILLS | SCORE (TGT KILL) |
| FOXHOLE BIPOD SUPPORTED | 1 | 75 | 3 | 15 | 1 | 1 |
| " | 4 | 300 | 12 | 60 | 4 | 2 |
| " | 2 | 175 | 9 | 45 | 3 | 2 |
| " | 1 | 75 | 3 | 15 | 1 | 1 |
| " | 3 | 75/175 | 12 | 60 | 4 | 2 |
| " | 2 | 175 | 9 | 45 | 3 | 1 |
| SUB-TOTAL | | | | | 16 | 9 |
| SEQUENCE B | | | | | | |
| PRONE BIPOD SUPPORTED | 1 | 75 | 3 | 15 | 1 | 1 |
| " | 4 | 300 | 12 | 60 | 4 | 1 |
| " | 2 | 175 | 9 | 45 | 3 | 3 |
| " | 2 | 175 | 9 | 45 | 3 | 3 |
| " | 4 | 300 | 12 | 60 | 4 | 2 |
| " | 1 | 75 | 3 | 15 | 1 | 1 |
| SUB TOTAL | | | | | 16 | 11 |
| GRAND TOTAL | | | | | 32 | 20 |

DA FORM 3008-R, 1 Nov 73

REPLACES DA FORM 3008-R, 1 JUN 65; AND TOGETHER WITH DA FORM 3005-R, 1 NOV 73, REPLACES DA FORM 3091-R, 1 FEB 71, WHICH ARE OBSOLETE.

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Figure 7-19. Alternate automatic rifle transition firing scorecard (DA Form 3008-R) with sample entries.

| PERIOD 19 | | SEQUENCE A | | | | |
|---|--------------|---------------------------------|-----------|---------------------|---------------|-------------------|
| POSITION | TYPE TARGET* | RANGE (M) | RDS FIRED | EXPOSURE TIME (SEC) | MAX TGT KILLS | SCORE (TGT KILL) |
| FOXHOLE BIPOD SUPPORTED | 1 | 75 | 3 | 15 | 1 | 1 |
| // | 4 | 300 | 12 | 60 | 4 | 3 |
| // | 2 | 175 | 9 | 45 | 3 | 1 |
| // | 1 | 75 | 3 | 15 | 1 | 1 |
| // | 3 | 75/175 | 12 | 60 | 4 | 2 |
| // | 2 | 175 | 9 | 45 | 3 | 3 |
| SUB-TOTAL | | | | | 16 | 11 |
| SEQUENCE B | | | | | | |
| PRONE BIPOD SUPPORTED | 1 | 75 | 3 | 15 | 1 | 2 |
| // | 4 | 300 | 12 | 60 | 4 | 4 |
| // | 2 | 175 | 9 | 45 | 3 | 2 |
| // | 2 | 175 | 9 | 45 | 3 | 1 |
| // | 4 | 300 | 12 | 60 | 4 | 1 |
| // | 1 | 75 | 3 | 15 | 1 | 1 |
| SUB TOTAL | | | | | 16 | 11 |
| GRAND TOTAL | | | | | 32 | 22 |
| PERIOD 20 | | SEQUENCE A QUALIFICATION FIRING | | | | |
| POSITION | TYPE TARGET* | RANGE (M) | RDS FIRED | EXPOSURE TIME (SEC) | MAX TGT KILLS | SCORE (TGT KILLS) |
| FOXHOLE BIPOD SUPPORTED | 2 | 175 | 9 | 45 | 3 | 3 |
| // | 1 | 75 | 3 | 15 | 1 | 1 |
| // | 3 | 75/175 | 12 | 60 | 4 | 3 |
| // | 1 | 75 | 3 | 15 | 1 | 1 |
| // | 4 | 300 | 12 | 60 | 4 | 3 |
| // | 2 | 175 | 9 | 45 | 3 | 2 |
| SUB TOTAL | | | | | 16 | 13 |
| PRONE BIPOD SUPPORTED | 3 | 75/175 | 12 | 60 | 4 | 3 |
| // | 2 | 175 | 9 | 45 | 3 | 2 |
| // | 1 | 75 | 3 | 15 | 1 | 1 |
| // | 2 | 175 | 9 | 45 | 3 | 2 |
| // | 1 | 75 | 3 | 15 | 1 | 1 |
| // | 4 | 300 | 12 | 60 | 4 | 3 |
| SUB TOTAL | | | | | 16 | 12 |
| GRAND TOTAL | | | | | 32 | 25 |
| *SEE RANGE DIAGRAM FOR TARGET CONFIGURATION: (FIG. 5) | | | | | | |
| SIGNATURE OF SCORER <u>Tom Black</u> | | | | | | |
| QUALIFICATION RATINGS (CIRCLE ONE) (TOTAL HITS) | | | | | | |
| EXPERT -----27 - 32 MARKSMAN -----16 - 22 SHARPSHOOTER ----23 - 26 UNQUALIFIED -----15 AND BELOW | | | | | | |
| SIGNATURE OF OFFICER <u>Joe Smith 1LT Inf.</u> | | | | | | |

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Figure 7-19—Continued.

CHAPTER 8

QUICK FIRE

8-1. Purpose

The purpose of this chapter is to provide guidance in the training procedures and instructional techniques on the fast, unaimed method of fire called quick fire.

8-2. General

The quick fire technique is a distinct departure from methods which tend toward mathematical shooting precision. The key to the successful employment of this technique is simplicity. It must be understood that when time allows it is always preferable to use the sights; however, when the occasion calls for the speed of reflex reaction as a prerequisite to survival, there is no substitute for the use of the quick fire technique.

8-3. Position

When using the quick fire technique, the firer assumes the standing position as described in paragraph 3-4 (3) with the exception that he uses a raised stock weld and looks 2 to 3 inches above the sights on a plane level with the barrel. The soldier

must learn to *look* at the target and *not* at his sights. When he locks his rifle into the pocket of his shoulder and looks over the carrying handle of the M16A1 rifle, he is not only inclined to be distracted but is unable to pick up the top plane of the barrel. The effective quick fire shooter does not consciously align his barrel when picking up his target. He must be able to relate himself to the target just as the driver of an automobile keeps his car on the road by relating the horizon to the hood of the car as it appears in his peripheral vision. In order to establish this same relationship between rifle and target, and at the same time prohibit the firer from aiming, the sights of the rifle are taped (fig 8-1).

8-4. M16A1 Quick Fire Field Firing

a. The soldier initially engages the E-type silhouette (fig 8-2) using the M16A1 with taped sights at a range of 15 meters. This silhouette should have a circle 2 to 3 inches in diameter painted in the center of the lower third to afford the firer a definite spot on which to focus his vision.

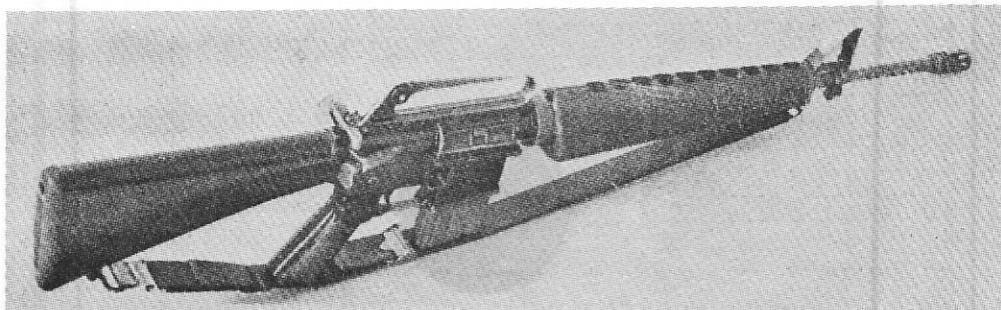


Figure 8-1. M16A1 rifle with sights taped.

b. Once the firer can hit the E-type silhouette eight out of ten times at 15 meters, the firing line is moved back to 30 meters, and the firer again engages the E-type silhouette.

Note. No useful purpose is served in extending the firer's range until he is effective at 15 meters.

c. After the firer is effective at engaging the E-

type silhouette at 30 meters, the tape should be removed. With the tape removed the firer again engages the E-type silhouette at both ranges. Assistant instructors should observe each firer to insure he is not aiming the weapon. If the firer attempts to aim, the tape should be put back on the sights.

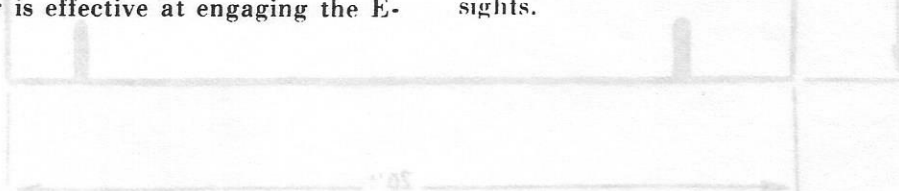


Figure 8-2. E-type silhouette used for quick fire training.

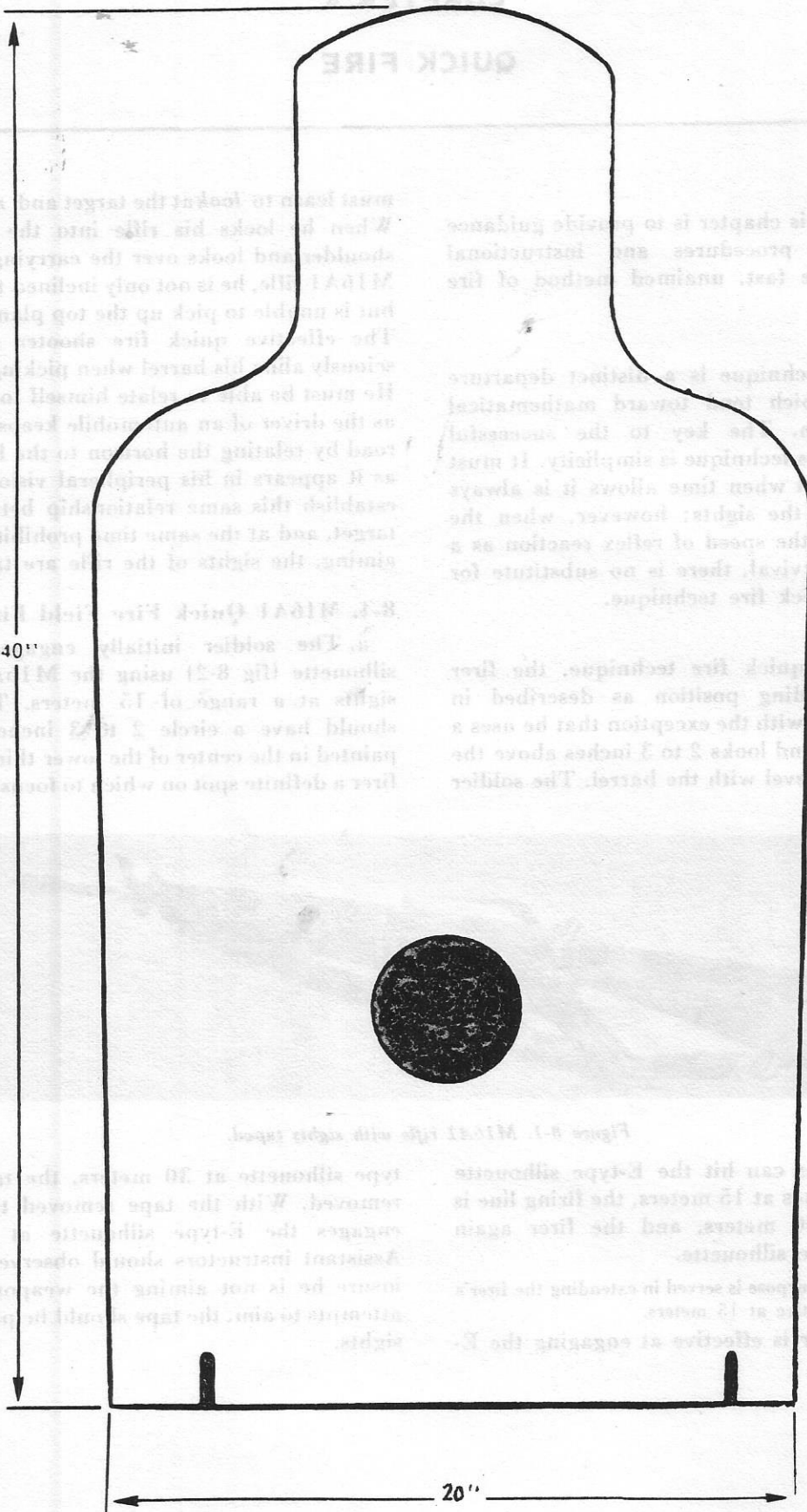


Figure 8-2. E-type silhouette used for quick fire training.

CHAPTER 9

RECORD FIRE

Section I. GENERAL

9-1. Purpose

Record firing is a series of practical exercises which require the soldier to apply individual rifle marksmanship techniques learned in previous instruction. Although the soldier receives a qualification rating based on the number of targets he hits, record firing should not be considered so much a test as it is an extremely valuable training exercise. When record firing is correctly organized and conducted, any soldier can gain valuable experience and become more effective as a combat rifleman regardless of his qualification rating. Properly used, qualification ratings are important, as they provide goals for the individual soldier and aid the commander in identifying the more proficient marksmen in his unit. This can be a significant consideration in the assignment of personnel, since the better marksmen should be evenly distributed among all elements of a combat unit. However, the ultimate objective of record firing, like all combat marksmanship training, is to produce combat proficient marksmen—not award qualification ratings.

9-2. Training Concepts

a. Uniform and Equipment. While firing the record course, soldiers should not be required to wear equipment. Tests have proven that the results will be the same whether they wear it or not.

b. Assistance to Firers.

(1) Record firing is strictly an individual effort of each soldier. The firer *should not* receive coaching or any other assistance during the exercise. This is particularly true of detecting targets, determining ranges, and locating the impact of bullets. If a rifle sustains a malfunction, it is the firer's responsibility to apply immediate action and attempt to eliminate the stoppage.

(2) The single exception to not assisting the firer is in the interest of safety. A firer attempting to clear a stoppage may inadvertently point the muzzle of his rifle to the flanks or rear. In such instances, the scorer or other range personnel should immediately correct the unsafe condition. During exercises in which the firer is moving, the scorer should also caution the firer to stay on line with adjacent firers.

Section II. RECORD FIRE—DAY

9-3. General

The standard record firing range achieves realism by presenting the firer with various target situations he will likely encounter in combat. Except where modification is necessary to install and maintain targets, the terrain is left undisturbed. Upon completion of record firing the number of targets hit by each firer is totaled. Based on this score, marksmanship qualification ratings are awarded. The qualification rating is based upon the collective scores of Record Fire I, Record Fire II, and Night Record Fire.

9-4. Organization

a. Firers. For scheduling purposes the average company of approximately 200 men must be divided in half. While half of the unit is firing the record course, the other half of the unit receives other training as prescribed by the commander. Since only half of a unit can be scheduled at one time, 2 training days are required to conduct Record Fire I and II using one record range. To

equalize light conditions, the half which conducts Record Fire I in the morning of the first day should fire Record Fire II in the afternoon of the second day. Conversely, the half which conducts Record Fire I in the afternoon of the first day should conduct Record Fire II in the morning of the second day.

b. Range and Range Personnel. There are four general areas needed to form a record range complex. These are an *orientation area*, *ready area*, *firing area*, and a *retired area*. The requirements for these areas, to include the necessary range personnel, are as follows:

(1) *Orientation area.* Location of the orientation area for record firing should be close to the firing area but should not allow the firer observation of the firing area. The orientation for record firing should include conduct of record fire, instructions on safety and range operations to include procedures in the ready and retired areas, and scoring.

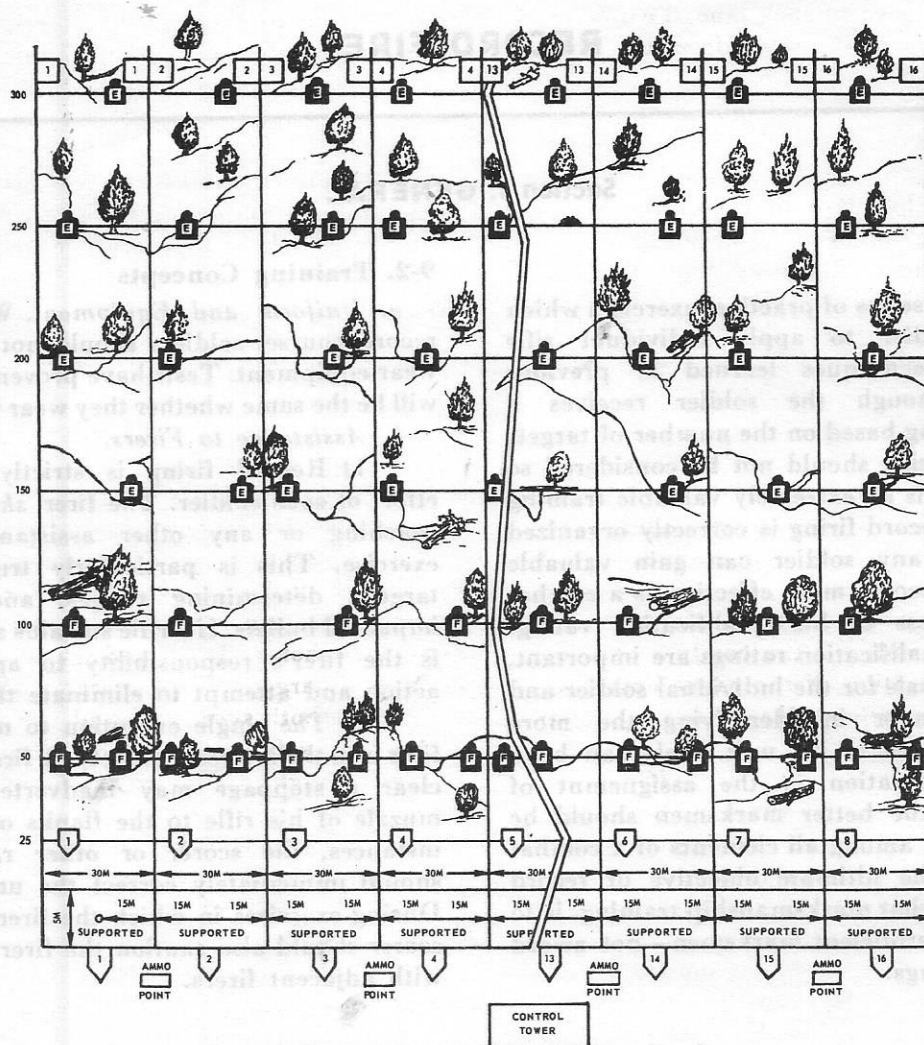


Figure 9-1. Standard record fire range.

(2) Ready area.

(a) Location and Purpose. The ready area should be located in the immediate vicinity of the firing range; however, firers should not be able to see the targets on the range from this area. While in the ready area, each soldier should be allowed sufficient time to blacken his rifle sights* lubricate the rifle as needed, and visually check his rifle for any apparent defects which might cause malfunctions. An ordnance small arms repairman should also be available in this area to service those rifles requiring technical repair.

(b) Range personnel.

1. Noncommissioned officer in charge. Supervises the activities of firers in the ready area.

2. Ordnance small arms repairman. Replaces damaged or broken parts discovered prior to or during record firing.

Caution: The replacement of any element of the sight system will change the battlesight zero of the weapon. When such replacements are made, the ordnance repairman informs the noncommissioned officer in charge of the ready area so provisions for rezeroing the rifle can be made.

(3) Firing area.

(a) Location and construction. Ideally, a record firing range should be located on ground which has a gradual downward slope for approximately 200 meters and then a gradual upward slope for an additional 110 meters, giving a total range depth of 310 meters. The standard record range (fig 9-1) is divided into 16 lanes, each 30 meters wide, with one foxhole in each lane. Stakes will be placed 25 meters from the first bank of targets and used for control points during the quick fire exercises (firing at the 25-meter targets). The

*Extreme caution is taken when blackening the sights of rifles equipped with the promethium sight. A direct exposure to flame or intense heat will melt the plastic vial of luminous material in the front sight post (app C).

E- and F-type silhouette targets attached to target holding mechanisms are used for record firing. Seven targets are placed in each lane. Two targets are placed at a range of 50 meters from the line of foxholes. These two targets must be a minimum distance of 10 meters apart to insure that the firer does not employ aimed fire on quick fire targets. Subsequent targets are placed at 50-meter intervals out to 300 meters. For Record Fire I the F-type silhouette is used at ranges of 50 and 100 meters, and the E-type silhouette is used at all other ranges. For Record Fire II the two F-type silhouettes at 50 meters are replaced with E-type silhouettes. Targets must be placed in positions approximating those which enemy soldiers might occupy. They must not be completely hidden, but so situated that an alert observer can be expected to detect their location. In the raised position, however, targets must not provide a distinct outline against the horizon or contrast with the background.

(b) Range personnel.

1. *Officer in charge.* The senior officer on the range is responsible for the conduct of firing and the overall operation of the range complex.

2. *Safety officer.* He enforces safety regulations.

3. *Noncommissioned officer in charge.* He supervises and coordinates the actions of the target control operator, lane scorers, ammunition detail, target repairmen, and the non-commissioned officers in charge of the ready and retired areas.

4. *Lane scorers.* One lane scorer is required for each lane (total of 16 for the standard record range). The lane scorers have the following duties.

(a) Check the location and proper operation of targets within their lanes before firing begins.

(b) Point out the right and left flank limits of the lane to each firer.

(c) Record the hits, misses, and no fires on the scorecard of each firer. Rule on the validity of alibis and the number of alibis to be fired (para 9-5 d). If in doubt, the lane scorers should request the noncommissioned officer in charge or the officer in charge to rule on the alibi.

(d) Require each firer to observe all safety precautions. During the moving phases of record firing, the lane scorer continually cautions the firer to stay on line with firers in adjacent lanes.

5. *Ammunition detail.* This detail is responsible for the issue and accounting of ammunition.

6. *Control tower operators.* They are responsible for raising and lowering the targets, timing their exposures, sounding the audible signal, and giving the fire commands. If possible, two men

should be designated to perform these functions.

7. *Medical aidman.* He is responsible for providing medical support as required and/or assistance in the evacuation of injured.

(4) Retired area.

(a) Location and purpose. The retired area is located in the immediate vicinity of the firing range, usually about 100 meters behind the ready area. Soldiers completing record firing move to the retired area where they are checked for live ammunition and brass. They may also clean their rifles in this area.

(b) Range personnel. One non-commissioned officer is required to check firers for live ammunition and brass cartridge cases and supervise the cleaning of rifles.

9-5. Conduct of Firing

a. Target Operation.

(1) *Control tower.* All targets are operated from the control tower. The control tower should be located in the center and slightly to the rear of the line of foxholes. It should be high enough to permit the target control operator to observe firers conducting both supported and unsupported firing phases. For safety purposes, the tower should also be high enough to permit observation of the entire target area.

(2) Target exposure times.

(a) In Record Fire I the soldier is confronted with both single and multiple target exposures. The firer has 5 seconds to engage a single target exposure between 50 and 200 meters, and 10 seconds to engage a single target exposure beyond 200 meters. The time for multiple target exposures depends upon the range to the targets. The firer has 10 seconds to engage double target exposures if both targets are 200 meters or less, and 15 seconds if one or both targets are beyond 200 meters. The firer has 20 seconds for triple target exposures.

(b) In Record Fire II the soldier is again confronted with single and multiple targets with the same time for engagement as in Record Fire I. Additionally the firer is confronted with two close-in targets simultaneously (25 meters) which he has 3 seconds to engage. The firer must employ quick fire techniques to engage the close-in targets.

(3) *Signals.* When the prescribed target exposure time has elapsed, the target control operator sounds a signal such as a bell, buzzer, or whistle which is audible to all firers and scorers. Rounds fired after this signal are scored as misses. To eliminate confusion resulting from targets being hit at the same moment the signal is sounded, target control operators must allow a few seconds interval between the signal and the actual lowering of targets.

Note: In order to provide maximum target and terrain situations, soldiers should fire Record Fire II on a lane different from that on which they fired Record Fire I.

b. Record Fire I. Record Fire I consists of four tables of ten target exposures each (fig 9-2). The firer is issued 40 rounds (four magazines of 10 rounds each) and is instructed to engage each target with one round. Total possible points for Record

Fire I is 40. During Record Fire I the firer is required to engage single and multiple targets from the foxhole supported and prone unsupported firing position.

(1) Table 1—The firer engages 10-single target exposures from the foxhole supported firing position.

| | | | | | | | | | | | |
|---|-----------|------------|-----|-----------------|---|---|-----------|------------|-----|------|---------|
| FIRER'S NAME (LAST) | | (FIRST) | | (MI) | GRADE | SS N | UNIT | ORDER NO. | | | |
| MORRIS | | JIM | | L. | PVT 2 | 578-92-62 | COA | 6 | | | |
| WEATHER: RECORD I | | | | <u>clear</u> | | TIME: RECORD I (AM PM) CROSS OUT ONE. | | | | | |
| RECORD II | | | | <u>overcast</u> | | RECORD II (AM PM) CROSS OUT ONE. | | | | | |
| NIGHT RECORD | | | | <u>clear</u> | | | | | | | |
| RECORD I FOXHOLE POSITION TABLE 1. FIRING POINT NO. | | | | | RECORD I PRONE POSITION TABLE 3. FIRING POINT NO. | | | | | | |
| RD | RANGE (M) | TIME (SEC) | HIT | MISS | NO FIRE | RD | RANGE (M) | TIME (SEC) | HIT | MISS | NO FIRE |
| 1 | 200 | 5 | | ✓ | | 1 | 50 | 5 | ✓ | | |
| 2 | 150 | 5 | | ✓ | | 2 | 200 | 5 | ✓ | | |
| 3 | 250 | 10 | ✓ | | | 3 | 100 | 5 | | ✓ | |
| 4 | 300 | 10 | | | ✓ | 4 | 150 | 5 | ✓ | | |
| 5 | 50 | 5 | ✓ | | | 5 | 300 | 10 | | ✓ | |
| 6 | 150 | 5 | ✓ | | | 6 | 250 | 10 | | ✓ | |
| 7 | 100 | 5 | ✓ | | | 7 | 50 | 5 | | | ✓ |
| 8 | 250 | 10 | | ✓ | | 8 | 200 | 5 | ✓ | | |
| 9 | 200 | 5 | ✓ | | | 9 | 150 | 5 | ✓ | | |
| 10 | 100 | 5 | ✓ | | | 10 | 250 | 10 | | ✓ | |
| RECORD I FOXHOLE POSITION TABLE 2. FIRING POINT NO. | | | | | RECORD I PRONE POSITION TABLE 4. FIRING POINT NO. | | | | | | |
| PHASE | RANGE (M) | TIME (SEC) | HIT | MISS | NO FIRE | PHASE | RANGE (M) | TIME (SEC) | HIT | MISS | NO FIRE |
| 1 | 100 | 15 | ✓ | | | 1 | 100 | 15 | ✓ | | |
| | 250 | | ✓ | | | | 250 | | ✓ | | |
| | 300 | | ✓ | | | 2 | 300 | 10 | ✓ | | |
| 50 | ✓ | | | 50 | ✓ | | | | | | |
| 2 | 150 | 10 | | ✓ | | 3 | 200 | 10 | ✓ | | |
| | 100 | | ✓ | | | | 150 | | ✓ | | |
| 3 | 150 | 20 | ✓ | | | 4 | 300 | 15 | ✓ | ✓ | |
| | 50 | | ✓ | | | | 50 | | ✓ | | |
| | 250 | | | | ✓ | | 200 | ✓ | | | |
| 4 | 200 | 5 | | ✓ | | 5 | 50 | 10 | ✓ | | |
| | 100 | | ✓ | | | 200 | ✓ | | | | |
| RECORD I TOTAL | | | 26 | 10 | 4 | Fred Browning SCORER'S SIGNATURE | | | | | |

DA FORM 3595, 1 Nov 73

RECORD FIRE SCORECARD

REPLACES DA FORM 3595, 1 APR 70, WHICH IS OBSOLETE.

For use of this form, see ASUBJSCD 23-72; the proponent agency is TRADOC.

Front

Figure 9-2. Record Fire Scorecard (DA Form 3595).

(2) Table 2—The firer engages single and multiple target exposures from the foxhole supported firing position.

(3) Table 3—The firer engages 10 single target exposures from the prone unsupported firing position.

(4) Table 4—The firer engages single and multiple target exposures from the prone unsupported firing position.

(a) Foxhole position phase of Record Firing I.

1. After receiving an orientation and completing preparations in the ready area, the soldier moves to the firing area. The soldier moves to his designated lane and stands or sits behind the foxhole facing away from the target area. On command, the firer hands his scorecard to the lane scorer and moves into the foxhole. There should be

| RECORD II | | | | | |
|---------------------------|-----------|------------|-----|------|---------|
| FOXHOLE POSITION | | | | | |
| TABLE 1. FIRING POINT NO. | | | | | |
| PHASE | RANGE (M) | TIME (SEC) | HIT | MISS | NO FIRE |
| 1 | 150 | 5 | ✓ | | |
| 2 | 300 | 10 | | ✓ | |
| 3 | 100 | 10 | ✓ | | |
| | 200 | | ✓ | | |
| 4 | 150 | 15 | ✓ | | |
| | 250 | | | ✓ | |
| 5 | 100 | 20 | ✓ | | |
| | 300 | | | | ✓ |
| | 200 | | ✓ | | |
| 6 | 300 | 10 | | ✓ | |

| OPTIONAL POSITIONS | | | | | |
|---------------------------|-----------|------------|-----|------|---------|
| TABLE 2. FIRING POINT NO. | | | | | |
| PHASE | RANGE (M) | TIME (SEC) | HIT | MISS | NO FIRE |
| MO 1 | 100 | 10 | ✓ | | |
| | 200 | | | ✓ | |
| MO 2 | 250 | 15 | ✓ | | |
| | 300 | | | | ✓ |
| MO 3 | 250 | 15 | ✓ | | |
| | 100 | | ✓ | | |
| MO 4 | 250 | 10 | ✓ | | |
| MO 5 | 300 | 10 | ✓ | | |
| MO 6 | 25 | 3 | ✓ | | |
| | 25 | | | ✓ | |

| OPTIONAL POSITIONS | | | | | |
|---------------------------|-----------|------------|-----|------|---------|
| TABLE 3. FIRING POINT NO. | | | | | |
| PHASE | RANGE (M) | TIME (SEC) | HIT | MISS | NO FIRE |
| MO 1 | 100 | 20 | ✓ | | |
| | 250 | | | ✓ | |
| | 150 | | ✓ | | |
| MO 2 | 100 | 10 | ✓ | | |
| | 200 | | ✓ | | |
| MO 3 | 150 | 10 | ✓ | | |
| | 200 | | | ✓ | |
| MO 4 | 25 | 3 | ✓ | | |
| | 25 | | ✓ | | |
| MO 5 | 25 | 3 | ✓ | | |

| OPTIONAL POSITIONS | | | | | |
|---------------------------|-----------|------------|-----|------|---------|
| TABLE 4. FIRING POINT NO. | | | | | |
| PHASE | RANGE (M) | TIME (SEC) | HIT | MISS | NO FIRE |
| MO 1 | 150 | 15 | ✓ | | |
| | 300 | | | ✓ | |
| | 150 | | ✓ | | |
| MO 2 | 200 | 20 | ✓ | | |
| | 250 | | | ✓ | |
| | 25 | | 3 | ✓ | |
| MO 3 | 25 | 3 | ✓ | | |
| MO 4 | 25 | 3 | ✓ | ✓ | |
| | 25 | | ✓ | | |
| MO 5 | 25 | 3 | ✓ | | |
| | 25 | | | ✓ | |

| NIGHT FIRING RECORD | | |
|--------------------------------------|---------|-----------|
| FOXHOLE OR PRONE SUPPORTED POSITIONS | | |
| RANGE | ROUNDS | TGT KILLS |
| 25 | 1 - 30 | 10 |
| 50 | 31 - 60 | 9 |
| | TOTAL | 19 |

| RECORD FIRING I | RECORD FIRING II | RECORD NIGHT FIRING | QUALIFICATION SCORE |
|-----------------|------------------|---------------------|---------------------|
| 26 | 26 | 19 | 71 |

| RECORD II TOTALS | HIT | MISS | NO FIRE |
|------------------|-----|------|---------|
| | 26 | 11 | 3 |

| QUALIFICATION SCORES AND RATING: | |
|----------------------------------|------------|
| POSSIBLE | 100 |
| EXPERT | 75 - ABOVE |
| SHARPSHOOTER | 66 - 74 |
| MARKSMAN | 54 - 65 |
| UNQUALIFIED | 53 - BELOW |

| QUALIFICATION (CIRCLE ONE): | | | |
|-----------------------------|----------------------|-----------|-------------|
| EXPERT, | <u>SHARPSHOOTER,</u> | MARKSMAN, | UNQUALIFIED |

| SCORER'S SIGNATURE |
|---------------------|
| <i>Frank Bousel</i> |

| OFFICER'S SIGNATURE |
|-----------------------------|
| <i>Rafael Smith 217-imp</i> |

Back

Figure 9-2—Continued.

at least three sandbags at each foxhole so the firer can adjust the emplacement to fit the conformation of his body. After making these adjustments, the firer should be given time to search his lane, using those techniques learned in target detection training. (The targets *must not* be raised while the firer is performing this search.) This procedure will familiarize him with the terrain, likely target locations, and most important, place added emphasis on previous target detection training.

2. On command, the firer is issued one magazine of 10 rounds and loads his rifle. The target control operator then gives the command WATCH YOUR LANES. Immediately following this command, the target operator begins raising and lowering targets according to the time and sequence prescribed by the scorecard (fig 9-2). Ten targets are presented to the firer in each table of Record I and he may fire *only one round at each*

target. Upon completion of tables 1 and 2 of Record I, to include alibi firing (*d* below), the target control operator requires a safety clearance of the firing line. At this time the firer clears his rifle and returns unexpended ammunition to the lane scorer. The lane scorer checks to insure the rifle is clear and directs the firer to get out of the foxhole and assume a good prone position beside the foxhole.

(b) Prone position phase of Record Fire I. Tables 3 and 4 (fig 9-2) are fired from the prone position. They are conducted in the same manner as tables 1 and 2, with the exception that the firer is in the prone position instead of the foxhole position. Upon completion of tables 3 and 4 of Record Fire I, to include alibi firing, the target control operator requires a safety clearance of the firing line. At this time, the firer clears his rifle and returns all unexpended ammunition to the lane scorer. The

lane scorer checks to insure the rifle is clear, hands the firer his scorecard, and directs him to the retired area.

c. *Record Fire II.* Record Fire II consists of four tables of 10 target exposures each (fig 9-2). The firer is issued 40 rounds (four magazines of 10 rounds each) and is instructed to engage each target with one round. Total possible points for Record Fire II is 40. During Record Fire II the firer is required to engage single and multiple targets from the foxhole firing position (table 1) and from an optional firing position while advancing from the foxhole towards the target line (tables 2, 3, and 4). Additionally, the firer is required to engage 10 quick fire targets (two in table 2, three in table 3, and five in table 4). The quick fire targets are to be exposed and engaged when the firer reaches a point of 25 meters from the target line (para 9-4 b (3) (a)).

(1) *Foxhole position phase of Record Fire II (Table 1).* The foxhole position phase consists of one table with both single and multiple targets. The conduct is the same as the foxhole position phase of Record Fire I.

(2) *Optional position and move out phase (Tables 2, 3, and 4).* When the firer completes the first table, he again receives the command get out of the foxhole. This time, however, he is told to move to a standing position directly in front of the foxhole. The lane scorer takes up a standing position immediately behind the firer. On command the firer is issued one magazine of 10 rounds and loads his rifle. The command to begin the exercise is MOVE OUT. On this command, the firer and scorer begin moving slowly toward the 50-meter targets. The target control operator begins raising and lowering targets according to the times and sequence prescribed by the scorecard. As the firer detects a target, he assumes a position of his own choice and fires at the target. As in the supported phase, he may fire only one round at each target. After firing at a target, the firer may change his position, *but he must not move forward until he receives another command to MOVE OUT.* While waiting for this command, the firer should continue to search his lane since other targets may appear. The firers should be on line with the 25-meter stakes prior to engaging the quick fire targets. During movements, the lane scorer continually cautions the firer to maintain alignment with firers in adjacent lanes and to keep his weapon locked when not firing. The procedures for clearing rifles are the same as prescribed for the supported firing phase.

d. *Alibi Firing.* Alibi firing is reserved for those firers who have encountered bonafide alibis. An alibi is to be awarded under the following circumstances:

(1) Malfunctioning of rifles (e.g., broken firing pin, double feed, failure to extract, etc.), provided the firer attempted to apply correct immediate action to eliminate the stoppage. Alibis for malfunctions are valid only if they were not due to improper maintenance or failure to prepare the rifle for firing. A general rule to follow in awarding alibis for rifle malfunctions is to allow an alibi for each target appearing during and subsequent to the moment the firer applies immediate action, provided the target drops before the soldier can fire. However, if the firer was slow in taking action to reduce the stoppage, an alibi should not be allowed.

(2) Faulty ammunition.

(3) Malfunction of the target holding mechanism (e.g., target fails to appear, target remains in the up position, or target appears and falls without having been engaged).

(4) In no instance will an alibi be given when the firer fails to detect and / or engage a target(s) in the prescribed time limit.

e. *Conduct of Alibi Firing.* If a firer is unable to fire at a target through no fault of his own, he receives an "alibi" for that particular target. This means he will be given another opportunity to fire at a target. For best results, alibi firing should be conducted after each exercise. To conduct alibi firing, the target control operator first asks, ARE THERE ANY ALIBIS? Those scorers whose firers have bona fide alibis give an affirmative signal (raising their hands or holding up the scorecard). If there are alibis, the target control operator commands ALIBI FIRERS WATCH YOUR LANES. Targets are then exposed singly. As a general rule, alibi firing should be conducted using midrange targets (150 to 250 meters), as the majority of the targets exposed during the regular exercises are located at these ranges. Since alibi firing can never approximate the identical target situation of the regular exercise, range personnel must insure alibis are legitimate before they are allowed. The firer should be allowed to fire only one round for each alibi. Alibis granted during engagement of quick fire targets must be fired at the same range (25 meters) using the same method of target engagement (quick fire). Quick fire alibi firing should be conducted separate from regular alibis with the target control operator announcing, QUICK FIRE ALIBIS ONLY.

f. *Commands.* Simple, standardized fire commands are essential to avoid confusion and misunderstanding during the conduct of record firing. Type commands which may be used are as follows:

(1) *Supported phases.*

FIRERS ASSUME THE FOXHOLE
PRONE POSITION.

SCORERS POINT OUT THE LIMITS OF THE LANES.

LOCK, ONE MAGAZINE OF TEN ROUNDS, LOAD.

WATCH YOUR LANES.

CEASE FIRING.

ARE THERE ANY ALIBIS?

ALIBI FIRERS WATCH YOUR LANES.*

CEASE FIRING.*

CLEAR ALL WEAPONS.

CLEAR ON THE RIGHT?

CLEAR ON THE LEFT?

THE FIRING LINE IS CLEAR.

FIRERS, STAND IN FRONT OF THE FOXHOLE.

LOCK, ONE MAGAZINE OF TEN ROUNDS, LOAD.

MOVE OUT.

CEASE FIRING.

ARE THERE ANY ALIBIS?

ALIBI FIRERS WATCH YOUR LANES.*

CEASE FIRING.*

CLEAR ALL WEAPONS.

CLEAR ON THE RIGHT?

CLEAR ON THE LEFT?

THE FIRING LINE IS CLEAR.

Caution: The control tower operator will orally command "Lock All Weapons" prior to all move out commands.

(2) *Unsupported phases.*

Section III. RECORD FIRE—NIGHT

9-6. General

The soldier's inability to successfully detect and engage targets during periods of limited visibility has always been a major concern of commanders. To help overcome this handicap more time has been devoted to the fundamentals and their application through practice firing during periods of darkness to include night record qualification. The night qualification score is then added to the day qualification score and a qualification rating is awarded on the basis of the combined score (qualification criteria will be discussed in para 9-13).

9-7. Fundamentals

a. *Target Detection.* Trying to detect a target during the day is difficult enough but at night it becomes even more difficult. In order for an individual to see targets at night, he must apply the three principles of night vision. For more detailed information on the three principles of night vision see FM 21-75.

(1) *Dark adaptation.* This is the process which conditions the eyes to see under low levels of illumination. It takes the eyes of the average person approximately 30 minutes to become 98 percent dark adapted in a completely darkened area.

(2) *Off-center vision.* During the daytime when an individual looks at an object, he looks directly at it. However, if he did this at night he would only see the object for a few seconds. In order to see this object for any length of time, he must look 6 to 10 degrees away from this object while concentrating his attention on the object.

(3) *Scanning.* The act of scanning relates to

the short, abrupt, irregular movement of the firer's eyes every 4 to 10 seconds around an object or area.

b. *Mode of Fire.* When engaging targets during periods of limited visibility, the best mode of fire is automatic fire in three-round bursts.

c. *Firing Position.* The recommended firing position for use during periods of limited visibility is the bipod supported prone position (fig 9-3). This position, when used during periods of limited visibility, differs slightly from the bipod supported prone position discussed in chapter 7. The reason for this is that an individual cannot use his sights during periods of limited visibility; in fact, the sights block his field of vision. To effectively engage targets during periods of limited visibility, the firer assumes the bipod supported prone firing position discussed in chapter 7, establishes a raised stock weld (looks 2 to 3 inches above the sights on a plane level with the barrel), points the weapon at the target, and fires three-round bursts. To obtain optimum results the firer should keep both eyes open and his head, arms, and rifle should move as one unit.

9-8. Training Facilities and Equipment

a. *Range Construction.* When constructing a night fire range the following factors must be considered:

(1) Construct on level or slightly rolling terrain away from or shielded from artificial light sources.

(2) Have a dark background to prevent skylining the targets.

(3) Have an approximate depth of 100 meters. To aid in individual target identification,

* Commands given only if alibis are indicated by scorers.

the lateral distance between the target holding mechanisms and firing points should be a minimum of 5 meters. (When sufficient terrain facilities are available the lateral distance may be increased proportionately.)

(4) Firing line and target should be on the same plane.

(5) Funding and / or terrain restrictions may necessitate variations in range construction; however, the examples listed below will generally satisfy all circumstances:

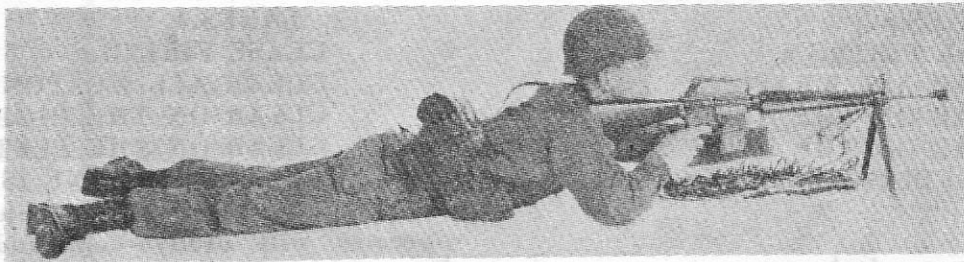


Figure 9-3. Bipod supported prone night fire position.

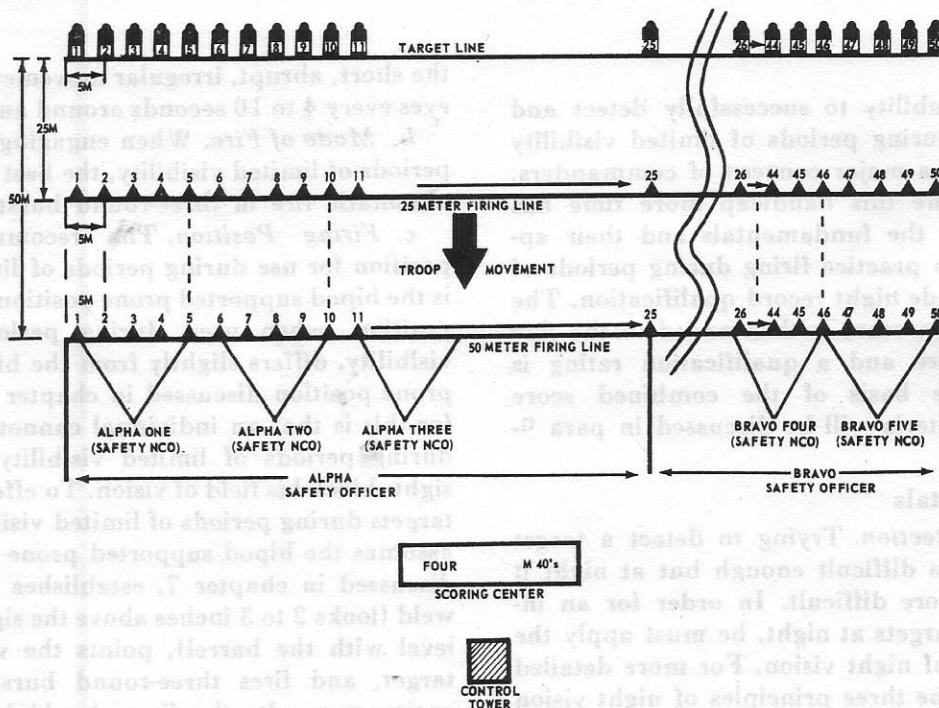


Figure 9-4. Night fire range (troop movement to the rear).

(a) Figure 9-4 illustrates a range capable of accommodating 50 firers simultaneously. This range features one bank of 50 targets (5 meters apart) and two firing lines. Troop movement is to the rear from the 25-meter firing line to the 50-meter firing line. This range configuration requires 50 M31A1 target holding mechanisms and four M40 counter devices.

(b) Figure 9-5 illustrates a range capable of accommodating 50 firers simultaneously, but it differs from the range in figure 9-4 in that there are two banks of targets (50 targets at 25 meters and 50 targets at 50 meters) and one firing line which eliminates the requirement for troop movement during the conduct of firing. This range con-

figuration requires 100 M31A1 target holding mechanisms and eight M40 counter devices.

(c) Figure 9-6 illustrates a range capable of accommodating 50 firers simultaneously, but it differs from the ranges discussed in figure 9-4 and 9-5 in that there are two banks of targets (25 targets at 25 meters and 25 targets at 50 meters) and one firing line with troop movement being lateral. This range requires 50 M31A1 target holding mechanisms and four M40 counter devices.

Note. Each of the range configurations discussed above have advantages / disadvantages over each other in a given situation. The selection of one over the other is a local selection and will be dictated by the local conditions (i.e., funding and available terrain).

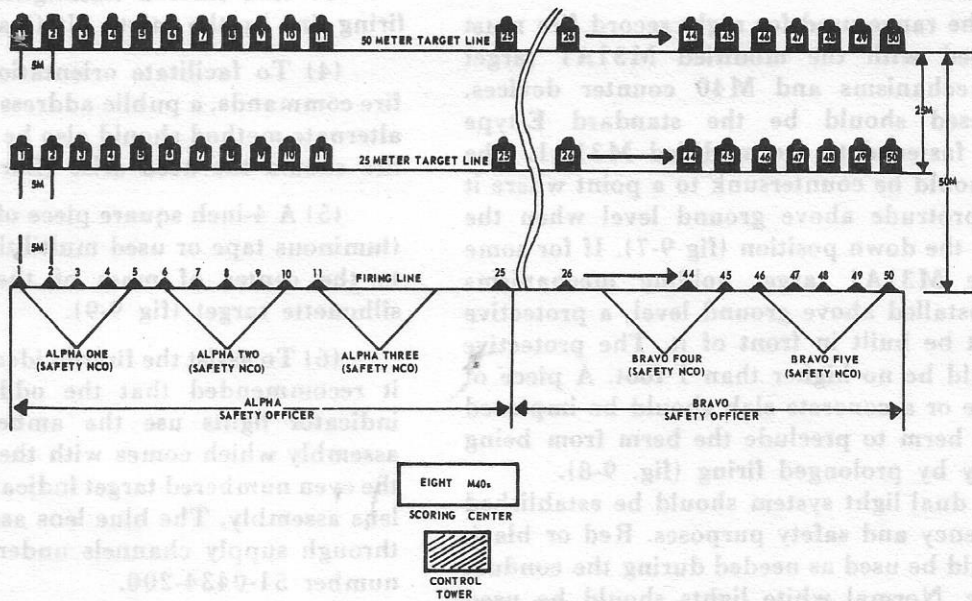


Figure 9-5. Night firing range (no troop movement required).

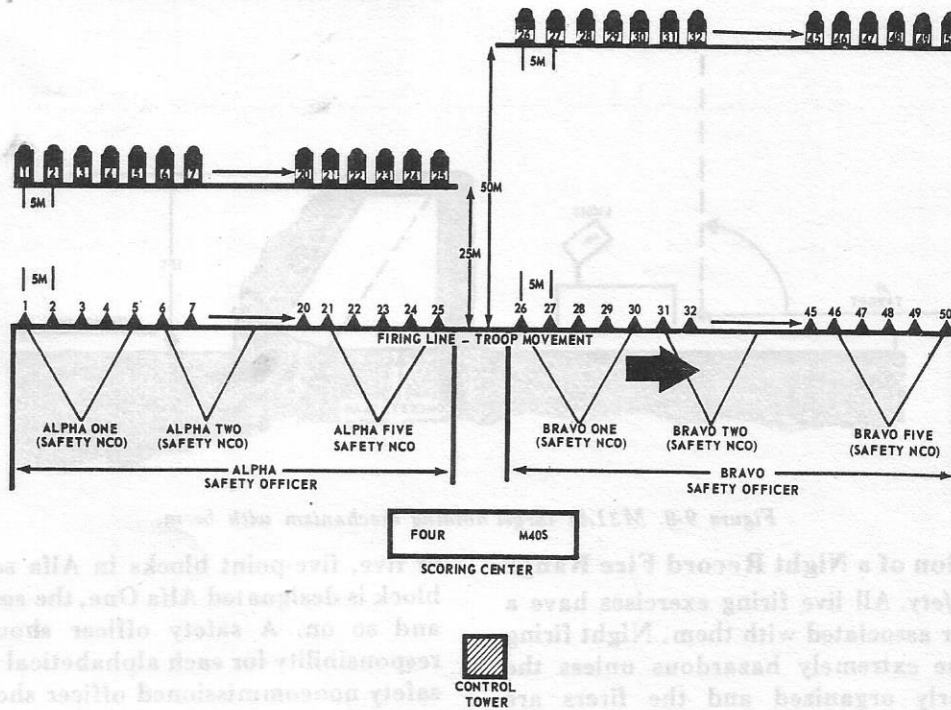


Figure 9-6. Night firing range (lateral troop movement).

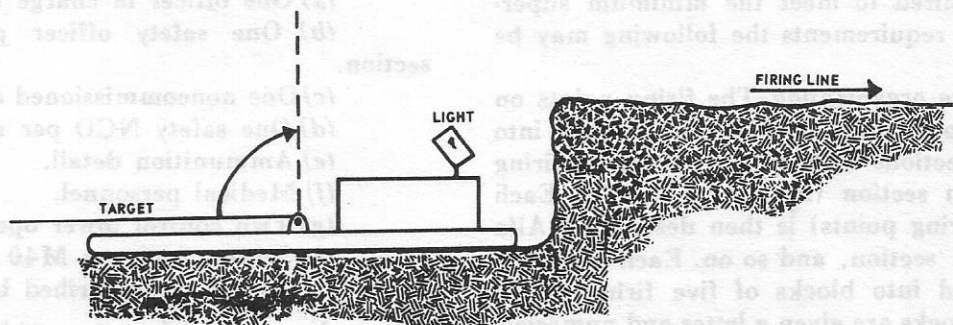


Figure 9-7. Countersunk M31A1 target holding mechanism.

b. Logistics.

(1) The range used for night record fire must be equipped with the modified M31A1 target holding mechanisms and M40 counter devices. Targets used should be the standard E-type silhouette, fastened to the modified M31A1. The M31A1 should be countersunk to a point where it does not protrude above ground level when the target is in the down position (fig 9-7). If for some reason the M31A1 target holding mechanisms must be installed above ground level, a protective berm must be built in front of it. The protective berm should be no higher than 1 foot. A piece of boiler plate or a concrete slab should be implaced within the berm to preclude the berm from being eaten away by prolonged firing (fig. 9-8).

(2) A dual light system should be established for expediency and safety purposes. Red or black lights should be used as needed during the conduct of training. Normal white lights should be used only for emergency purposes and police of the range after firing.

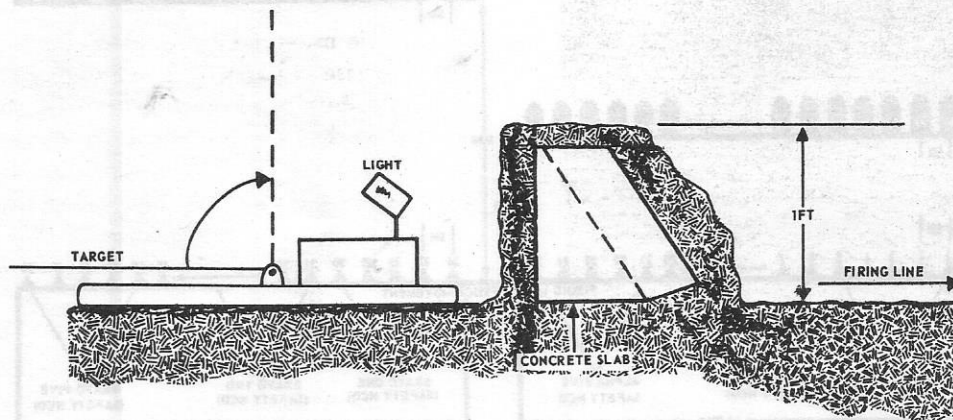


Figure 9-8. M31A1 target holding mechanism with berm.

9-9. Organization of a Night Record Fire Range

a. Range Safety. All live firing exercises have a degree of danger associated with them. Night firing exercises can be extremely hazardous unless the range is properly organized and the firers are closely supervised. As a guide in establishing the organization of a night record range and the personnel required to meet the minimum supervisory / safety requirements the following may be used:

(1) **Range organization.** The firing points on the night record range should be divided into alphabetical sections with no more than 25 firing points in each section (fig 9-4, 9-5, 9-6). Each section (25 firing points) is then designated Alfa section, Bravo section, and so on. Each section is further divided into blocks of five firing points each. These blocks are given a letter and numerical designation. For example, there are 25 firing points

(3) Red filtered flashlights are used on the firing line by the safety NCO and safety officers.

(4) To facilitate orientation and issuance of fire commands, a public address system is used. An alternate method should also be devised for a cease fire should the need arise (flares, sirens, etc.).

(5) A 4-inch square piece of reflective material (luminous tape or used multilith plate) is attached to the center of mass of the standard E-type silhouette target (fig 9-9).

(6) To assist the firer in identifying his target it is recommended that the odd numbered target indicator lights use the amber or reddish lens assembly which comes with the M40 systems and the even numbered target indicator lights are a blue lens assembly. The blue lens assembly is available through supply channels under the manufacturer number 51-0434-200.

(7) The indicator light assembly must be modified and will be discussed in paragraph 9-17.

or five, five-point blocks in Alfa section. The first block is designated Alfa One, the second, Alfa Two, and so on. A safety officer should be assigned responsibility for each alphabetical section, and one safety noncommissioned officer should be assigned responsibility for each numerical block.

(2) **Range personnel.**

(a) One officer in charge of the range.

(b) One safety officer per alphabetical section.

(c) One noncommissioned officer in charge.

(d) One safety NCO per numerical block.

(e) Ammunition detail.

(f) Medical personnel.

(g) Two control tower operators.

(h) Scorers (one per M40 counter device).

(i) Guards as prescribed by local policy.

Note. Although some modifications in the organization of the range may be required, night firing should

not be attempted without an adequate number of supervisory and safety personnel.

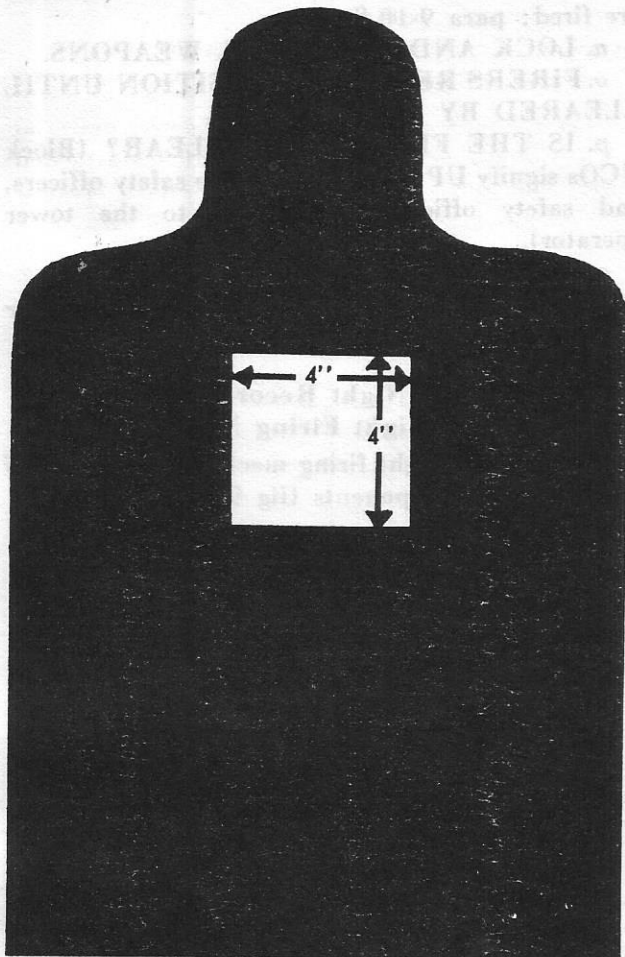


Figure 9-9. E-type silhouette with reflective material.

b. Organization of Firers. Firers are divided into orders (one firer per firing point). The first order moves to the firing line while subsequent orders remain on the ready line until called forward to fire.

9-10. Conduct of Firing

a. Initially, firers are given a review of the pointing technique and the principles of night vision. This is followed by an orientation on safety aspects and range procedures.

b. The first firing exercise is for practice. (Rifles are equipped with bipods.) Targets are exposed at a range of 25 meters with each soldier firing six rounds in the semiautomatic mode. The first and fourth rounds should be tracers to aid the firer in obtaining weapon alignment on target. Targets are initially in the UP position. At the command **COMMENCE FIRE**, the tower operator, controlling the targets, counts 20 seconds, pushes the switch that controls the targets to the UP position, and releases it. Firers are instructed to fire only one round at each target exposure.

c. At the completion of 25-meter semiautomatic practice firing the soldier is ready to begin the record fire exercise at 25 meters. He is issued two magazines containing 15 rounds each and is instructed to fire a three-round burst at each of 10 target exposures. As in semiautomatic practice firing, the targets are initially in the UP position and the tower operator raises them every 20 seconds. Targets are to be exposed only 10 times.

d. Upon completion of the 25-meter record fire exercise the scores are recorded from the M40 counter device (para 9-12) and the 50-meter exercise is initiated (i.e., six rounds semiautomatic followed by 10 three-round bursts at 10 target exposures). The 50-meter exercise is a repeat of the 25-meter exercise with the exception of the distance to the targets.

e. At the completion of the 50-meter record fire exercise the scorers again are recorded from the M40 counter device and each firer is informed of his score.

Note. Targets should never be lowered by the tower operator during the conduct of the record fire exercises (para 9-12c) or prior to firing alibis.

f. Alibis must be fired after the completion of each exercise or prior to the changing of firing lines.

g. Distribution of ammunition for the conduct of firing may be accomplished by having each firer pick up from a central issue point two 20-round magazines of six rounds each (for practice firing) and four 30-round magazines of 15 rounds each (for record firing). After each order has completed firing the entire course, the magazines are returned to the central point. This procedure may be modified to fit local conditions.

9-11. Fire Commands

Fire commands should be simple and include only that information and instruction required. Sample commands for night practice fire and night record fire are as follows:

a. **ARE RANGE PERSONNEL READY TO FIRE?**

(Block safety NCOs signify UP to section safety officers; safety officers in turn signify UP to the tower operator: e.g., **ALPHA UP**, **BRAVO UP** . . .) Safety personnel may show readiness by oral or visual (red lights) signals.

Note. This procedure may be modified to conform to local safety SOPs.

b. **IS THERE ANYONE DOWN RANGE?**
(Ask three times)

c. **THE FIRING LINE IS NO LONGER CLEAR.**

d. **ORDER _____, MOVE TO THE FIRING LINE, PLACE YOUR WEAPON NEXT TO THE STAKE OF YOUR ASSIGNED**

FIRING POINT AND ASSUME A GOOD NIGHT FIRE POSITION; THEN SECURE YOUR WEAPON.

e. IS THE FIRING LINE READY?
(Block safety NCOs signify UP to their respective safety officer; safety officers in turn signify UP to the tower operator).

f. THE FIRING LINE IS READY.

g. SAFETY NCOs ISSUE ONE MAGAZINE OF SIX ROUNDS (two magazines of 15 rounds each for record fire).

h. FIRER'S: ONE MAGAZINE OF SIX (15) ROUNDS; LOAD.

i. UNLOCK YOUR WEAPON BY POINTING SELECTOR SWITCH TO THE SEMI-AUTOMATIC MODE (automatic mode for record fire).

j. TARGETS UP (a slight hesitation to allow firer to point toward target).

k. COMMENCE FIRING (targets raised six

times at 20 second intervals for practice) (10 times at 20 second intervals for record fire).

l. CEASE FIRE.

m. ARE THERE ANY ALIBIS? (If so, alibis are fired; para 9-10 f).

n. LOCK AND CLEAR ALL WEAPONS.

o. FIRERS REMAIN IN POSITION UNTIL CLEARED BY SAFETY NCOs.

p. IS THE FIRING LINE CLEAR? (Block NCOs signify UP to their respective safety officers, and safety officers signify UP to the tower operator).

q. THE FIRING LINE IS CLEAR.

Repeat commands for record fire of the 25-meter and 50-meter exercises.

9-12. Scoring of Night Record Fire with the M40 Night Firing Mechanism.

a. The M40 night firing mechanism consists of the following components (fig 9-10).

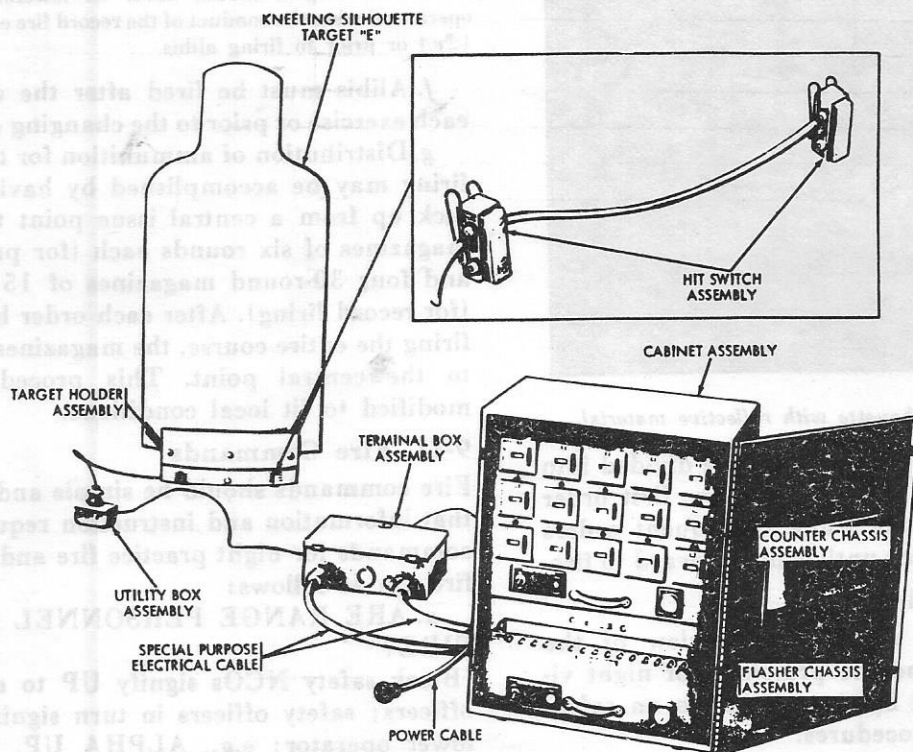


Figure 9-10. Night firing target mechanism M40—components and assemblies.

- (1) The cabinet assembly.
- (2) The counter chassis assembly.
- (3) The flasher chassis assembly.
- (4) The terminal box assembly.
- (5) The target holder assembly (not used for night record fire, as it is already present on the M31A1 target holding mechanism).
- (6) The hit switch assembly (not used when employed in conjunction with the M31A1 as it is

already present on the M31A1 target holding mechanism).

(7) Indicator light (see modification instruction for M31A1 target holding mechanism).

b. Scores for night record fire are recorded automatically on the M40 counter device. Each device is capable of recording scores for 15 firing points (M31A1 target holding mechanisms). The target will fall when hit by a projectile. Each time

the target falls the score is increased by one and is registered on the M40 device. Only one round need hit the target to cause it to fall. Subsequent hits from the three-round burst will not increase the score on the M40. After each exercise the scores are transferred by a scorer from the M40 to a scoresheet, the counters are turned back to zero, and the next exercise is conducted.

c. The scorer must turn off the counter assembly immediately after all alibis have been fired and the command CEASE FIRE has been given. The

purpose of this procedure is to insure accurate scoring, as any actuation of the M31A1 target mechanism will be recorded by the M40 night firing mechanism; this includes the lowering of the targets by the tower operator. The tower operator should allow ample time between the command CEASE FIRE and the actual lowering of the targets; this provides the scorer with sufficient time to turn off his respective machine. The scorer then records all hits for each firing point on a master scoresheet (fig 9-11) and resets all counters to zero prior to the firing of the next exercise.

| NIGHT RECORD SCORES | | | | | | | | | | | |
|---------------------|-----------|-----------|----------|----------|-------------------------|--------------------|-----------|-----------|----------|----------|-------|
| COMPANY _____ | | | | | DATE FIRED _____ | | | | | | |
| RANGE _____ | | | | | WEATHER CONDITION _____ | | | | | | |
| NAME OR ROSTER NO. | ORDER NO. | POINT NO. | 25M HITS | 50M HITS | TOTAL | NAME OR ROSTER NO. | ORDER NO. | POINT NO. | 25M HITS | 50M HITS | TOTAL |
| | | 1 | | | | | | 26 | | | |
| | | 2 | | | | | | 27 | | | |
| | | 3 | | | | | | 28 | | | |
| | | 4 | | | | | | 29 | | | |
| | | 5 | | | | | | 30 | | | |
| | | 6 | | | | | | 31 | | | |
| | | 7 | | | | | | 32 | | | |
| | | 8 | | | | | | 33 | | | |
| | | 9 | | | | | | 34 | | | |
| | | 10 | | | | | | 35 | | | |
| | | 11 | | | | | | 36 | | | |
| | | 12 | | | | | | 37 | | | |
| | | 13 | | | | | | 38 | | | |
| | | 14 | | | | | | 39 | | | |
| | | 15 | | | | | | 40 | | | |
| | | 16 | | | | | | 41 | | | |
| | | 17 | | | | | | 42 | | | |
| | | 18 | | | | | | 43 | | | |
| | | 19 | | | | | | 44 | | | |
| | | 20 | | | | | | 45 | | | |
| | | 21 | | | | | | 46 | | | |
| | | 22 | | | | | | 47 | | | |
| | | 23 | | | | | | 48 | | | |
| | | 24 | | | | | | 49 | | | |
| | | 25 | | | | | | 50 | | | |
| REMARKS: | | | | | | | | | | | |

Figure 9-11. Night firing scoresheet (fabricated locally).

d. The flasher assembly is preset to control the indicator lights mounted on the M31A1 in a manner to emit a flash of light every 4 seconds.

This gives the firer five flashes for every target exposure. The mode of the flash may be set to either the single or rapid mode.

9-13. Qualification Scores and Ratings

a. Qualification scores for rifle marksmanship are based on a possible 100 points and include 70 possible points for daylight aimed fire, 10 possible points for daylight quick fire, and 20 possible points for night fire. Every effort will be made to insure that scoring is accurate and opportunities for error are minimized. Qualification scores and ratings are:

Expert..... 75 to 100
 Sharpshooter..... 66 to 74

Marksmanship..... 54 to 65
 Unqualified..... 53 and below

b. Qualification and requirement procedures.

(1) Individuals must fire Record Fire I, Record Fire II, and Night Record Fire exercises and achieve a combined minimum qualification score of 54.

(2) To assist in recognizing individuals who are not reaching the minimum proficiency at critical points in the Record Fire course, the following guides are established:

| | Score | Action to be taken |
|--|--------------|--|
| Record Fire I | Less than 20 | Refire Record I on a contingency basis. ¹ |
| Record I | More than 20 | Progress to Record Fire II. |
| Record fire I and II Total | Less than 47 | Refire Record Fire II on a contingency basis. ² |
| Record Fire I and II Total | More than 47 | Progress to Night Record Fire. |
| Record Fire I, II and Night Fire Total | 53 or below | Refire Night Record Fire. ³ |
| Record Fire I, II and Night Fire Total | 54 or more | Award qualification rating. |

¹ An individual who scores less than 20 on Record Fire I will be refired on a contingency basis before proceeding to further scheduled marksmanship training and qualification firing. This refire score will be disregarded if it is not used to obtain the minimum qualification score of 54 (the total score of Record I, Record II, and Night Record).

² An individual who attains a combined score of less than 47 (original or refire score for Record I plus the original score for Record II) will refire Record II on a contingency basis. The refire score will be disregarded if it is not used to obtain the minimum qualification score of 54 (the total score of Record I, Record II, and Night Record).

³ An individual who has not attained a combined minimum score of 54 (Record I—original or refire score—plus Record II—original or refire score—plus original Night Fire score) will refire Night Record Fire. If after refiring night Record Fire the individual's total score is less than 54, (4) below shall apply.

(3) The use of any refire score (I, II, or Night Fire) to obtain the *minimum* qualification score of 54 will result in the firer receiving a *maximum* score of 54 and a maximum qualification rating of **MARKSMAN**. Expert and sharpshooter qualification ratings are reserved for those individuals who obtained the required number of hits through the use of the original scores only.

(4) If after firing all three exercises (including refire of exercise(s) as described above) an in-

dividual has not attained the specified minimum qualification score (54) and thereby achieved qualification, he should be provided intensive remedial training. Subsequently, he should be refired once on one or more exercises as necessary to achieve the minimum qualification score of 54. If he still does not qualify, he will be recycled in the case of a basic trainee; or if the individual case warrants, a weapons qualification waiver will be requested.

Section IV. MODIFICATION OF M31A1 MECHANISM

9-14. General

The M31A1 target holding mechanism is designed to be activated by the vibration of a bullet striking the target. When firing automatic fire (three-round bursts), the primary concern is to hit the target, whether with one, two, or three rounds; the M31A1 must be modified to register this information. Thus, any one of the three rounds fired in the burst that hits the target will cause the target to fall and a "Kill" is recorded on the M40 counter device.

9-15. Materials Required for Modification

- 1 each—Wire insulated (18 gage) 10 inches long.
- 1 each—Wire insulated (18 gage) 11 inches long.
- 1 each—Binding Post (ORD No. 8410723; FSN 5940-588-6808).

9-16. Procedure for Modification

- Remove the cover of the M31A1 target holding mechanism.

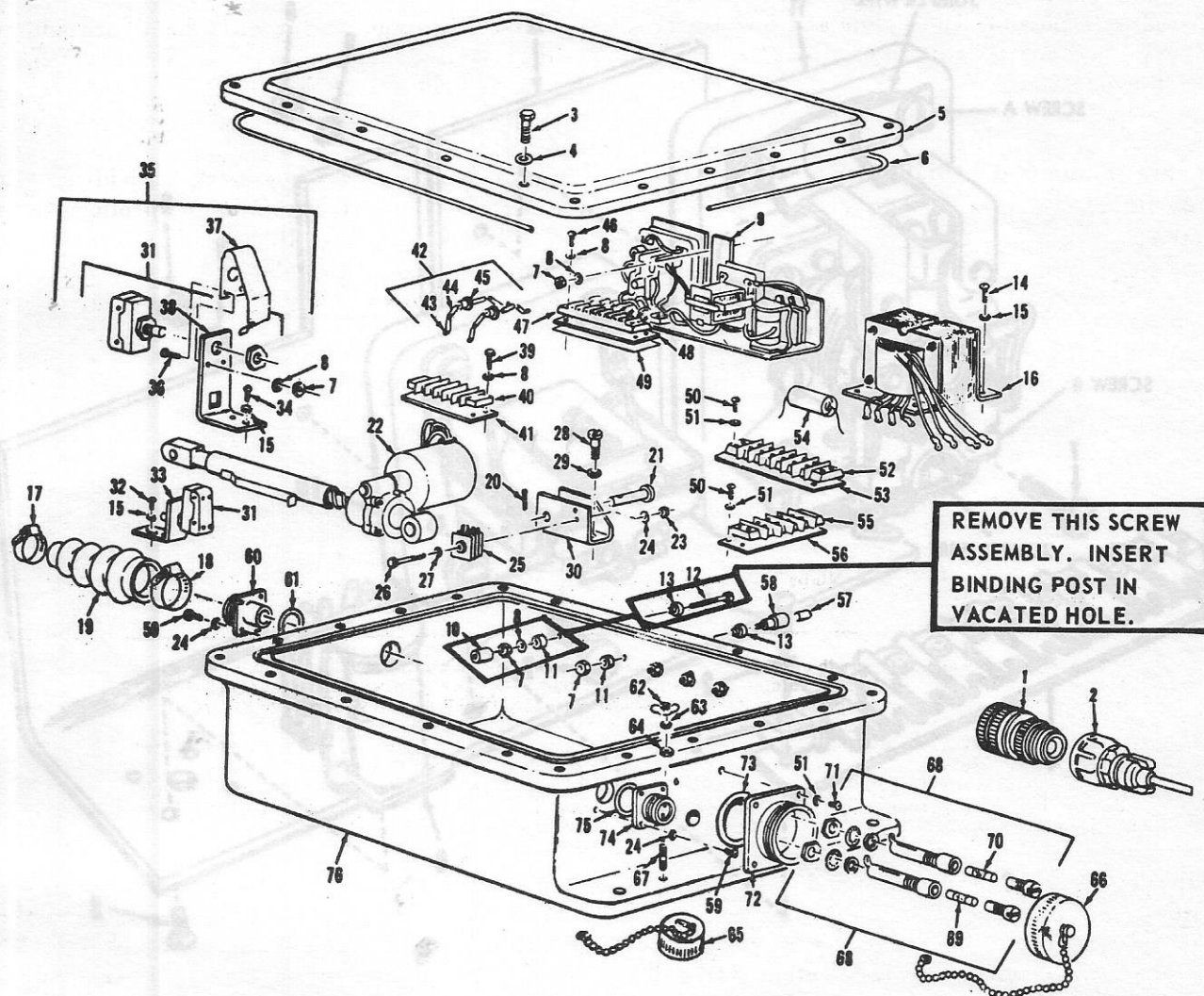


Figure 9-12. Box assembly, exploded view.

b. Remove the screw, shouldered washer, insulator disk, lock washer, nut, and spacer that secures the bracket assembly (ORD No. 8421854) to box assembly (ORD No. 8421550) (fig 9-12).

c. Insert binding post (ORD No. 8410723; FSN 5940-588-6809) in the hole vacated by the removal of the screw (b above).

d. Secure the binding post to the box assembly using the shouldered washer, insulator disk, lock washer, and nut (removed in b above).

e. Remove the 3-inch jumper wire (ORD No. 8410662) from the top of the relay (1, fig 9-13).

f. Remove the 3¼-inch jumper wire (ORD No. 8410662) from the bottom of the relay (1, fig 9-13).

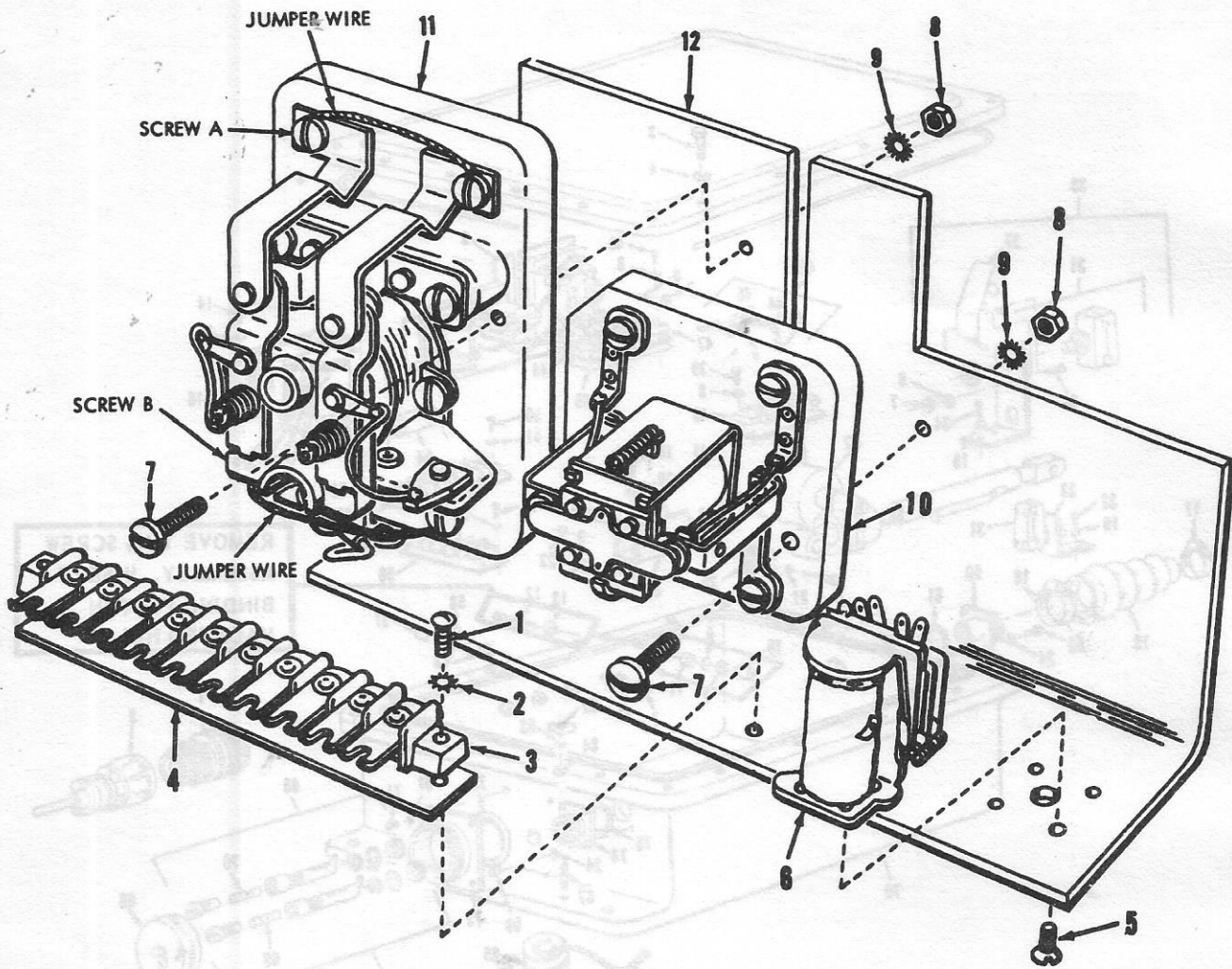
g. Attach one end of the 10-inch insulated wire (18 gage) under the screw labeled "A" (2, fig 9-13) and the remaining end *between* the insulator disk and the lock washer of the binding post lettered "L" (stamped under binding post exterior of box

assembly).

h. Attach one end of the 11-inch insulated wire (18 gage) under the screw labeled "B" and the remaining end *between* the insulator disk and lock washer on the binding post (as installed in c and d above).

9-17. Modification of Indicator Light

The indicator light is susceptible to damage if used in a position centered on the target as indicated in figure 9-10. Therefore, it should be removed from the target, placed within a metal cylinder (beer can), and attached to the front of the M31A1 target holding mechanism by way of a locally fabricated holder (fig 9-14). This facilitates the aiming of the indicator light onto the target. In this manner, the aimed cylinder directs the flashes of light upon a 4-inch square of reflective material attached to the silhouette (fig 9-9), thus, preventing accidental damage caused by a round striking the indicator light.



1

Figure 9-13. Bracket assembly, exploded view.

assembly.

Attach one end of the 1/4-inch insulated wire (18) under the screw labeled "B" and the remaining end between the insulator disk and lock washer on the binding post as installed in 9-12.

9-17. Modification of indicator light.

The indicator light is susceptible to damage if used in a position centered on the target as indicated in figure 9-16. Therefore it should be removed from the target, placed within a metal cylinder (part 9-14) and attached to the front of the M3A1 target holder (fig 9-14). This facilitates the aiming of the indicator light onto the target in this manner, the aimed cylinder directs the flashes of light upon a 4-inch square of reflective material attached to the aluminum (fig 9-15) thus preventing accidental damage caused by a round striking the indicator light.

Remove the screw, shouldered washer, insulator disk, lock washer, nut, and spacer bar secures the bracket assembly (ORD No. 8421824) to box assembly (ORD No. 8421250) (fig 9-13).

Insert binding post (ORD No. 8410723; ESN 5049-288-5899) in the hole vacated by the removal of the screw (6 above).

Secure the binding post to the box assembly using the shouldered washer, insulator disk, lock washer, and nut (removed in 9 above).

Remove the 3/4-inch jumper wire (ORD No. 8410623) from the top of the relay (11, fig 9-13).

Remove the 2 1/4-inch jumper wire (ORD No. 8410623) from the bottom of the relay (11, fig 9-13).

Attach one end of the 1/4-inch insulated wire (18) under the screw labeled "A" (12, fig 9-13) and the remaining end between the insulator disk and the lock washer of the binding post between "I" (stamped under binding post extension of box

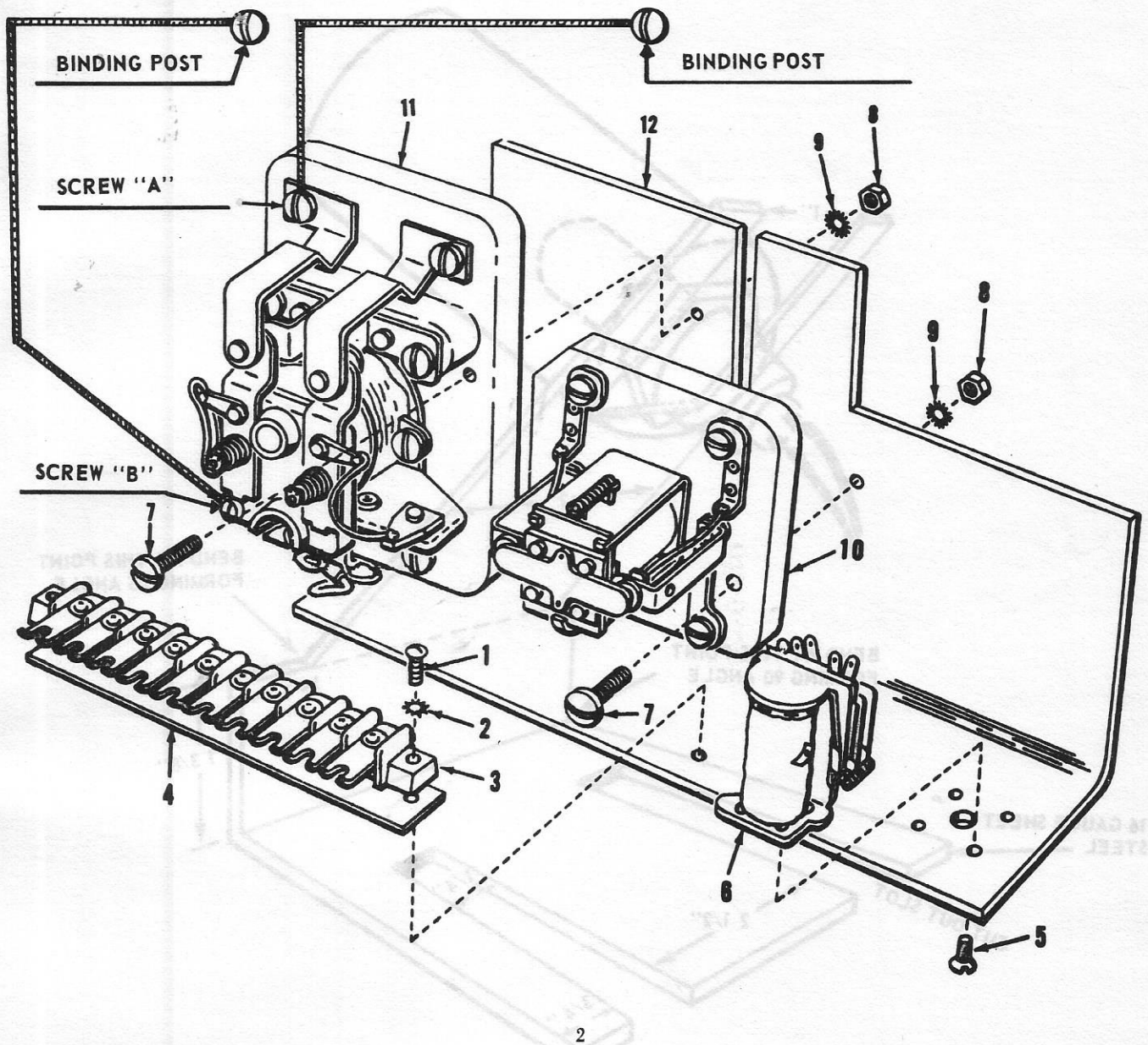


Figure 9-13—Continued.

Section V. PROCEDURES FOR CONNECTING IS MODIFIED M3A1 TARGET HOLDING MECHANISMS TO ONE M49 COUNTER DEVICE

9-19. Procedures for Connection of System

a. Punch out the upper perforated circles on the left middle and right of the terminal box.
 b. Insert the ends of the electrical special purpose cable assembly (Fig. 9-13) (Part 0930-802) into the right and left holes (a above).
 Connect the ground wire to the common section

9-18. General
 Connecting the M3A1 target holding mechanism to the M49 counter device enables the fire to engage a target and ascertain the results without moving down range. This is ideal for night firing as it is both expeditious and safe. Fifteen M3A1 target mechanisms may be connected to one M49 night firing device.

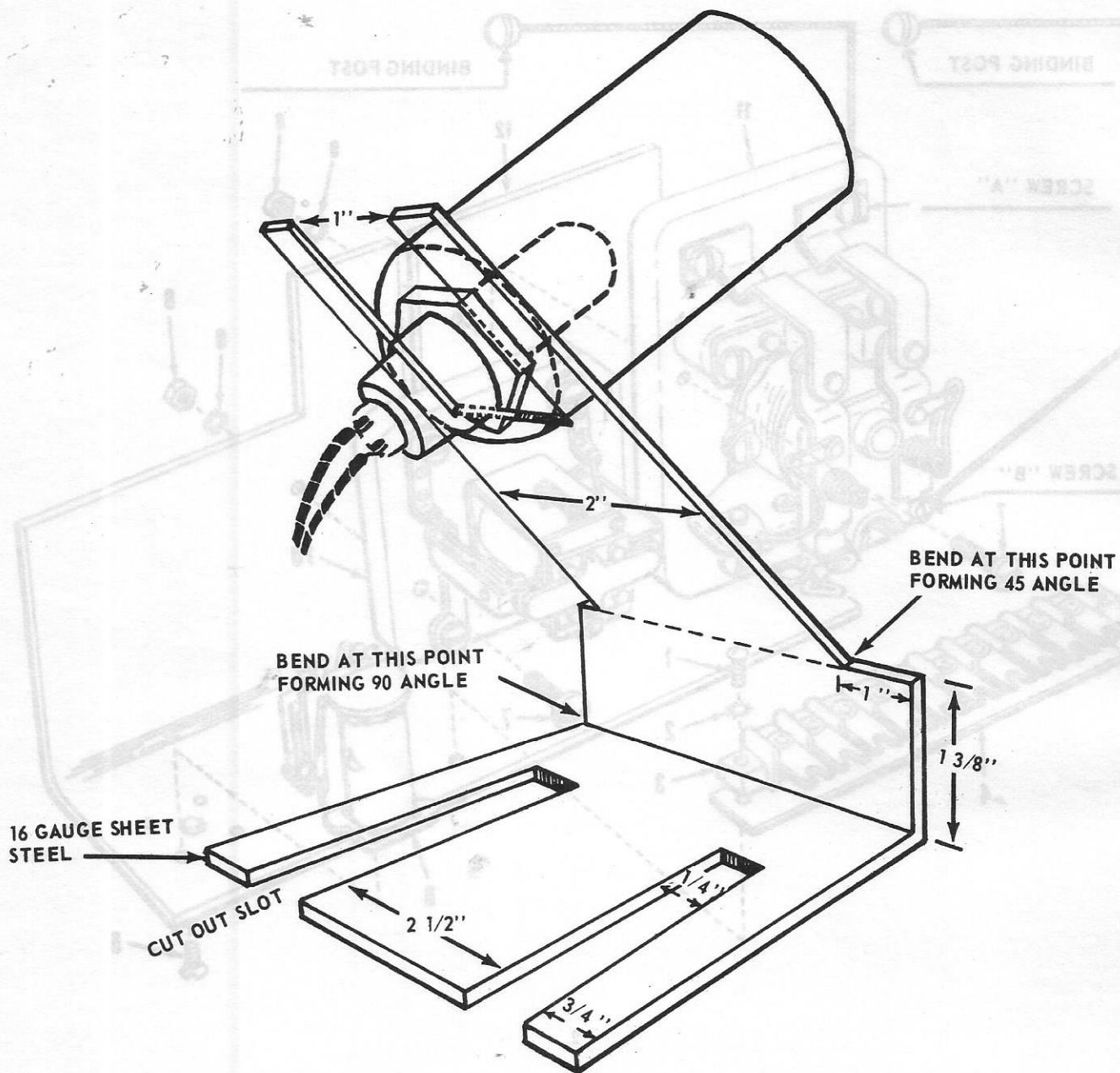


Figure 9-14. Indicator light bracket (locally fabricated).

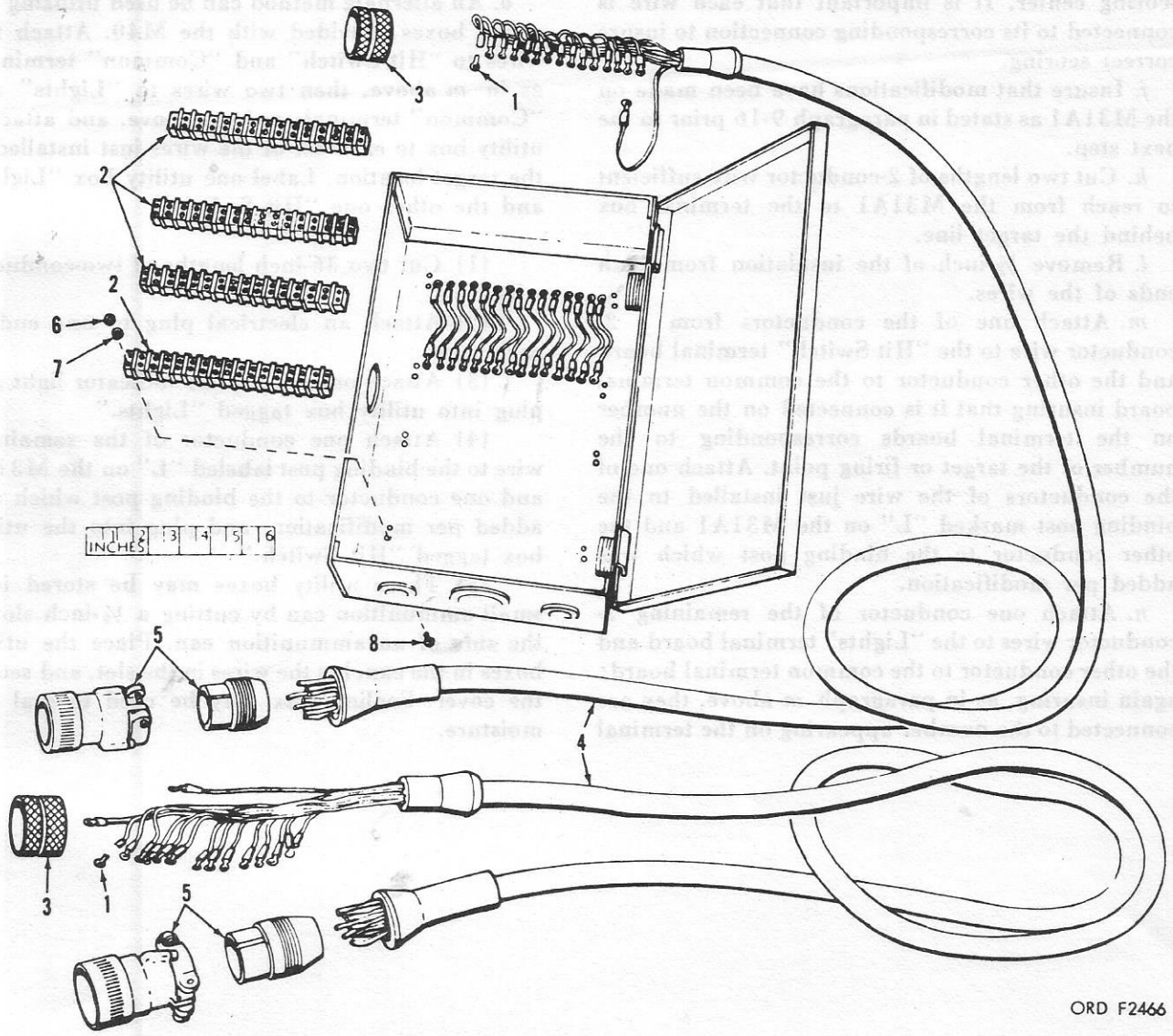
Section V. PROCEDURES FOR CONNECTING 15 MODIFIED M31A1 TARGET HOLDING MECHANISMS TO ONE M40 COUNTER DEVICE

9-18. General

Connecting the M31A1 target holding mechanism to the M40 counter device enables the firer to engage a target and ascertain the results without moving down range. This is ideal for night firing as it is both expeditious and safe. Fifteen M31A1 target mechanisms may be connected to one M40 night firing device.

9-19. Procedures for Connection of System

- a. Punch out the upper perforated circles on the left, middle, and right of the terminal box.
- b. Insert lug ends of the electrical special purpose cable assembly (fig 9-15) (FSN 6920-862-4759) into the right and left holes (a above). Connect the ground wire to the common section



ORD F2466

- 1-Lug terminal 5940-204-7830
- 2-Terminal board 5940-109-2583
- 3-Electrical conduit coupling nut 5975-821-6446
- 4-Electrical special purpose cable assembly 6920-862-4759

- 5-Electrical plug connector 5935-201-6635
- 6-Hexagon plain nut 5310-271-4644
- 7-Lockwasher 5310-209-0766
- 8-Machine screw 5305-543-5763

Figure 9-15. Electrical special purpose cable assembly.

and one each lug terminal to each terminal on the terminal board (fig 9-16) marked "Hit Switches." Repeat the above procedure with the second special purpose cable to connect the lights.

c. Lay two 15-pair conducting cables from the scoring center terminal box down range to the vicinity of the berm.

d. Strip the insulation back 1/2-inch at both ends on each conductor wire of the two 15-pair conductor cables.

e. Select one set of two conductors from a 15-pair conductor cable. Attach one conductor under

the screw numbered 1 on the "Hit Switch" terminal board.

f. Select one set of two conductors from the other cable. Attach one conductor under the screw numbered 1 on the "Lights" terminal board and the other conductor under the corresponding screw on the "Common" terminal board.

g. Repeat the procedure in e and f above for each M31A1 to be used (up to 15 per each M40 device).

h. Take an additional terminal box and set it up behind the target line in a desirable location.

i. Connect the other ends of the two 15-pair cables to this second terminal box in the respective positions occupied on the terminal box at the scoring center. It is important that each wire is connected to its corresponding connection to insure correct scoring.

j. Insure that modifications have been made on the M31A1 as stated in paragraph 9-16 prior to the next step.

k. Cut two lengths of 2-conductor wire sufficient to reach from the M31A1 to the terminal box behind the target line.

l. Remove 1/2-inch of the insulation from both ends of the wires.

m. Attach one of the conductors from a 2-conductor wire to the "Hit Switch" terminal board and the other conductor to the common terminal board insuring that it is connected on the number on the terminal boards corresponding to the number of the target or firing point. Attach one of the conductors of the wire just installed to the binding post marked "L" on the M31A1 and the other conductor to the binding post which was added per modification.

n. Attach one conductor of the remaining 2-conductor wires to the "Lights" terminal board and the other conductor to the common terminal board; again insuring, as in paragraph m above, they are connected to the number appearing on the terminal

board corresponding to the number of the target or firing point. These wires are then connected to the indicator lights for the target (fig 9-16).

o. An alternate method can be used utilizing the utility boxes provided with the M40. Attach two wires to "Hit Switch" and "Common" terminals, as in m above, then two wires to "Lights" and "Common" terminals as in n above, and attach a utility box to each set of the wires just installed at the target location. Label one utility box "Lights" and the other one "Hit Switch."

(1) Cut two 36-inch lengths of two-conductor wire.

(2) Attach an electrical plug to one end of each wire.

(3) Attach one wire to the indicator light and plug into utility box tagged "Lights."

(4) Attach one conductor of the remaining wire to the binding post labeled "L" on the M31A1 and one conductor to the binding post which was added per modification, and plug into the utility box tagged "Hit Switch."

(5) These utility boxes may be stored in a small ammunition can by cutting a 1/4-inch slot in the side of an ammunition can. Place the utility boxes in the can, lay the wires in the slot, and secure the cover. Sealing wax may be used to seal out moisture.

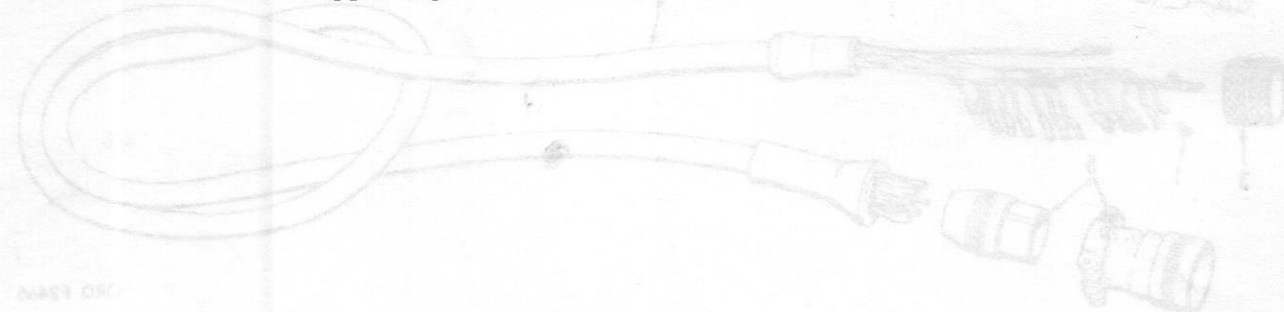


Figure 9-12. Electrical special purpose cable assembly.

and one each leg terminal to each terminal on the terminal board (Fig 9-10) marked "Hit Switch". Repeat the above procedure with the second special purpose cable to connect the lights.

c. Lay two 15-pair conducting cables from the scoring center terminal box down range in the vicinity of the beam.

d. Strip the insulation back 1/2 inch at both ends on each conductor wire of the two 15-pair conductor cables.

e. Select one set of two conductors from a 15-pair conductor cable. Attach one conductor under

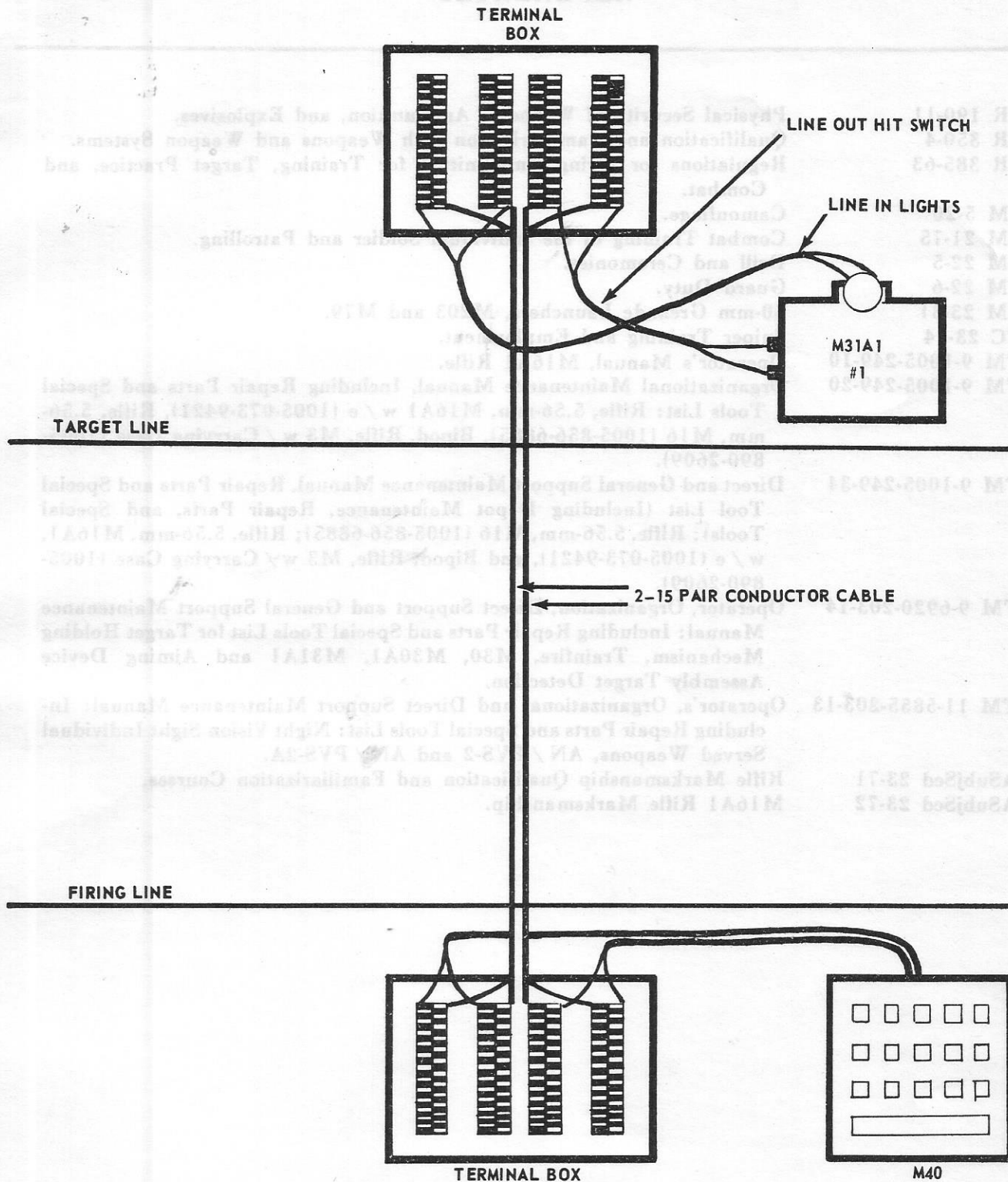


Figure 9-16. Wiring diagram—firing line to target line.

APPENDIX A

REFERENCES

- AR 190-11 Physical Security of Weapons, Ammunition, and Explosives.
AR 350-4 Qualification and Familiarization with Weapons and Weapon Systems.
AR 385-63 Regulations for Firing Ammunition for Training, Target Practice, and Combat.
- FM 5-20 Camouflage.
FM 21-75 Combat Training of the Individual Soldier and Patrolling.
FM 22-5 Drill and Ceremonies.
FM 22-6 Guard Duty.
FM 23-31 40-mm Grenade Launchers, M203 and M79.
TC 23-14 Sniper Training and Employment.
TM 9-1005-249-10 Operator's Manual, M16A1 Rifle.
TM 9-1005-249-20 Organizational Maintenance Manual, Including Repair Parts and Special Tools List: Rifle, 5.56-mm, M16A1 w / e (1005-073-9421), Rifle, 5.56-mm, M16 (1005-856-6885), Bipod, Rifle, M3 w / Carrying Case (1005-890-2609).
- TM 9-1005-249-34 Direct and General Support Maintenance Manual, Repair Parts and Special Tool List (Including Depot Maintenance, Repair Parts, and Special Tools); Rifle, 5.56-mm, M16 (1005-856-6885); Rifle, 5.56-mm, M16A1, w / e (1005-073-9421), and Bipod, Rifle, M3 w / Carrying Case (1005-890-2609).
- TM 9-6920-203-14 Operator, Organization, Direct Support and General Support Maintenance Manual: Including Repair Parts and Special Tools List for Target Holding Mechanism, Trainfire, M30, M30A1, M31A1 and Aiming Device Assembly Target Detection.
- TM 11-5855-203-13 Operator's, Organizational and Direct Support Maintenance Manual: Including Repair Parts and Special Tools List: Night Vision Sight Individual Served Weapons, AN / PVS-2 and AN / PVS-2A.
- A SubjScd 23-71 Rifle Marksmanship Qualification and Familiarization Courses.
A SubjScd 23-72 M16A1 Rifle Marksmanship.

APPENDIX B

AN / PVS-2(2A), NIGHT VISION SIGHT (STARLIGHT SCOPE)

Section I. GENERAL

B-1. Purpose

This appendix gives a brief description of the AN / PVS-2(2A), procedures for installing the sight on the M16A1 rifle, and recommended zeroing procedures. (More detailed information can be found in TM 11-5855-203-13.)

B-2. Description

The starlight scope is a portable, battery-powered, electro-powered, electro-optical (fig B-1) in-

strument for passive visual observation and aimed fire of weapons at night. It uses the natural light (moonlight and / or starlight) of the night sky for target illumination. The starlight scope, since it does not project a visible or infrared light, offers freedom from the possibility of enemy detection with infrared equipment. Weapons adaptor brackets are standard accessories with the AN / PVS-2(2A), and one is used to mount the starlight to the M16A1 rifle.

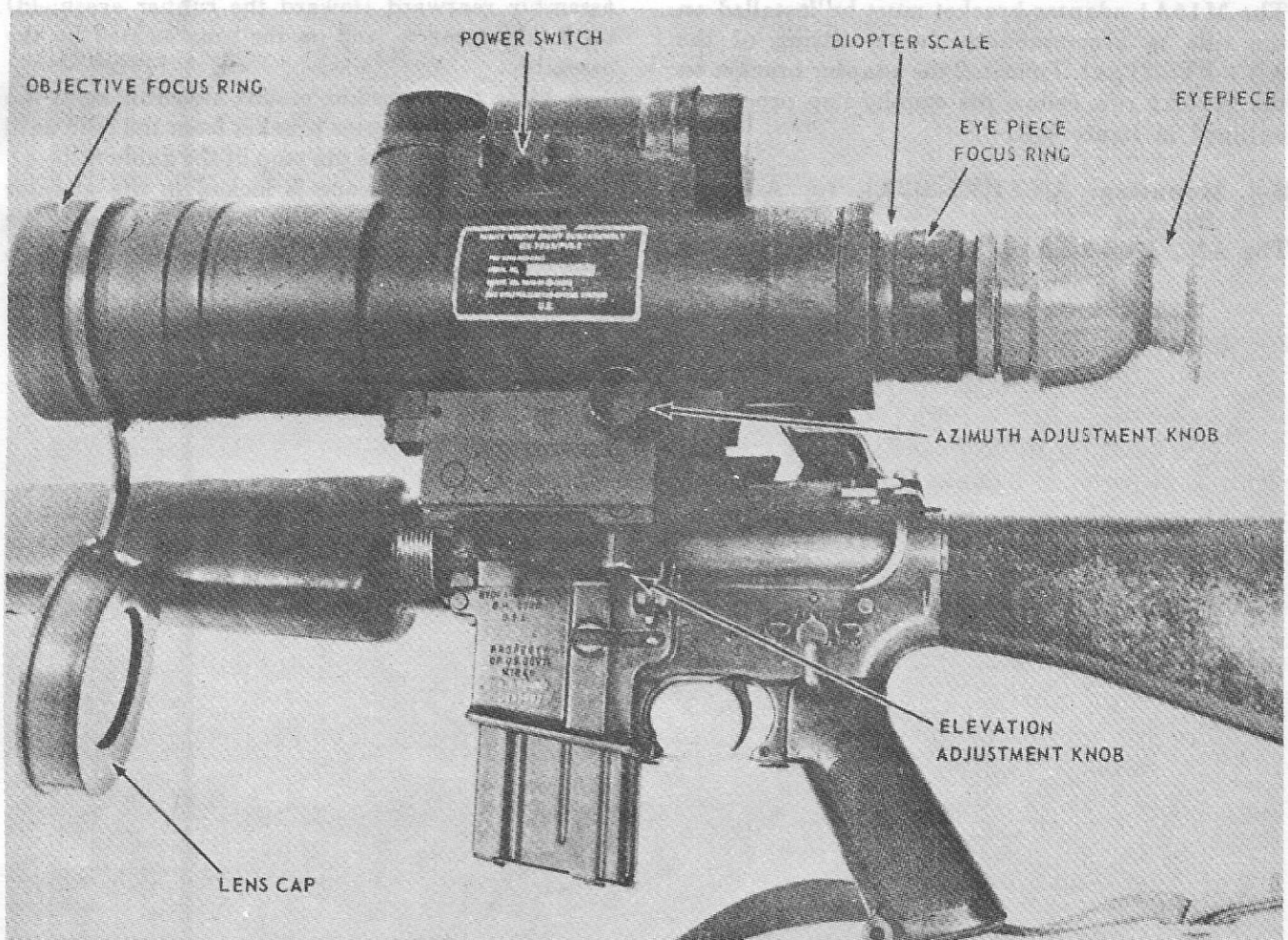


Figure B-1. AN / PVS-2(2A) starlight scope.

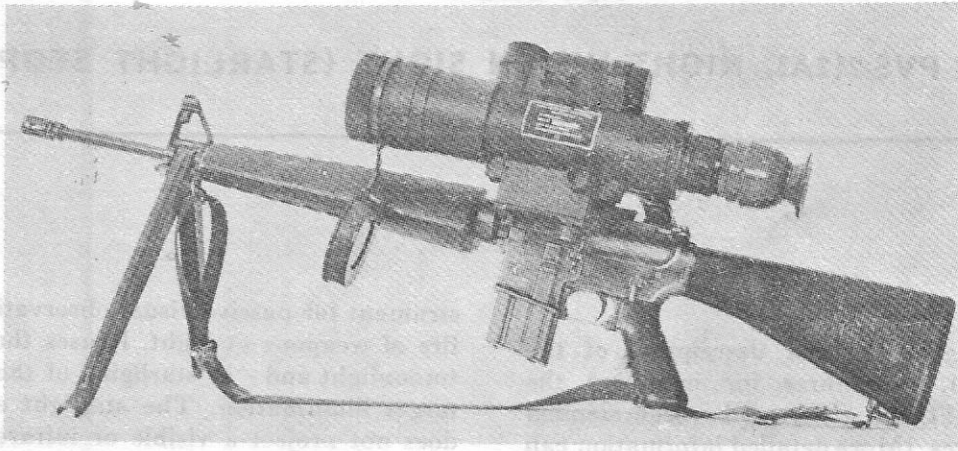


Figure B-1—Continued.

Section II. INSTALLING ADAPTOR BRACKET AND MOUNTING SCOPE

B-3. Installation of Adaptor Bracket to M16A1 Rifle

The M16A1 adaptor bracket must be installed on the rifle to accommodate the mounting of the AN / PVS-2(2A). To install the adaptor bracket on the M16A1 rifle follow the step-by-step procedure outlined in figure B-2.

B-4. Mounting AN / PVS-2(2A) to Adaptor Bracket

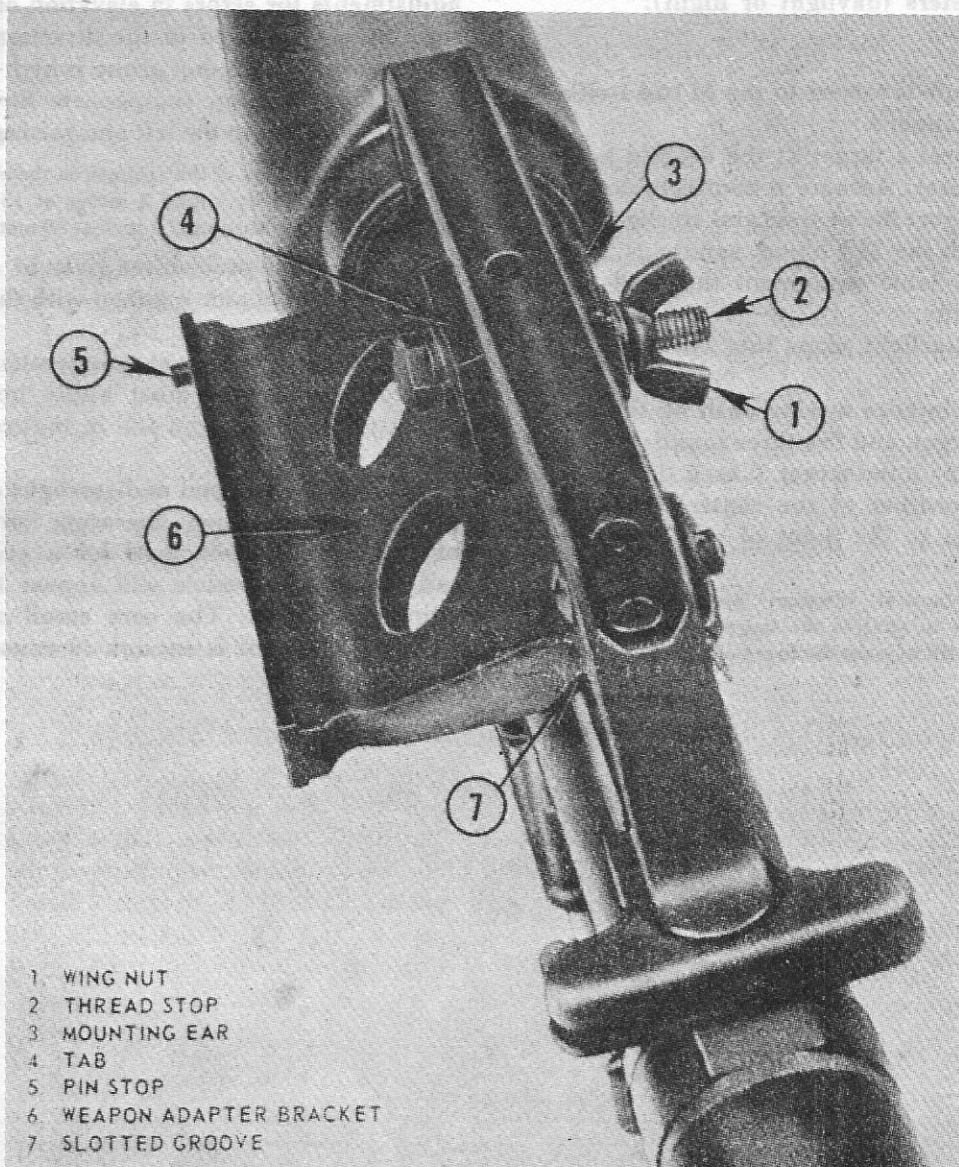
The AN / PVS-2(2A) is mounted to the weapon

adaptor bracket in the following manner:

a. Rotate lock knobs of the boresight mount assembly rearward (toward the rubber eyeshield) until they come to stop on the pins located on the assembly.

b. Slide the boresight mount assembly onto the guide rail of the adaptor bracket from the rear until positioned against the pin stop of the guide rail.

c. The starlight scope is locked to the adaptor bracket by rotating the two locking knobs of the boresight mount assembly in a forward direction.



- 1 WING NUT
- 2 THREAD STOP
- 3 MOUNTING EAR
- 4 TAB
- 5 PIN STOP
- 6 WEAPON ADAPTER BRACKET
- 7 SLOTTED GROOVE

- Step 1. Unthread wingnut (1) to thread stop on screw.
- Step 2. Pull tab (4) away from weapon adaptor assembly (6).
- Step 3. Slide mounting ear (3) under handle and position weapon adaptor assembly flat against top of receiver and all the way forward.
- Step 4. Firmly tighten wingnut (1) until tab (4) is pulled tightly against handle and weapon adaptor assembly.

Figure B-2. Installation of M16A1 adaptor bracket.

Section III. ZEROING PROCEDURE

B-5. General

The starlight scope may be zeroed during daylight hours or during hours of darkness. However, the operator may experience some difficulty in attempting to zero the starlight scope just before darkness (dusk). The light level is too low at dusk

to permit the operator to resolve his zero target with the lens cap cover in place, but the light level at dusk is still intense enough to cause the starlight scope to automatically cut off unless the lens cap cover is positioned over the objective lens. To preclude this situation the firer should zero before

dusk. When mounted on the M16A1 rifle, the recommended distance for zeroing the starlight scope is 150 meters (daylight or night).

B-6. Zeroing

The starlight scope is zeroed to the M16A1 rifle in the following manner:

a. Place or select a target at the desired zeroing range (150 meters). Assume a comfortable prone position and support the weapon and starlight scope combination with the M3 bipod, sandbags, stakes, or any other available equipment that will afford maximum stability.

b. Place the starlight scope into operation (TM 11-5855-203-13).

c. Place the reference aiming dash on the center of mass of the target, and fire three rounds to obtain a good shot group on the target. Check the target to determine the location of the center of the shot group in relation to the point of aim.

Note. If the tactical situation precludes physically walking down range to analyze the target, an observer with binoculars may be used to assist the firer by calling the location of the shots.

d. Adjust the sight to move the aiming reference dash to the center of the shot group. When making adjustments for errors in elevation or azimuth, the sight must be moved in the direction of the error. For example, if the shot group is high and to the left of the point of aim, compensate for this error by moving the sight to the left and raising it.

Note. Each click of the azimuth on the elevation knob will move the strike of the round 3 inches at 150 meters (1 click moves the strike of the round 1 inch at 50 meters).

e. Repeat the procedures given in c and d above until the point of aim is aligned with the center of the shot group.

f. To engage targets at ranges other than the zero range, the operator must apply holdoff to compensate for the rise and fall in the trajectory of the round.

g. Once the weapon and starlight combination is zeroed, do not refocus the scope for range. If the objective lens is refocused for a greater or lesser range, the sight reticle will appear to move in an elliptical pattern. The very small amount of apparent movement is enough to cause the scope to lose its zero.

to permit the operator to resolve his zero target with the lens cap cover in place, but the light level at dusk is still intense enough to cause the starlight scope to automatically cut off unless the lens cap cover is positioned over the objective lens. To preclude this situation the lens should zero before

B-5 General
The starlight scope may be zeroed during daylight hours or during hours of darkness. However, the operator may experience some difficulty in attempting to zero the starlight scope just before darkness (dusk). The light level is too low at dusk

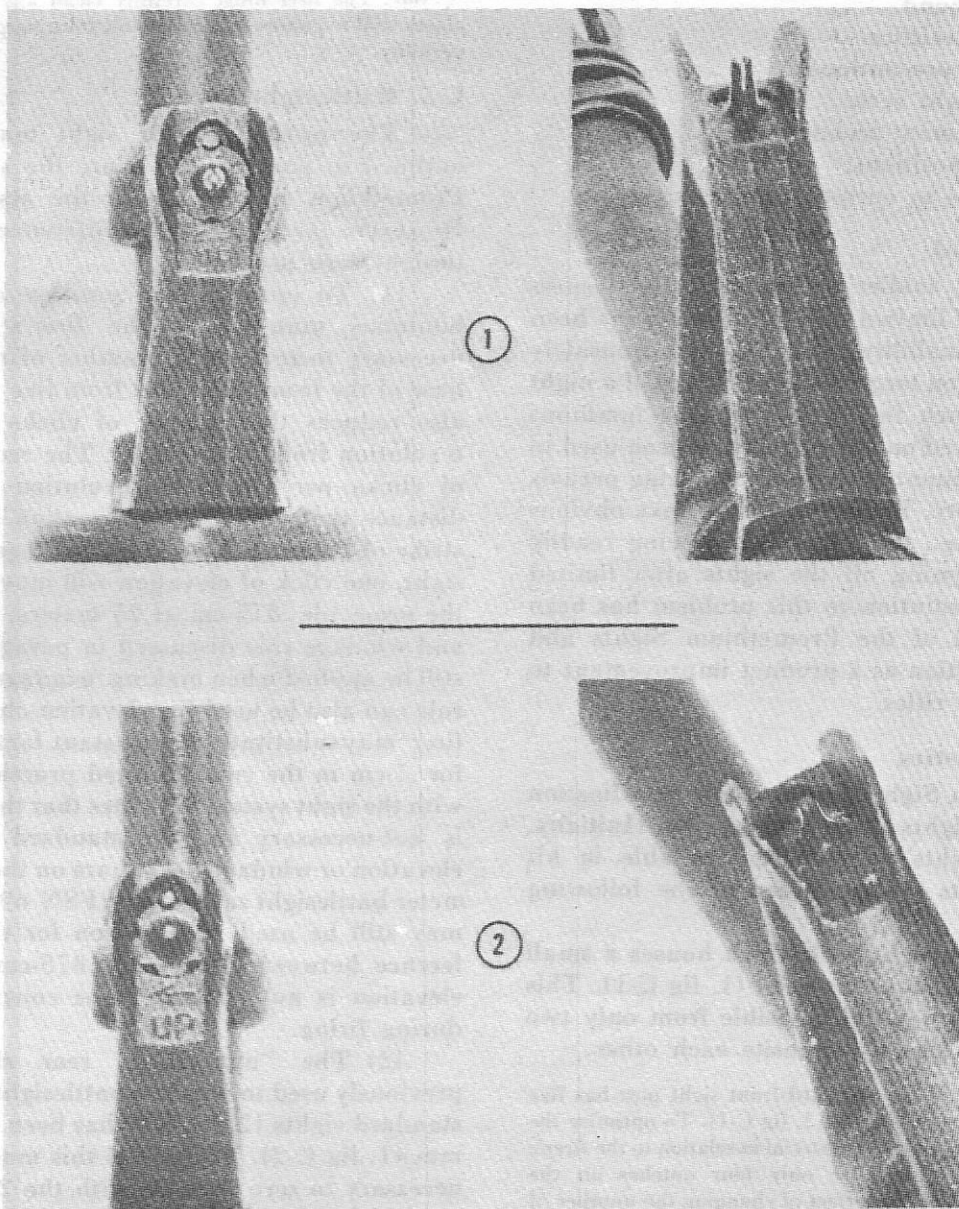
APPENDIX C

LOW LIGHT LEVEL SIGHT SYSTEM

C-1. Purpose and Scope

The purpose of this appendix is to provide the soldier with the essential background knowledge and employment techniques required to use the *low light level sight system* during periods of limited visibility as well as during periods of unrestricted visibility.

a. The initial production of the sights discussed in this appendix was commonly referred to as the *Promethium sights*. This term evolved as a result of the luminous material, used in the front sight to produce the glow, called Promethium. The possible use of a different luminous material in future production of the sights has necessitated the



1 Promethium sight
2 Standard sight

Figure C-1. Front sights.

adoption of a more general term; thus, the term low light level sight system. Throughout the remainder of this appendix however, the low light level sight system will be referred to as the Promethium sights.

b. Study all material covered in this appendix prior to firing any weapon equipped with the low light level sight system.

c. The use of the low light level sight system and automatic fire (three-round bursts) was developed to increase the soldier's combat effectiveness during periods of limited visibility. It is *not* intended to deemphasize the importance/superiority of a single, well-aimed shot when possible, nor to eliminate the requirement to train soldiers in the pointing technique discussed in paragraphs 9-6 through 9-13.

d. Material discussed in this appendix includes:

- (1) Background.
- (2) Characteristics.
- (3) Special precautions.
- (4) Battlesight zero.
- (5) Employment techniques.
- (6) Firing positions.
- (7) Changes to current training doctrine.

C-2. Background

The American soldier's combat effectiveness during periods of limited visibility has always been hindered by his inability to quickly and accurately align his weapon on target without the aid of a night vision device. Such field expedients as luminous tape or paint placed on the sights have been used to assist in the alinement of the weapon during periods of limited visibility. These expedients have obvious shortcomings; e.g., the material not being readily available and coming off the sights after limited use. An interim solution to this problem has been the development of the Promethium Sights and subsequent adoption as a product improvement to selected M16A1 rifles.

C-3. Characteristics

The Promethium Sights are merely a modification of the standard sights of the M16A1 rifle. (Initially, the modified sights were made available in kit form.) The sights are composed of the following parts:

a. A split front sight post which houses a small plastic vial of luminous material (1, fig C-1). This vial of luminous material is visible from only two sides which are directly opposite each other.

Note. The base of the standard front sight post has five evenly spaced notches cut into it (2, fig C-1). To optimize the position of the vial of luminous material in relation to the firer's eye, it was necessary to have only four notches on the Promethium front sight. The effect of changing the number of notches will be discussed in paragraph C-5.

b. A modified rear sight which features an

enlarged (7-mm) unmarked aperture and a standard (2-mm) aperture marked "L" (1, fig C-2).

c. The installation of the Promethium sights is the responsibility of direct support and / or general support maintenance units.

C-4. Special Precautions

The normal practice of blackening the front sight post, to reduce glare, must be carefully performed on any weapon which has a Promethium front sight installed. Direct exposure to flame or intense heat will cause the plastic vial, containing the luminous substance, to melt, thereby reducing the effectiveness of the Promethium front sight (during periods of limited visibility) to that of a standard front sight.

Note. The firer must carefully clean any smudge off the plastic vial to restore its effectiveness during periods of limited visibility.

C-5. Battlesight Zero

a. The procedures for sight manipulation as outlined in paragraph 4-4 are the same with the Promethium sights as with the standard sights. However, there are some differences in the battlesight zero procedure.

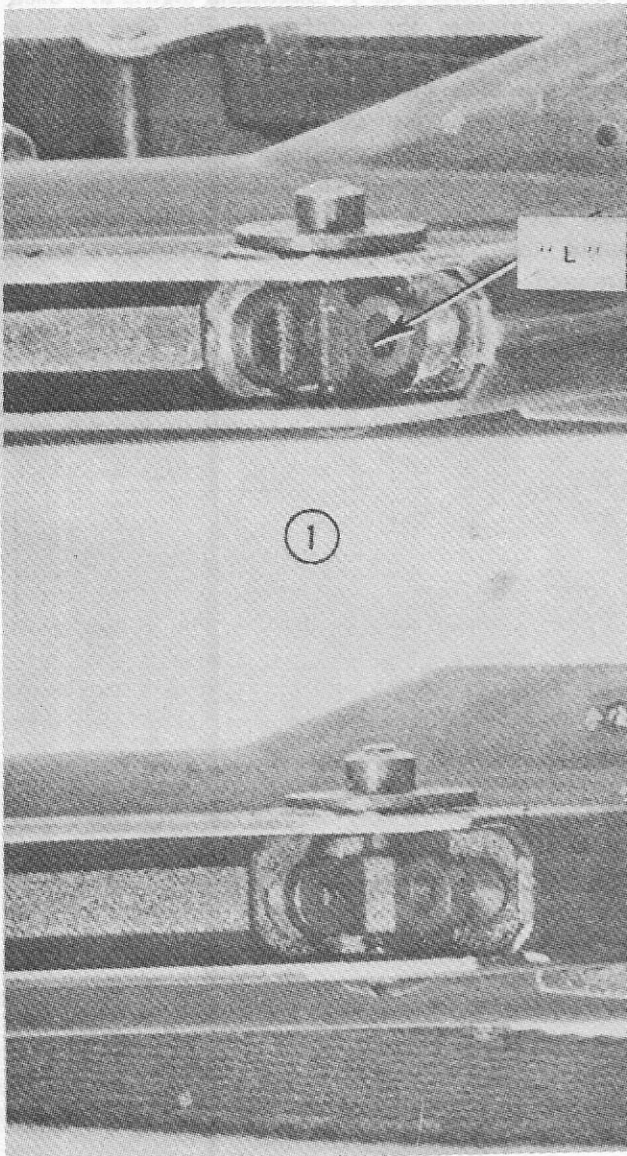
(1) To optimize the position of the vial of luminous material to the firer's eye, it was necessary to reduce the number of notches in the base of the front sight post from five to four, which also reduces the number of clicks per complete revolution from five to four. The reduced number of clicks per complete revolution increases the distance that one click of elevation will move the strike of the projectile. With the Promethium front sight, one click of elevation will move the strike of the projectile .875-cm at 25 meters. The elevation and windage rule discussed in paragraph 4-5 may still be applied when making *windage* changes. The rule can also be used for elevation changes and the firer *may* substitute the constant factor of .875-cm for .7-cm in the rule. Limited practical experience with the sight system indicates that this substitution is *not* necessary and the standard two clicks of elevation or windage per square on the standard 25-meter battlesight zero target (FSN 6920-906-0169) may still be used. The reason for this is the difference between .7-cm and .875-cm per click of elevation is not enough to be considered critical during firing.

(2) The "unmarked" rear sight aperture previously used to obtain a battlesight zero with the standard sights (2, fig C-2) has been enlarged to 7-mm (1, fig C-2). Because of this modification it is necessary to zero the rifle with the 2-mm aperture marked "L."

(3) The split front post is constructed so as to expose the vial, containing the luminous material,

on a 180 to 360 degree axis. After establishing a battlesight zero with a weapon equipped with the Promethium front sight, the vial of luminous material may not be in alignment with the firer's eye. Should this occur it will be necessary to rotate the front sight post one click until its luminous portion is visible to the firer. This action will slightly alter the daytime zero setting, but will have little effect when engaging targets out to 300 meters.

b. Soldiers armed with weapons which have



1 Promethium rear sight
2 Standard rear sight

Figure C-2. Rear sights.

been battlesight zeroed (250 meters) with the Promethium sights no longer have the capability of flipping to the aperture marked "L" and automatically extending the zero to 375 meters. Any target engagement beyond 250 meters (the original battlesight zero) must be accomplished by applying hold off.

C-6. Employment Techniques

The Promethium sights, when installed on the M16A1 rifle, increase the soldier's ability to obtain sight / weapons alignment during periods of limited visibility. The mode of fire which the soldier will use to engage targets will depend upon how well he can define the target.

Note. Only a limited number of M16A1 rifles will be equipped with the Promethium sights.

a. When ambient light conditions are such that targets can be detected and their outline established, the firer aims and obtains a good sight picture in the same manner as he would during daylight hours, i.e., obtains sight alignment by centering the top of the luminous portion of the front sight post both vertically and horizontally within the 7-mm aperture, adjusts his point of aim onto the center of visible mass of the target (fig C-3), and squeezes off a single round.

Note. The Night Record Fire range is an excellent facility for training soldiers in the use of semiautomatic fire with Promethium sights. Under certain light conditions the firer may be able to see the luminous front sight but unable to determine the exact location of the 7-mm rear sight aperture. To insure that he is in fact looking through the rear sight aperture and not over or to the side of it, the firer must practice obtaining the proper stock weld. Practice must continue until the firer is able to instinctively acquire the proper stock weld which enables him to see through the rear sight aperture. The firer then completes the sight picture by placing the luminous portion of the front sight post onto the target, and fires a three-round burst.

b. During daylight firing, the 2-mm aperture marked "L" (1, fig C-2) is used for the engagement of targets at all ranges out to the maximum effective range of the weapon. This is accomplished by aiming at the center of visible mass out to the range of 250 meters and applying holdoff from 250 meters to the maximum effective range (460 meters). The amount of holdoff to be taken will depend on the range to the target (e.g., to hit the center of mass of an E-type silhouette at a range of 350 meters the firer must hold approximately 11 inches above the desired point of impact. To hit the center of mass of an E-type silhouette at a range of 460 meters—maximum effective range—the firer must hold approximately 22 inches above the top edge of the silhouette.)

c. The Promethium sights are also expected to permit accurate fire under artificial illumination because the firer will be able to see through the 7-

mm aperture and attain sight alinement. The firer can not usually see through the 2-mm aperture because of the flickering shadowy nature of artificial illumination.

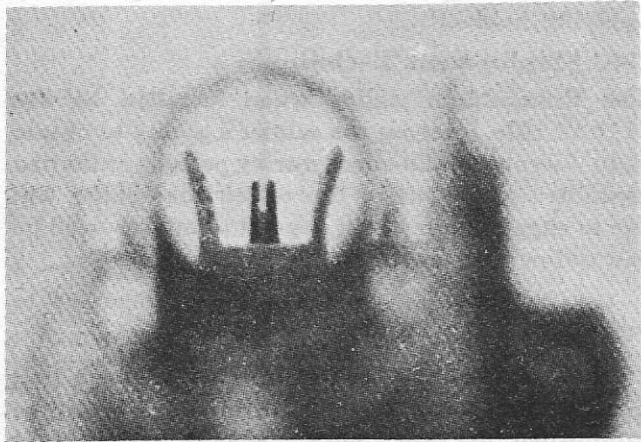


Figure C-3. Sight alinement using Promethium sights.

Note. The Promethium sight may prove to be more effective than quick fire for daylight engagement of close-in

targets which must be accurately engaged within extreme time pressure limitations. The Promethium sight may also be the most effective sight against moving or fleeting targets during daylight when the shot must be fired quickly before the target disappears.

C-7. Firing Positions

The use of the Promethium sights during daylight and periods of limited visibility does not require altering any of the six standard firing positions. They are assumed and modified in either case as the tactical and training situation dictate and are equally applicable to the defense as well as the offense.

C-8. Training

In all cases, where the Promethium sights are used during training, the soldier should also receive instruction in the pointing technique as discussed in paragraph 9-7. This becomes a necessity for two reasons. First, not all M16A1 rifles will be equipped with the Promethium sights, and second, a working knowledge of the pointing technique will allow the rifleman to remain relatively effective should the vial of luminous material become damaged or broken.

During daylight firing, the 2-mm aperture marked "2" on the C-21 is used for the engagement of targets at all ranges out to the maximum effective range of the weapon. This is accomplished by aiming at the center of visible mass out to the range of 250 meters and approximating holdoff from 250 meters to the maximum effective range (450 meters). The amount of holdoff to be taken will depend on the range to the target (e.g., to hit the center of mass of an F-type silhouette at a range of 250 meters the firer must hold approximately 11 inches above the desired point of impact. To hit the center of mass of an E-type silhouette at a range of 450 meters—maximum effective range—the firer must hold approximately 22 inches above the top edge of the silhouette.)

The Promethium sights are also expected to permit accurate fire under artificial illumination because the firer will be able to see through the 2-

APPENDIX D

TARGET DETECTION EXERCISES

D-1. General

a. The exercises outlined in this appendix serve as the basis for the target detection training conducted in conjunction with any of the rifle marksmanship courses. Target detection periods of instruction are listed in numerical sequence; however, this denotes only the recommended sequence of instruction and has no relation to the numerical periods of a specific marksmanship course.

b. Army Subject Schedule 23-72 may be used as a guide for a target detection program; however, detailed information can be found in this appendix.

c. The ammunition is based on the number of rounds used in each presentation and demonstration, assuming one rehearsal for each presentation and demonstration.

Note. One initial rehearsal should be conducted for each target detection exercise. Additional rehearsals are required only if target men are changed. A presentation refers to each time one exercise is conducted. Count a rehearsal as a presentation.

D-2. Target Detection Exercises

a. *Period One, Introduction to Target Detection (2 Hr).* The purpose of this period is to teach each soldier the necessary skills and methods of detecting, marking, and determining the range to

realistic battlefield targets.

(1) *Range facilities.* Two target detection ranges.

(2) *Personnel.*

(a) Two principal instructors (one for each range).

(b) Eight assistant instructors (four for each range).

(c) Six target men (three for each range).

Note. One principal instructor is needed at each range. He has the responsibility for setting up the range, training target men, and conducting the class. Four assistant instructors are needed for each range. They control the observers, assist in scoring, and must be thoroughly familiar with the position of the targets. The six target men, three for each range, must be trained to perform the duties of "targets." Each one is assigned a number of target placements within a certain area, and all target men are given a target trial card containing only the trial numbers and the indications he is to perform.

(3) *Blank ammunition requirements.*

For each presentation:

First hour: 5 rounds for demonstration.

Second hour: 15 rounds for practice

exercise.

For each rehearsal:

First hour: 5 rounds.

Second hour: 15 rounds.

(4) *Master trial sheet.*

Sample Master Trial Sheet
Period I

| Trial No. | Target man | Action | Location | Range (meters) | Stake |
|-----------|------------|---|----------|----------------|-------|
| 1 | 1 | 1. Slightly exposed, motionless. 2. Raise and lower head, slowly. 3. Repeat 2 (above), rapidly. 4. Fire one blank round. | A-B | 22 | 41A |
| 2 | 2 | 1. Slightly exposed, motionless. 2. Move head from side to side, slow. 3. Raise head slow, drop fast. 4. Fire one blank round. | B-D | 66 | 31B |
| 3 | 3 | 1. Slightly exposed, motionless. 2. Move forward and back each 10 seconds. 3. Step out and back rapidly. 4. Fire two blank rounds. | E-F | 161 | 11C |
| 4 | 1 | CHANGE TARGET LOCATIONS | G | 119 | 13B |
| 5 | 2 | 1. Slightly exposed, motionless. 2. Shake bush each 5 seconds. 3. Raise and lower head slowly with shiny helmet liner. 4. Fire two blank rounds. 1. Kneeling partially exposed (motionless). 2. Move head and shoulders from side to side, slowly. 3. Jump out and back each 5 seconds. 4. Fire one blank round. | C | 44 | 32A |

| Trial No. | Target man | Action | Location | Range (meters) | Stake |
|-----------|------------|---|----------|----------------|-------|
| 6 | 3 | 1. Slightly exposed, motionless. 2. Assume kneeling position slowly. 3. Raise up slow, drop fast. 4. Fire two blank rounds. | D | 95 | 19B |
| 7 | 1 | CHANGE TARGET LOCATIONS 1. Partially exposed, kneeling. 2. Raise head slow, drop fast. 3. Repeat 2 (above) rapidly. 4. Fire two blank rounds. | B | 91 | 29B |
| 8 | 2 | 1. Slightly exposed, motionless. 2. Slow up and down movement. 3. Rapid, jerky movement. 4. Fire one blank round. | D | 51 | 27 |
| 9 | 3 | 1. Slightly exposed, motionless. 2. Move head and shoulders side to side, slowly. 3. Same as 2 (above) with shiny helmet liner. 4. Fire one blank round. | A-D | 41 | 29A |
| 10 | 1 | CHANGE TARGET LOCATIONS 1. Slightly exposed. 2. Slow movement. 3. Fast movement. 4. Fire two blank rounds. | D-E | 88 | 28B |

Note. An Individual Target Trial Card (fig 6-3) should be prepared for each target man. It should contain only those trials in which he participates, the location (stake number) used, and the action performed in each trial. Although each target man has been thoroughly rehearsed, the target trial cards will insure that no mistakes are made.

(5) *Answer sheet.* See DA Form 3009-R (fig D-1). DA Form 3009-R will be reproduced locally on 8- by 10½-inch paper.

b. Period Two, Detection of Realistic Battlefield Targets (2 Hr). This period is conducted in the same manner as period one, but on a different range if possible. Range facilities, personnel, organization, ammunition requirements, master trial sheet, and answer sheet are the same as outlined for period one.

c. Period Three, Detection of Single Moving Targets (2 Hr). The purpose of this period is to

give the soldier practice in detecting and simulating the engagement of single, combat-type, moving targets.

(1) *Range facilities.* One target detection range.

(2) *Personnel.*

(a) One principal instructor.

(b) Three target men.

(3) *Blank ammunition requirements.*

Rounds per presentation 10
Rounds per rehearsal 10

**TARGET DETECTION EXERCISE
ANSWER SHEET
PERIODS 1, 2, AND 8**

For use of this form, see FM 23-8 and FM 23-9; proponent agency is TRADOC.

| NAME | | (LAST) | (FIRST) | PLATOON | SQUAD | DATE |
|--------------|--------------|--------|---------|---------|------------------------------------|----------------|
| TRIAL NO. | PHASE NUMBER | | | | WHERE (LETTER OF NEAREST LANDMARK) | RANGE (METERS) |
| | 1 | 2 | 3 | 4 | | |
| 1 ----- | | | | | | |
| 2 ----- | | | | | | |
| 3 ----- | | | | | | |
| 4 ----- | | | | | | |
| 5 ----- | | | | | | |
| 6 ----- | | | | | | |
| 7 ----- | | | | | | |
| 8 ----- | | | | | | |
| 9 ----- | | | | | | |
| 10 ----- | | | | | | |
| 11 ----- | | | | | | |
| 12 ----- | | | | | | |
| 13 ----- | | | | | | |
| 14 ----- | | | | | | |
| 15 ----- | | | | | | |
| 16 ----- | | | | | | |
| TOTAL | | | | | | |

DA FORM 3009-R, 1 Nov 73 REPLACES DA FORM 3009-R, 1 JUN 65, WHICH IS OBSOLETE.

Figure D-1. Answer sheet, periods one, two, and eight (DA Form 3009-R).

**TARGET DETECTION EXERCISE
ANSWER SHEET
PERIODS 1, 2, AND 8**

For use of this form, see FM 23-8 and FM 23-9; proponent agency is TRADOC.

| NAME | (LAST) | (FIRST) | PLATOON | SQUAD | DATE | |
|--------------|--------------|---------|---------|-------|------------------------------------|----------------|
| | TORRES | BRYAN | 3 D | 3 D | 30 JULY 1973 | |
| TRIAL NO. | PHASE NUMBER | | | | WHERE (LETTER OF NEAREST LANDMARK) | RANGE (METERS) |
| | 1 | 2 | 3 | 4 | | |
| 1 ---- | X | ✓ | | | C | 50 |
| 2 ---- | X | X | ✓ | | D | 75 |
| 3 ---- | X | | | | B | 50 |
| 4 ---- | X | X | X | ✓ | F | 278 |
| 5 ---- | X | ✓ | | | A | 83 |
| 6 ---- | X | X | ✓ | | E | 115 |
| 7 ---- | X | | | | C | 196 |
| 8 ---- | X | ✓ | | | B | 58 |
| 9 ---- | X | X | X | X | | |
| 10 ---- | X | X | ✓ | | F | 280 |
| 11 ---- | X | ✓ | | | D | 89 |
| 12 ---- | X | ✓ | | | B | 63 |
| 13 ---- | X | ✓ | | | A | 90 |
| 14 ---- | X | X | ✓ | | B | 70 |
| 15 ---- | ✓ | | | | E | 120 |
| 16 ---- | ✓ | | | | C | 230 |
| TOTAL | 16 | 18 | 8 | 1 | | |

DA FORM 3009-R, 1 Nov 73 REPLACES DA FORM 3009-R, 1 JUN 65, WHICH IS OBSOLETE.

(Sample entries.)

Figure D-1—Continued.

(4) *Master trial sheet.*

Sample Master Trial Sheet
Period 3

| Trial No. | Target man | Range (meters) | Description of requirements | Stake No. |
|-----------|------------|----------------|---|--------------------------|
| 1 | 1 | 200 | 1. Standing by tree. 2. Kneel slowly. 3. Slow movement from view. | 26A. |
| 2 | 2 | 150 | 4. Fire two blank rounds. Same as trial 1 (above) at poor aiming point. | 28B. |
| 3 | 3 | 175 | Start standing. Disappear; on command Reappear in same position. Make four 4-second rushes to good aiming points. | 27C-28C-29C-30C-32C. |
| | | | CHANGE TARGET MEN LOCATIONS | |
| 4 | 1 | 300 | Start from kneeling position behind bush. Make five rushes. Disappear at poor aiming points. Reappear from same position. 5-3-3-5-5, fire one blank round from last position. | 1A-2A-3A-4A-5A-6A. |
| 5 | 3 | 300 | Start prone. Make five rushes. Disappear after each rush and roll or crawl to a new location before reappearing. 5-3-2-8-8, fire one blank round from last position. | 1C-2C-3C-4C-5C-6C. |
| 6 | 2 | 175 | Start prone. Make five lateral rushes. Reappear at same location. 4-5-4-4-3, fire one blank round from last position. | 28B-29B-30B-31B-32B-33B. |
| | | | CHANGE TARGET MEN LOCATIONS | |
| 7 | 2 | 175 | Run six in reverse. | 33B-32B-31B-30B-29B-28B. |
| 8 | 3 | 200 | Run 100 meters from tree to position with poor aiming point. | 25C-39C. |
| 9 | 1 | 260 | Start prone. 5-L-3-3-6-R-4-5, through draw fire one blank round from last position. (Numbers indicate duration of rush; letters indicate direction of roll or crawl after each rush.) | 6A-7A-8A-9A-10A-11A. |
| 10 | 2 | 300 | Start behind bush. 6-8-R-3-R-4-3; fire one blank round from last position. | 1B-2B-3B-4B-5B-6B. |

(5) *Answer sheet.* See DA Form 3010-R (fig D-2). DA Form 3010-R will be reproduced locally on 8- by 10½-inch paper.

d. Period Four, Detection of Multiple Moving Targets (2 Hr). The purpose of this period is to give the soldier practice in detecting and aiming at multiple, combat-type, moving targets.

TARGET DETECTION EXERCISE

ANSWER SHEET

PERIOD 3

For use of this form, see FM 23-8 and FM 23-9; proponent agency is TRADOC.

| NAME | PLATOON | SQUAD | DATE |
|-----------|------------------------------------|-------|----------------|
| TRIAL NO. | WHERE (LETTER OF NEAREST LANDMARK) | | RANGE (METERS) |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |

DA FORM 3010-R, 1 Nov 73 REPLACES DA FORM 3010-R, 1 JUN 65, WHICH IS OBSOLETE.

Figure D-2. Answer sheet, period three (DA Form 3010-R).

| TARGET DETECTION EXERCISE ANSWER SHEET PERIOD 3 For use of this form, see FM 23-8 and FM 23-9; proponent agency is TRADOC. | | | |
|---|------------------------------------|----------------|--------------|
| NAME | PLATOON | SQUAD | DATE |
| TORRES, BRYAN | 3 D | 3 D | 30 JULY 1973 |
| TRIAL NO. | WHERE (LETTER OF NEAREST LANDMARK) | RANGE (METERS) | |
| 1 | V G | V 86 | |
| 2 | X A | X 90 | |
| 3 | V E | V 110 | |
| 4 | V B | V 225 | |
| 5 | V C | V 50 | |
| 6 | X F | V 120 | |
| 7 | V G | V 86 | |
| 8 | V D | V 105 | |
| 9 | V H | V 75 | |
| 10 | V A | V 125 | |

DA FORM 3010-R, 1 Nov 73 REPLACES DA FORM 3010-R, 1 JUN 65, WHICH IS OBSOLETE.

(Sample entries.)

Figure D-2—Continued.

(1) *Range facilities.* Two target detection ranges.

(2) *Personnel.*

(a) Two principal instructors (one for each range).

(b) Eight assistant instructors (four for each range).

(c) Sixteen target men (eight for each range).

(3) *Organization.* One order of observers is assigned to each range.

(4) *Blank ammunition requirements.*

Rounds per presentation 47

Rounds per rehearsal 47

(5) *Master trial sheet.* (Observers use target aiming device to mark the points of disappearance of moving targets.)

Sample Master Trial Sheet
Period 4

| Trial No. | Target man | Range (meters) | Description of requirements | Stake No. |
|-----------|------------|----------------|--|--|
| 1 | 1 | 75 | Kneeling exposed. Crawl to new position in five 5-meter crawling movements. Fire one blank round from each new position. (5 rounds per target man). Good aiming points. | 42A-43A-44A-45A-46A. |
| | 2 | | | 40B-41B-42B-43B-44B. |
| 2 | 3 | 100 | Same as above. Poor aiming points, but reference points available. | 39A-40A-41A-42A-43A. |
| | 4 | | | 37B-38B-39B-40B-41B. |
| 3 | 5 | 300 | Start with targets walking through woods or other partial concealment. Disappear when fired on. Make five 4-second rushes to positions with good aiming points. Fire one blank round from last position. | 9A-10A-11A-12A-13A-14A. |
| | 6 | | | 11B-12B-13B-14B-15B-16B. |
| | 7 | | | 7C-8C-9C-10C-11C-12C. |
| 4 | 8 | 200 | Start from kneeling position behind bush. Make five rushes. Disappear where there is a poor aiming point. | 9C-10C-11C-12C-13C-14C. |
| | 7 | | | 12C-13C-14C-15C-16C-17C. 14C-15C-16C-17C-18C-19C. |

| Trial No. | Target men | Panel location | Trial No. | Target men | Panel location |
|-----------|------------|----------------|-----------|------------|----------------|
| 25 | 5 | 8 | 27 | 4 | 10 |
| | 1 | 3 | | 5 | 8 |
| 26 | 2 | 9 | 28 | 4 | 8 |
| | 3 | 14 | | | |

(6) *Answer sheet.* See DA Form 3011-R (fig D-3). DA Form 3011 will be reproduced locally on 8- by 10½-inch paper.

f. Period Six, Detection of Movement by Opposing Teams, Personal Camouflage. The purpose of this period is to give soldiers practical work in target detection and movement as target teams, and to conduct demonstrations and practical work in personal camouflage.

(1) *Range facilities.* Two target detection ranges.

(2) *Personnel.*

(a) Two principal instructors (one for each range).

(b) Four assistant instructors (two for each range).

(c) Four demonstrators (two for each range).

(3) *Organization.* One order of observers is assigned to each range.

(4) *Blank ammunition requirements.* None.

(5) *Master trial sheet* (fig D-4).

(6) *Target trial cards.*

Target Trial Card No. 1 (Target Man 1)
Trials: (2) 2-second rush; (5) 5-meter low crawl; (6) 4-second rush; (9) 6-second rush; (10) 50-meter bound.

Target Trial Card No. 2 (Target Man 2)
Trials: (1) 6-second rush; (3) 5-meter low crawl; (6) 4-second rush; (8) 2-second rush; (10) 50-meter bound.

Target Trial Card No. 3 (Target Man 3)
Trials: (2) 2-second rush; (6) 4-second rush; (7) 10-meter high crawl; (9) 6-second rush; (10) 50-meter bound.

Target Trial Card No. 4 (Target Man 4)
Trials: (1) 6-second rush; (3) 5-meter low crawl; (4) 4-second rush; (8) 2-second rush; (10) 50-meter bound.

Target Trial Card No. 5 (Target Man 5)
Trials: (4) 4-second rush; (5) 5-meter low crawl; (8) 2-second rush; (9) 6-second rush; (10) 50-meter bound.

Target Trial Card No. 6 (Target Man 6)
Trials: (1) 6-second rush; (3) 5-meter low crawl; (6) 4-second rush; (8) 2-second rush; (10) 50-meter bound.

Target Trial Card No. 7 (Target Man 7)
Trials: (1) 6-second rush; (2) 2-second rush; (4) 4-second rush; (7) 10-meter high crawl; (10) 50-meter bound.

Target Trial Card No. 8 (Target Man 8)
Trials: (4) 4-second rush; (7) 10-meter high crawl; (8) 2-second rush; (9) 6-second rush; (10) 50-meter bound.

Target Trial Card No. 9 (Target Man 9)
Trials: (2) 2-second rush; (5) 5-meter low crawl; (6) 4-second rush; (8) 2-second rush; (10) 50-meter bound.

Target Trial Card No. 10 (Target Man 10)
Trials: (1) 6-second rush; (4) 4-second rush; (5) 5-meter low crawl; (8) 2-second rush; (10) 50-meter bound.

Target Trial Card No. 11 (Target Man 11)
Trials: (2) 2-second rush; (6) 4-second rush; (7) 10-meter high crawl; (8) 2-second rush; (10) 50-meter bound.

Target Trial Card No. 12 (Target Man 12)
Trials: (2) 2-second rush; (4) 4-second rush; (5) 5-meter low crawl; (9) 6-second rush; (10) 50-meter bound.

Target Trial Card No. 13 (Target Man 13)
Trials: (1) 6-second rush; (3) 5-meter low crawl; (6) 4-second rush; (8) 2-second rush; (10) 50-meter bound.

Target Trial Card No. 14 (Target Man 14)
Trials: (2) 2-second rush; (4) 4-second rush; (5) 5-meter low crawl; (9) 6-second rush; (10) 50-meter bound.

Targets representing fire support should be located in a tactically sound position. Moving targets should be located generally to the flank of the maneuver area. Where rushing targets are widely separated (100 meters or more), fire support may be centrally located.

**TARGET DETECTION EXERCISE
ANSWER SHEET
PERIOD 5**

For use of this form, see FM 23-8 and FM 23-9; the proponent agency is TRADOC.

| | | | |
|---|-----------------------|--------------------|-----------------------|
| OBSERVER'S NAME (LAST) (FIRST) PLATOON | | | |
| OBSERVATION POINT | | | DATE |
| TRIAL NO. | SOUND POSITION | TRIAL NO. | SOUND POSITION |
| 1 ----- | | 15 ----- | |
| 2 ----- | | 16 ----- | |
| 3 ----- | | 17 ----- | |
| 4 ----- | | 18 ----- | |
| 5 ----- | | 19 ----- | |
| 6 ----- | | 20 ----- | |
| 7 ----- | | 21 ----- | |
| 8 ----- | | 22 ----- | |
| 9 ----- | | 23 ----- | |
| 10 ----- | | 24 ----- | |
| 11 ----- | | 25 ----- | |
| 12 ----- | | 26 ----- | |
| 13 ----- | | 27 ----- | |
| 14 ----- | | 28 ----- | |
| TOTAL -----RIGHT ----- | | WRONG ----- | |

DA FORM 3011-R, 1 Nov 73 REPLACES DA FORM 3011-R, 1 JUN 65, WHICH IS OBSOLETE.

Figure D-3. Answer sheet, period five (DA Form 3011-R).

**TARGET DECTION EXERCISE
ANSWER SHEET
PERIOD 5**

For use of this form, see FM 23-8 and FM 23-9; the proponent agency is TRADOC.

| | | | | |
|-------------------------------|-----------------------|------------------|-----------------------|----------------|
| OBSERVER'S NAME (LAST) | | (FIRST) | | PLATOON |
| TORRES | | BRYAN | | 3 D |
| OBSERVATION POINT | | | DATE | |
| 23 | | | 30 JULY 1964 | |
| TRIAL NO. | SOUND POSITION | TRIAL NO. | SOUND POSITION | |
| 1 ----- | 4-3 | 15 ----- | 6-13 | |
| 2 ----- | 6 X | 16 ----- | 14-4 | |
| 3 ----- | 8 | 17 ----- | 8 | |
| 4 ----- | 12-14 | 18 ----- | 13 | |
| 5 ----- | 1-3 X | 19 ----- | 6-5 | |
| 6 ----- | 7 | 20 ----- | 7-1 X | |
| 7 ----- | 4 | 21 ----- | 3 | |
| 8 ----- | 2-5 | 22 ----- | 7 | |
| 9 ----- | 9 | 23 ----- | 4 | |
| 10 ----- | 10-12 | 24 ----- | 7-12 | |
| 11 ----- | 4 | 25 ----- | 10-1 | |
| 12 ----- | 8 X | 26 ----- | 8-4 X | |
| 13 ----- | 10 | 27 ----- | 3 | |
| 14 ----- | 1 | 28 ----- | 6-4 X | |
| TOTAL -----RIGHT | | WRONG | | |
| 35 | | 6 | | |

DA FORM 3011-R, 1 Nov 73 REPLACES DA FORM 3011-R, 1 JUN 65, WHICH IS OBSOLETE.

(Sample entries.)

Figure D-3—Continued.

Period 6

| Trial No. | (1) 6-sec rush | (2) 2-sec rush | (3) 5-m low crawl | (4) 4-sec rush | (5) 5-m low crawl | (6) 4-sec rush | (7) 10-m high crawl | (8) 2-sec rush | (9) 6-sec rush | (10) 50-m bound |
|-----------|-------------------|-------------------|----------------------|-------------------|----------------------|-------------------|------------------------|-------------------|-------------------|--------------------|
| 1 | X | X | X | X | X | X | X | X | X | X |
| 2 | X | X | X | X | X | X | X | X | X | X |
| 3 | X | X | X | X | X | X | X | X | X | X |
| 4 | X | X | X | X | X | X | X | X | X | X |
| 5 | X | X | X | X | X | X | X | X | X | X |
| 6 | X | X | X | X | X | X | X | X | X | X |
| 7 | X | X | X | X | X | X | X | X | X | X |
| 8 | X | X | X | X | X | X | X | X | X | X |
| 9 | X | X | X | X | X | X | X | X | X | X |
| 10 | X | X | X | X | X | X | X | X | X | X |
| 11 | X | X | X | X | X | X | X | X | X | X |
| 12 | X | X | X | X | X | X | X | X | X | X |
| 13 | X | X | X | X | X | X | X | X | X | X |
| 14 | X | X | X | X | X | X | X | X | X | X |

Note. The above sample master trial sheet reflects 10 trials for 14 soldiers acting as targets. Units may revise the above master trial sheet to include additional target requirements so as to insure maximum participation when larger squads are used.

Figure D-4. Sample of master trial sheet.

g. Period Seven, Combination of Sound and Multiple Moving Targets (2 hr). The purpose of this period is to give soldiers practice in locating, marking, and aiming combinations of firing and moving combat-type targets.

(1) *Range facilities.* Two target detection ranges.

(2) *Personnel.*

(a) Two principal instructors (one for each range).

(b) Ten assistant instructors (five for each range).

(c) Sixteen target men (eight for each range).

(3) *Organization.* One order of observers assigned to each range.

(4) *Blank ammunition requirements.*

Rounds per presentation 75

Rounds per rehearsal 75

(5) *Master trial sheet.*

Sample Master Trial Sheet
Period 7^a

| Trial No. | Target man | Range (meters) | Description of requirements | Stake No. |
|--------------------------------|------------|----------------|---|---|
| 1 | 1 | 150 | Two targets make clumsy 5-meter crawls; two targets fire four blank rounds each toward the observation line. All located at good aiming points. | 28A-31A. 28B-31B. P14. P3. |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| 2 | 5 | 200 | Three targets make skilled 5-meter crawls; one target fires two blank rounds. All positions lack good aiming points. Distance between targets 25 meters. | 22A-23A. 20B-22B. 21C-23C. P4. |
| | 6 | | | |
| | 7 | | | |
| | 8 | | | |
| CHANGE TARGET LOCATIONS | | | | |
| 3 | 1 | 300 | Two targets walking through woods. Disappear on command and make one 4-second rush. Two targets fire two blank rounds each. | 1A-2A. 2B-3B. 1C-2C. P12. |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| 4 | 5 | 250 | Two targets make a 3-second rush and disappear at poor aiming points. Two targets, fire three blank rounds each. | 14B-15B. 13C-14C. P13. P10. |
| | 6 | | | |
| | 7 | | | |
| | 8 | | | |
| CHANGE TARGET LOCATIONS | | | | |
| 5 | 1 | 100 | One target makes a 5-meter crawl and stops at a good aiming point. One target makes a 5-meter rush, stops at a poor aiming point. One target makes a 10-meter rush. One target fires five blanks. | 31A-32A. 31B-32B. 29C-31C. P9. |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| 6 | 5 | 150 | Three targets make a 5-meter clumsy crawl. One target fires two blank rounds. All positions at poor aiming points. Good reference points available. | 27B-28B. 26C-27C. 25A-26A. P2. |
| | 6 | | | |
| | 7 | | | |
| | 8 | | | |
| CHANGE TARGET LOCATIONS | | | | |
| 7 | 1 | 225 | Two targets make a skilled 5-meter crawl. Two targets fire two blank rounds each. All positions with a good aiming point. | P11. P1. 13C-14C. 14B-15B. |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| 8 | 5 | 300 | Three targets walk through woods until fired on from observation line. Disappear and make a 5-meter crawl. One target fires four blank rounds. | P6. 2C-3C. 2A-3A. 2B-3B. |
| | 6 | | | |
| | 7 | | | |
| | 8 | | | |
| CHANGE TARGET LOCATIONS | | | | |
| 9 | 1 | 150 | Same as above except all targets stop at poor aiming points. | 24A-25A. 25B-24B. P6. 26C-27C. |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| 10 | 5 | 225 | Two targets make a 5-second rush. Two targets fire one blank round each toward the observation line. | 15C-17C. P8. 19B-20B. P7. |
| | 6 | | | |
| | 7 | | | |
| | 8 | | | |
| CHANGE TARGET LOCATIONS | | | | |
| 11 | 1 | 250 | Four targets fire one blank round each. | P11. P13. P9. P12. |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |

| Trial No. | Target man | Range (meters) | Description of requirements | Stake No. |
|-----------|------------|----------------|---|-----------|
| 12 | 5 | 100 | One target makes a 10-meter rush to a poor aiming point. Three targets fire two blank rounds each. | P6. |
| | 6 | | | P10. |
| | 7 | | | P4. |
| | 8 | | | 39B-42B. |
| 13 | 1 | 200 | CHANGE TARGET LOCATIONS Two targets fire one blank round each. Two targets make a 5-meter crawl. Varied good and poor aiming points. | 11A-12A. |
| | 2 | | | 9B-10B. |
| | 3 | | | P2. |
| | 4 | | | P5. |
| 14 | 5 | 75 | Same as above except all positions at poor aiming points and require the use of reference points. | P3. |
| | 6 | | | P1. |
| | 7 | | | 44B-45B. |
| | 8 | | | 44C-45C. |
| 15 | 1 | 225 | CHANGE TARGET LOCATIONS Two targets spaced far apart make a 3-second rush. Two targets close together fire two blank rounds each. | 8A-9A. |
| | 2 | | | 7C-8C. |
| | 3 | | | P14. |
| | 4 | | | P11. |
| 16 | 5 | 275 | Four targets make 1-, 2-, 3-, 4-second rushes after being fired on from the observation line. Each target fires one blank round 2 seconds after disappearing. Varied, good, and poor aiming points. | 15A-16A. |
| | 6 | | | 14B-13B. |
| | 7 | | | 16B-15B. |
| | 8 | | | 14C-15C. |
| 17 | 1 | 125 | Four targets alternately fire one round each; varied, good, and poor aiming points. | 36A. |
| | 2 | | | 35A. |
| | 3 | | | 31B. |
| | 4 | | | 32C. |
| 18 | 5 | 300 | Two targets make a 1-second rush; two targets fire one blank round each. Varied, good, and poor aiming points. | P9. |
| | 6 | | | P13. |
| | 7 | | | 1A-2A. |
| | 8 | | | 2C-3C. |
| 19 | 1 | 125 | CHANGE TARGET LOCATIONS Three targets make a 3-second rush and one target fires one blank round. | 35A-34A. |
| | 2 | | | 36A-37A. |
| | 3 | | | 31B-32B. |
| | 4 | | | P9. |
| 20 | 5 | 175 | One target makes a 5-meter crawl and three targets fire one round each. Varied, good, and poor aiming points. | 23B-24B. |
| | 6 | | | P14. |
| | 7 | | | P11. |
| | 8 | | | P1. |

(6) Answer sheet. See DA Form 3012-R (fig D-5) DA Form 3012-R will be reproduced locally on 8- by 10½-inch paper.

h. Period Eight, Target Detection Test One (1 Hr). The purpose of this period is to test the soldier's ability to locate and determine ranges to single, stationary battlefield targets.

| TARGET DETECTION EXERCISE ANSWER SHEET PERIOD 7 For use of this form, see FM 23-8 and FM 23-9; proponent agency is TRADOC. | | | |
|---|-------------|---------------------|-------------|
| COMBINATION OF SOUND LOCALIZATION AND MULTIPLE MOVING TARGETS (OBSERVERS CHECK EACH OTHER'S ALINEMENT AND PLACE NUMBER OF TARGETS CORRECTLY ALINED IN SPACE OPPOSITE APPROPRIATE TRIAL NUMBER.) | | | |
| NAME | | PLATOON | SQUAD |
| DATE | | | |
| TRIAL NO. | NO. CORRECT | TRIAL NO. | NO. CORRECT |
| 1 ----- | | 12 ----- | |
| 2 ----- | | 13 ----- | |
| 3 ----- | | 14 ----- | |
| 4 ----- | | 15 ----- | |
| 5 ----- | | 16 ----- | |
| 6 ----- | | 17 ----- | |
| 7 ----- | | 18 ----- | |
| 8 ----- | | 19 ----- | |
| 9 ----- | | 20 ----- | |
| 10 ----- | | | |
| 11 ----- | | | |
| | | TOTAL CORRECT ----- | |
| TRIAL NO. | NO. CORRECT | TRIAL NO. | NO. CORRECT |
| 1 ----- | | 12 ----- | |
| 2 ----- | | 13 ----- | |
| 3 ----- | | 14 ----- | |
| 4 ----- | | 15 ----- | |
| 5 ----- | | 16 ----- | |
| 6 ----- | | 17 ----- | |
| 7 ----- | | 18 ----- | |
| 8 ----- | | 19 ----- | |
| 9 ----- | | 20 ----- | |
| 10 ----- | | | |
| 11 ----- | | | |
| | | TOTAL CORRECT ----- | |

DA FORM 3012-R, 1 Nov 73 REPLACES DA FORM 3012-R, 1 JUN 65, WHICH IS OBSOLETE.

Figure D-5. Answer sheet, period seven (DA Form 3012-R).

TARGET DETECTION EXERCISE
ANSWER SHEET
PERIOD 7

For use of this form, see FM 23-8 and FM 23-9; proponent agency is TRADOC.

COMBINATION OF SOUND LOCALIZATION AND MULTIPLE MOVING TARGETS (OBSERVERS CHECK EACH OTHER'S ALINEMENT AND PLACE NUMBER OF TARGETS CORRECTLY ALINED IN SPACE OPPOSITE APPROPRIATE TRIAL NUMBER.)

| NAME | | PLATOON | SQUAD | DATE |
|---------------|-------------|---------------------|-------------|--------------|
| TORRES, BRYAN | | 3 D | 3 D | 30 JULY 1973 |
| TRIAL NO. | NO. CORRECT | TRIAL NO. | NO. CORRECT | |
| 1 ----- | 1 | 12 ----- | 4 | |
| 2 ----- | 3 | 13 ----- | 3 | |
| 3 ----- | 2 | 14 ----- | 2 | |
| 4 ----- | 1 | 15 ----- | 2 | |
| 5 ----- | 3 | 16 ----- | 3 | |
| 6 ----- | 1 | 17 ----- | 1 | |
| 7 ----- | 0 | 18 ----- | 0 | |
| 8 ----- | 2 | 19 ----- | 3 | |
| 9 ----- | 2 | 20 ----- | 1 | |
| 10 ----- | 3 | TOTAL CORRECT ----- | | 38 |
| 11 ----- | 1 | | | |
| TRIAL NO. | NO. CORRECT | TRIAL NO. | NO. CORRECT | |
| 1 ----- | 0 | 12 ----- | 2 | |
| 2 ----- | 2 | 13 ----- | 0 | |
| 3 ----- | 2 | 14 ----- | 1 | |
| 4 ----- | 1 | 15 ----- | 1 | |
| 5 ----- | 3 | 16 ----- | 2 | |
| 6 ----- | 3 | 17 ----- | 1 | |
| 7 ----- | 1 | 18 ----- | 3 | |
| 8 ----- | 4 | 19 ----- | 2 | |
| 9 ----- | 2 | 20 ----- | 1 | |
| 10 ----- | 2 | TOTAL CORRECT ----- | | 34 |
| 11 ----- | 1 | | | |

DA FORM 3012-R, 1 Nov 73 REPLACES DA FORM 3012-R, 1 JUN 65, WHICH IS OBSOLETE.

(Sample entries.)

Figure D-5—Continued.

- (1) Range facilities. One target detection range.
- (2) Personnel.
 - (a) One principal instructor.
 - (b) Seven assistant instructors.
 - (c) Three target men.
- (3) Blank ammunition requirements.

- Rounds per presentation 15
- Rounds per rehearsal 15
- (4) Master trial sheet. Same as used for period 1 except locations of target men should be changed.
- (5) Answer sheet. Same as used in period 1 (fig D-1).
 - i. Period Nine, Target Detection Tests Two and

Three (1 Hr). The purpose of this period is to test the soldier's ability to locate and mark the points of disappearance of single and multiple moving targets and his ability to locate sound targets.

(1) *Range facilities.* One target detection range.

(2) *Personnel.*

(a) One principal instructor.

(b) Four assistant instructors.

(c) Four target men.

(3) *Blank ammunition requirements.*

Rounds per presentation 30

Rounds per rehearsal 30

(4) *Master trial sheet and answer sheet, target detection test two.*

Sample Master Trial Sheet
Period 9
(Test Two)

| Trial No. | Target | Range (meters) | Description of Requirements | Stake No. |
|-----------|--------|----------------|--|--|
| 1 | 1 | 300 | Kneeling by tree, up on command. Ten-meter bound to a poor aiming point. | 1A-2A. |
| 2 | 2 | 75 | Rush 15 meters to a poor aiming point. | 40A-41A. 39B-40B. 40C-41C. |
| | 3 | | | |
| | 4 | | | |
| | | | CHANGE TARGET LOCATIONS | |
| 3 | 1 | 200 | Rush 10 meters to poor aiming points. | 11A-12A. 13A-14A. 11B-12B. 11C-12C. |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| 4 | 1 | 150 | Ten-meter lateral rush. Good aiming points. | 12A-12B. 14A-14B. 12B-12C. 12C-11B. |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |
| | | | CHANGE TARGET LOCATIONS | |
| 5 | 1 | 200 | One man rush right, the other left, both stop at poor aiming points. | 13A-12B. 12C-11B. |
| | 2 | | | |
| 6 | 3 | 75 | Ten-meter rush. One to a good aiming point and the other two to poor aiming points. | 35C-36C. 29B-30B. 27A-28A. |
| | 4 | 100 | | |
| | 1 | 125 | | |
| | | | CHANGE TARGET LOCATIONS | |
| 7 | 2 | 75 | Five-meter rush to poor aiming points. | 34B-35B. 36C-35C. 35A-35B. 16A-17A. 1B-2B. 1C-3C. |
| | 3 | | | |
| | 4 | | | |
| 8 | 1 | 200 | Twenty-meter rush to a poor aiming point. | |
| 9 | 2 | 300 | One rush 5 meters to a good aiming point and the other 10 meters to a poor aiming point. | |
| | 3 | | | |
| 10 | 4 | 150 | Five-meter lateral rush to poor aiming points. | 25A-26A. 24B-25B. |
| | 1 | | | |

(5) *Answer sheet.* See DA Form 3014-R (fig D-6). DA Form 3014-R will be reproduced locally in 8- by 10½-inch paper.

(6) *Master trial sheet, target detection Test*

Two, sound detection.

Sample Master Trial Sheet
Period 9
(Test Three)

| Trial No. | Target man | Panel location | Trail No. | Target man | Panel location |
|-----------|------------|----------------|-----------|------------|----------------|
| 1 | 1 | 6 | 11 | 3, 4 | 10, 1 |
| 2 | 2, 3 | 4, 12 | 12 | 1, 2 | 2, 6 |
| 3 | 4, 1 | 7, 9 | 13 | 3, 4 | 7, 3 |
| 4 | 2 | 8 | 14 | 1, 2 | 11, 6 |
| 5 | 3 | 14 | 15 | 3 | 7 |
| 6 | 4, 1 | 14, 3 | 16 | 4 | 3 |
| 7 | 2 | 1 | 17 | 1, 2 | 6, 14 |
| 8 | 3 | 6 | 18 | 3, 4 | 12, 1 |
| 9 | 4 | 7 | 19 | 1 | 8 |
| 10 | 1, 2 | 13, 8 | 20 | 2 | 3 |

(7) Answer Sheet. See figure D-6.

| TARGET DETECTION EXERCISE ANSWER SHEETS TESTS NO. 2 AND 3 PERIOD 9 For use of this form, see FM 23-8 and FM 23-9; the proponent agency is TRADOC. | | | |
|---|--------------------------|-------------------------|-------------|
| OBSERVER'S NAME (LAST) | | OBSERVER'S NAME (FIRST) | PLATOON |
| OBSERVATION POINT | | DATE | |
| TRIAL NUMBER | NO. OF TARGETS PRESENTED | RIGHT | WRONG |
| 1 | 1 | | |
| 2 | 3 | | |
| 3 | 4 | | |
| 4 | 4 | | |
| 5 | 2 | | |
| 6 | 3 | | |
| 7 | 3 | | |
| 8 | 1 | | |
| 9 | 2 | | |
| 10 | 2 | | |
| TOTAL _____ | | RIGHT _____ | WRONG _____ |

DA FORM 3014-R, 1 Nov 73 REPLACES DA FORM 3014-R, 1 JUN 65, WHICH IS OBSOLETE.

Figure D-6. Answer sheet, period nine (DA Form 3014-R).

| Target No. | Target Name | Panel Location | Panel No. | Target Name | Panel Location |
|------------|-------------|----------------|-----------|-------------|----------------|
| 1 | 1.1 | 8 | 11 | 1.1 | 8 |
| 2 | 1.2 | 4.12 | 12 | 1.2 | 4.12 |
| 3 | 1.3 | 7.9 | 13 | 1.3 | 7.9 |
| 4 | 1.4 | 8 | 14 | 1.4 | 8 |
| 5 | 1.5 | 14 | 15 | 1.5 | 14 |
| 6 | 1.6 | 14.1 | 16 | 1.6 | 14.1 |
| 7 | 1.7 | 1 | 17 | 1.7 | 1 |
| 8 | 1.8 | 0 | 18 | 1.8 | 0 |
| 9 | 1.9 | 7 | 19 | 1.9 | 7 |
| 10 | 1.10 | 12.8 | 20 | 1.10 | 12.8 |

TARGET DETECTION EXERCISE
ANSWER SHEETS TESTS NO. 2 AND 3

PERIOD 9

For use of this form, see FM 23-8 and FM 23-9; the proponent agency is TRADOC.

| OBSERVER'S NAME (LAST) | | (FIRST) | | PLATOON | |
|-------------------------------|--------------------------|----------------|--------------|----------------|--|
| TORRES | | BRYAN | | 3 D | |
| OBSERVATION POINT | | | | DATE | |
| 23 | | | | 4 AUG 1964 | |
| TRIAL NUMBER | NO. OF TARGETS PRESENTED | RIGHT | WRONG | | |
| 1 | 1 | 1 | 0 | | |
| 2 | 3 | 2 | 1 | | |
| 3 | 4 | 1 | 3 | | |
| 4 | 4 | 3 | 1 | | |
| 5 | 2 | 2 | 0 | | |
| 6 | 3 | 2 | 1 | | |
| 7 | 3 | 2 | 1 | | |
| 8 | 1 | 1 | 0 | | |
| 9 | 2 | 1 | 1 | | |
| 10 | 2 | 2 | 0 | | |
| TOTAL | | RIGHT | WRONG | | |
| 25 | | 17 | 8 | | |

DA FORM 3014-R, 1 Nov 73 REPLACES DA FORM 3014-R, 1 JUN 65, WHICH IS OBSOLETE.

(Sample entries.)

Figure D-6—Continued.

APPENDIX E

METRIC CONVERSION TABLES

E-1. General

Metric units are based on the decimal system and are, for that reason, easier to manipulate than units in the English system. Additionally, units of different types, i.e., weight and length, use the same prefixes to establish their relationship to the basic unit.

a. Metric Prefixes.

| | | |
|--------------|----------------|-----------|
| (1) Mega = | one million | 1,000,000 |
| (2) Kilo = | one thousand | 1,000 |
| (3) Hecto = | one hundred | 100 |
| (4) Deca = | ten | 10 |
| (5) Deci = | one tenth | .1 |
| (6) Centri = | one hundredth | .01 |
| (7) Milli = | one thousandth | .001 |
| (8) Micro = | one millionth | .000001 |

b. Units of Measure.

(1) *Linear measure.* Basic unit is the meter (m).

$$1,000 \text{ m} = 1 \text{ Kilometer (km)}$$

$$1,000 \text{ millimeter (mm)} = 1 \text{ m}$$

$$100 \text{ centimeter (cm)} = 1 \text{ m}$$

(2) *Weight.* Basic unit is the gram (g).

$$1,000 \text{ g} = 1 \text{ kilogram (kg)}$$

$$1,000 \text{ milligram (mg)} = 1 \text{ g}$$

(3) *Velocity.* Kilometers per hour (kmph) and meters per second (m/s).

$$1 \text{ m/s} = 3.6 \text{ kmph}$$

$$1 \text{ kmph} = .28 \text{ m/s}$$

(4) *Temperature.* Temperature is measured in degrees centigrade.

c. Common Usage. Although all of the prefixes mentioned in *a* above can be used with each different type of unit, only a few of these are commonly used.

(1) In length measurements the meter, kilometer, centimeter, and millimeter are commonly used. Range-to-target distances are generally given in meters, longer distances in kilometers. Millimeters are frequently used to designate the caliber of a weapon. Because the units all differ by a multiple of ten, they can readily be interchanged and the choice of unit is frequently one of convenience.

(2) Both the gram and kilogram are often used. Again, the selection is one of convenience.

(3) Kilometers per hour are used for slow speed measurements, i.e. speed of vehicles, troops,

and aircraft. Meters per second are used for faster speeds like the velocity of projectiles.

(4) Zero degrees centigrade (0°C) is the freezing point of water and one hundred degrees centigrade (100°C) is the boiling point. The metric prefixes in *a* above are not used with temperature measurements.

E-2. Conversion Tables

a. Linear Measure.

| | |
|----------------|------------------|
| 1 m = 39.37 in | 1 in = 2.54 cm |
| 1 m = 3.28 ft | 1 ft = 30.48 cm |
| 1 m = 1.09 yd | 1 yd = 91.44 cm |
| 1 km = .62 mi | 1 mi = 1609.34 m |

b. Weight.

| | |
|-------------------|-------------------|
| 1 g = 15.43 grain | 1 grain = .0648 g |
| 1 g = .035 oz | 1 grain = 64.8 mg |
| 1 kg = 35.27 oz | 1 oz = 28.35 g |
| 1 kg = 2.20 lbs | 1 lb = 453.59 g |

c. Velocity.

| | |
|-----------------------|-----------------------|
| 1 m/sec = 3.28 ft/sec | 1 ft/sec = .305 m/sec |
| 1 m/sec = 2.24 mph | 1 ft/sec = 1.10 kmph |
| 1 kmph = .62 mph | 1 mph = 1.61 kmph |

d. Temperature.

| | |
|---|--|
| (1) $1^{\circ}\text{C} = 1.8^{\circ}\text{F}$ | $1^{\circ}\text{F} = .555^{\circ}\text{C}$ |
| Water freezing point— 0°C | 32°F |
| Boiling point— 100°C | 212°F |
| Common temperatures— 20°C | 68°F |
| | 25°C 77°F |
| | 30°C 86°F |
| | 35°C 95°F |

(2) When converting degrees centigrade and degrees Fahrenheit, the different starting points of the two scales must be taken into consideration. The following conversion formulas make allowance for that.

$$^{\circ}\text{C} = 5/9 (^{\circ}\text{F} - 32)$$

$$^{\circ}\text{F} = 9/5 (^{\circ}\text{C}) + 32$$

(a) For example, to convert 77°F to centigrade:

$$^{\circ}\text{C} = 5/9 (77 - 32)$$

$$^{\circ}\text{C} = 5/9 (45)$$

$$^{\circ}\text{C} = 25$$

(b) To convert 20°C to Fahrenheit:

$$^{\circ}\text{F} = 9/5 (20) + 32$$

$$^{\circ}\text{F} = 36 + 32$$

$$^{\circ}\text{F} = 68$$

APPENDIX F

M16A1 RIFLE HISTORY

F-1. Adoption of a small caliber rifle as a standard service weapon is not a recent concept. However, the first written requirement for a small caliber weapon (which led to the acceptance of the M16A1 rifle) began in 1957. Two types of rifles were produced in sufficient quantity to be tested in 1958. The Winchester-Western Division of Olin Mathieson Corporation produced a .224 Winchester lightweight military rifle. The second rifle produced was the AR 15. The AR 15 was developed by the Armalite Division of Fairchild Engine and Airplane Corporation. Following the tests, Winchester ceased work on caliber .22 military rifles and the management of Fairchild Engine and Airplane Corporation divested themselves of the AR 15 rifle. License to produce the AR 15 was acquired by Colt's Patent Fire Arms Manufacturing Company, Inc.

F-2. In 1960 the US Air Force tested the AR 15 at Lackland Air Force Base, Texas, as a replacement for the caliber .30 Carbine in the Air Force. In 1962, after additional testing and modifications, the Air Force adopted the AR 15 as its standard

weapon for security guards and other limited use. The AR 15 was then designated the M16 rifle.

F-3. The Army conducted more extensive tests with the rifle and before the Army would accept it, other modifications were made. The most noticeable of these was the addition of a forward assist assembly to enable the soldier to manually close the bolt. The AR 15 with modifications was designated the XM16E1 Rifle and in November 1963 85,000 were ordered from the Colt Company for use in airborne, air assault, and special forces units. It was felt that the XM16E1 with its lighter weight and shorter length was ideally suited for the tropical warfare encountered in the jungles of Southeast Asia.

F-4. Field tests proved that the XM16E1 rifle was ideally suited for tropical warfare but it was found that more modifications were necessary. In February 1967, after additional modifications were made, the XM16E1 rifle was accepted as a standard service weapon and redesignated the M16A1.

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