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Research Product 87-29

Training Support Package for
Advanced Rifle Marksmanship

ARI Field Unit at Fort Benning, Georgia
Training Research Laboratory

October 1987

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U. S. Army Research Institute for the Behavioral and Social Sciences

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This research product presents a program of instruction (POI) for soldiers undergoing One Station Unit Training (OSUT) at the United States Army Infantry Center (USAIC). It is designed to replace the current Advanced Rifle Marksmanship program being taught at the Infantry Training Center (ITC). Instruction is situationally focused and oriented for application on Fort Benning, GA, range facilities only, in conjunction with available special (continued)		

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ARI Research Product 87-29

20. Abstract (continued)

training devices. Utilization of the lesson outlines, special training devices, and other resource allocations described in the recommended training program will result in a higher level of proficiency in all infantry rifle marksmanship skills upon graduation from OSUT. Instructor requirements remain unchanged; however, nominal increases in training time and ammunition requirements are necessary. An Assault Course Range is required. Detailed lesson outlines and necessary training aid samples are included.

Research Product 87-29

Training Support Package For Advanced Rifle Marksmanship

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Education and Training

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FOREWORD

With his service rifle, the Infantry soldier must be able to engage personnel targets under all combat conditions. The battlefield will test each soldier in all of his learned skills. Soldiers can expect to be confronted by multiple moving personnel targets, hindered by darkness, and forced to perform in a chemically contaminated environment. Soldiers must learn these skills during One Station Unit Training (OSUT). They must depart from institutional training with the ability and confidence to perform these critical combat skills.

The research effort described in this report was monitored by the Army Research Institute's Fort Benning Field Unit, whose mission is to conduct research and develop training and training technology in response to the needs of the Infantry. The major focus is on the field experimentation within the Infantry arena with the goal of obtaining results that can be generalized to similar systems/problems in other segments of the Army or other services. The primary emphasis is on training systems/training technology, team training, and weapons systems training to improve the performance of soldiers and units. The research task that supports this mission is titled "Developing Training for Individual and Crew-Served Weapons" and is organized under the "Train the Force" program area. Providing sponsorship for the research effort was the United States Army Infantry School (USAIS), under a letter of agreement titled "Joint Efforts on Improved Training for Moving Target Engagement and Other Advanced Marksmanship Skills," dated 20 December 1984. Presentations on the work described in this report were made to the USAIS in June 1987. This training support package was developed from the findings of this research effort. It is expected that these recommendations will be used to revise current training methods.



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TRAINING SUPPORT PACKAGE FOR ADVANCED RIFLE MARKSMANSHIP

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TRAINING SUPPORT PACKAGE FOR ADVANCED RIFLE MARKSMANSHIP

INTRODUCTION

The development of this training support package was based on a series of experiments conducted to evaluate current Advanced Rifle Marksmanship (ARM) training for night fire and protective mask fire for One Station Unit Training (OSUT) soldiers at Fort Benning, Georgia (Hunt, Lucariello, Martere, Parish, and Rossi, in preparation). A previous ARM research effort evaluated existing training for moving target engagement (Hunt, Parish, Martere, Osborne, & Evans, in press), and two training support packages for moving target engagement were developed (Martere, Parish, & Hunt, in press-a; Martere, Parish, & Hunt, in press-b). The research conducted by Hunt et al. (in preparation) was based on a prioritized list of critical ARM skills determined by the Directorate of Training and Doctrine (DOTD) in the U.S. Army Infantry School (USAIS). The critical ARM skills identified were: (1) night fire with no illumination where target acquisition is achieved by simulating return enemy fire, (2) night fire with artificial illumination to simulate pyrotechnic flares, (3) night fire using night vision devices and, (4) protective mask fire during daylight.

Of the four skills being evaluated, there were three relevant Programs of Instruction (POIs) in current ARM training: (1) night fire with artificial illumination, (2) night fire with night vision devices, and (3) protective mask fire during daylight. However, during the period in which the research effort was conducted, only night fire with artificial illumination and protective mask fire during daylight were taught during ARM. The existing training for night fire with artificial illumination required soldiers to engage 30 single target exposures of an E-type target at 75 m from a prone bipod supported firing position. Targets were illuminated by stadium lights to simulate pyrotechnic flares. The level of illumination was controlled by a rheostat and varied during the course of fire. Soldiers were given two 15 round magazines of M193 ammunition and a total of 90 s to engage the 30 target exposures. The performance standards were 15 targets hit out of 30 target exposures; however, soldiers received no feedback after completing the course of fire and the number of targets hit was not recorded. Protective mask fire required soldiers to wear a M19A1 protective mask while engaging a pop-up F-type target at 75 m with 15 rounds of automatic fire. No performance standards were specified in the POI and soldiers received no feedback on their performance.

Observation of the existing ARM training indicated three major problems: (1) current training did not follow the most recent Program of Instruction (POI), (2) soldiers did not receive performance feedback and, (3) performance standards specified in the POI were not enforced. The main purpose of the research effort (Hunt et al., in preparation) was to determine the best training techniques and appropriate performance standards for night fire under various conditions of artificial illumination, night fire using night vision devices and protective mask fire during daylight. Two separate experimental procedures were used: one used the existing POI and range facilities, the other used a modified POI and existing range facilities. Pilot data were collected for all experiments using existing ARM POIs; however, minor procedural changes to the live-fire portions of training were made to ensure

scenarios were compatible with the range layout. The pilot data were used to modify experimental procedures for test purposes. These changes were defined by restructuring the training methodology, using special devices, and the development of new live-fire scenarios. The lesson outlines for these critical ARM skills are detailed in Appendix A (pp. A-9 - A-26) of this report. Each lesson outline presents a detailed lesson plan, resource requirements, and recommended performance standards.

The findings reported by Hunt et al. (in preparation) provide empirical support for the training methodology and performance standards described in the proposed POI. The results obtained for night fire with artificial illumination, using either a muzzle flash simulator or stadium lights which simulated pyrotechnic flares, indicated that it was unrealistic to require soldiers to engage point targets under these conditions. Based on the shot location data reported by Hunt et al. (in preparation, pp. 4-6) an area of fire target was determined to be more appropriate for night fire under these conditions (see Enclosure 2, p. A-26). In addition, realistic performance standards based on the extreme spread of the shot location data for the area of fire target were established. The results for night fire using the AN/PVS-4 night vision sight showed that soldiers were able to engage point targets at ranges up to 300 m. The results also demonstrated that a number of soldiers were able to use the same night vision sight zeroed to the same weapon effectively (see FC 23-11, p.24-2). Similarly, results for protective mask fire indicated that soldiers were capable of engaging targets out to 300 m.

Overall, when compared to the current POI the proposed POI offers lesson plans for the critical ARM skills identified by DOTD that provide soldiers with timely feedback and quantifiable performance standards for evaluation purposes. In addition, implementation of the proposed POI requires minimal reallocation of existing resources present in the training base. While the current POIs for night fire with artificial illumination and protective mask fire are suitable for initial familiarization training, they do not use appropriate feedback and they do not evaluate performance. These fundamental differences between the POIs provide compelling evidence in support of the proposed POI if command emphasis is given to teaching 11B and 11M infantry soldiers these critical ARM skills.

PROGRAM DEVELOPMENT

In a previously documented research effort (Hunt, Parish, Martere, Osborne, and Evans, in press), observation of ARM moving target training indicated that range facilities and concurrent training periods were not being fully utilized. Similarly, during this research effort, observation of a randomly selected OSUT company, at Fort Benning, Georgia, from Basic Rifle Marksmanship (BRM) Record Fire qualification through all current ARM periods, Individual Tactical Training (ITT) and Squad Tactical Training (STT) showed inappropriate utilization of resources and range facilities.

The training support package in this report is based on empirical findings reported by Hunt et al. (in preparation). All performance standards and training procedures for night fire with artificial illumination, night fire with night vision devices, and for protective mask fire during daylight are based on empirical support. However, no formal test of the entire POI was conducted. Similarly, the POIs for Quick Fire and Assault Fire were not formally evaluated; however, the rationale for both POIs followed a similar training concept of providing soldiers with appropriate, timely feedback, and providing performance standards for evaluation purposes. In addition, if ITT and STT are considered an integral part of ARM training then it is suggested that these POIs should be revised to include both feedback and scoring procedures. Ideally, soldiers should receive performance feedback whenever live fire is conducted. Physical or automated scoring procedures and prescribed standards enable trainers to identify strengths and weaknesses of soldiers performing live-fire tactical operations.

In conjunction with the implementation of the proposed POI for 11B and 11M infantry soldiers, the need for well qualified instructors is essential to maximize the effectiveness of the training program. Instructors should be carefully selected to perform assigned duties. The combination of well qualified instructors and an ARM POI that is based on sound training methodology and clear evaluation procedures will ensure the maximum utilization of available training resources.

PROGRAM UTILIZATION

There are three primary goals of the proposed ARM POI: (1) to improve the marksmanship ability of 11B and 11M infantry soldiers, (2) to increase the confidence of soldiers in their marksmanship ability and (3) to provide quantifiable standards for each ARM POI.

The proposed ARM POI uses currently recommended institutional training objectives and standards. If the recommended POI is accepted by the USAIS, as proponent for infantry OSUT, the program could be implemented immediately by the U.S. Army Infantry Training Center (USAITC), at Fort Benning, Georgia.

Proposed ARM Program Outline

Based on the research by Hunt, et al, (in preparation), the current ARM POI does not train Infantrymen beyond other MOSSs. The proposed ARM POI is intended to replace the current ARM POI. Lesson outlines and training aids are listed in Appendix A. Lesson outlines are numbered for each period of instruction for easy identification. A lesson outline for the conduct of 25 Meter Battlesight Zeroing is not included. The current BRM 25 Meter Battlesight Zero lesson outline will be used for ARM zero confirmation. Lesson outlines for the conduct of moving target engagement training with existing ranges and special devices are included in an earlier ARI research product (Martere, et al., in press-a). The following subjects are recommended to be taught during OSUT at Fort Benning, GA to MOS 11B and 11M soldiers.

<u>Subject</u>	<u>Rounds</u>	<u>Hours</u>
25 m Battlesight Zero Confirmation	18	4
Quick Fire Training	40	4
Assault Fire Training	60	8
Protective Mask Fire	45	4
Night Fire Training/Night Vision Devices	35	6
Night Fire Training w/o Night Vision Devices	30	4
Moving Target Engagement Training ¹	<u>117</u>	<u>16</u>
Totals:	345	46

¹The moving target engagement training program suggested for this ARM POI is detailed in Martere et al., (in press-a).

REFERENCES

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- Hunt, J. P., Lucariello, G., Martere, R. F., Parish, J. R., and Rossi, M. J., (in preparation). The development and evaluation of an advanced rifle marksmanship training program with the M16 rifle. Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.
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AUTHOR NOTES

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APPENDIX A

LESSON OUTLINES

US ARMY RESEARCH INSTITUTE

ARM 003

August 1987

LESSON OUTLINE: ADVANCED RIFLE MARKSMANSHIP

LESSON TITLE: Quick Fire

A. ADMINISTRATIVE INSTRUCTIONS:

1. When will training be given: As announced by training schedule.
2. Training location: As announced by training schedule.
3. Who will be trained: One Station Unit Training (OSUT) Soldiers.
4. Principal and assistant trainers: ARM Committee.
5. Training Aids: LCE, M16A1/A2 rifle, 4 magazines, 40 rounds of 5.56 mm ball ammunition per soldier, Chart: "Ready Position," "Firing Position" & Fundamentals of Quick Fire," and 20 rounds of 5.56 mm ball ammunition for demonstration.
6. References: FM 23-9, "M16A1/A2 Rifle and Rifle Marksmanship," and FC 23-11, "Unit Rifle Marksmanship Training Guide."
7. End of block test: None.

B. TRAINING OBJECTIVE:

TASK: Engage "F" & "E" silhouettes at 15 & 25 meters respectively, using quick fire techniques.

CONDITION: During daylight, given an operational M16A1/A2 rifle, 40 rounds of 5.56 mm ball ammunition, and target exposures of 2 seconds.

STANDARD: Achieve 7 target hits at 15 meters and 5 target hits at 25 meters for each 10 target exposures.

C. INTERMEDIATE TRAINING OBJECTIVES: None.

D. SEQUENCE OF TRAINING:

1. Introduction: During this period of instruction each of you will engage personnel targets at 15 and 25 meters. As a result of this training you will gain confidence in your ability to hit close-in targets without using the rifle

sights in the normal daylight aiming manner. Quick Fire techniques are effective at distances out to 30 meters.

2. Advantages of Quick Fire:

- a. Effective rapid engagement of close-in targets.
- b. Provides excellent technique of fire for Military Operations on Urbanized Terrain (MOUT).
- c. Conserves ammunition, compared to automatic fire, while delivering effective fire.
- d. Provides for immediate return of fire.
- e. Provides an introduction to training of night fire techniques.
- f. Very effective to suppress opposing forces (i.e., "buy time").

3. Fundamentals of Quick Fire.

- a. Look over the sights.
- b. Hold rifle firmly.
- c. Move head, body, and rifle as one unit.
- d. Keep both eyes open.
- e. Focus on lower third of the target.
- f. Pull trigger rapidly.

4. Quick Fire Ready Position.

NOTE: Show Chart (Ready Position).

- a. Execute a "half left or right face."
- b. Spread feet approximately shoulder width apart.
- c. Grasp the pistol grip firmly with firing hand.
- d. Grasp the hand guard with the non-firing hand, index finger extended and pointed along the under side of the barrel.
- e. Rifle is held lowered to the hip and horizontal to the ground.

NOTE: Post ARM committee demonstrator. Perform demonstration and release demonstrator.

4. Quick Fire Firing Position.

NOTE: Show Chart (Firing Position).

- a. Raise rifle as quickly as possible in one smooth motion.
- b. Press rifle butt firmly into the pocket of the shoulder.
- c. Look over sights (along the barrel line) at the lower third of target.
- d. Pull trigger rapidly.
- e. Move body and rifle as one unit.

NOTE: Recall demonstrator. Perform demonstration and release demonstrator.

5. Conduct of fire.

- a. Break the company into firing orders.
- b. Dry fire practice at 15 and 25 meter lines with 2 seconds per target exposure time.
- c. Rotate firing orders through both firing distances.
- d. Conduct practice and record live fire.

(1) Practice Quick Fire: 15 meters, 10 "F" targets, 10 rounds, 2 seconds per exposure.

(2) Practice Quick Fire: 25 meters, 10 "E" targets, 10 rounds, 2 seconds per exposure.

(3) Record Quick Fire: 15 meters, 10 "F" targets, 10 rounds, 2 seconds per exposure. Standard: 7 targets hit of 10 targets exposed.

(3) Record Quick Fire: 25 meters, 10 "E" targets, 10 rounds, 2 seconds per exposure. Standard: 5 targets hit of 10 targets exposed.

e. Peer scorers or paper facings (NSN: 6920-00-600-6874) may be used if computer scoring is not available.

E. CONCLUSION:

- a. Recap main points.
 - (1) Fundamentals of Quick Fire.
 - (2) Ready position.
 - (3) Firing position.

(4) Advantages of Quick Fire.

b. Clarify student questions.

c. Closing statement: Your ability to bring effective rapid semiautomatic fire on an opposing force quickly will ensure your success as an infantryman.

F. SAFETY RESTRICTIONS: USAIC REG 210-4.

G. ADDITIONAL COMMENTS AND INFORMATION: None.

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ARM 004

August 1987

LESSON OUTLINE: ADVANCED RIFLE MARKSMANSHIP

LESSON TITLE: Assault Course

A. ADMINISTRATIVE INSTRUCTIONS:

1. When will training be given: As announced by training schedule.
2. Training location: As announced by training schedule.
3. Who will be trained: One Station Unit Training (OSUT) Soldiers.
4. Principal and assistant trainers: ARM Committee.
5. Training aids: M16A1/A2 rifle, 3 magazines, 60 rounds of 5.56 mm ball ammunition, LCE, Chart: "Techniques of Suppressive Fire" and Chart: "Course Layout."
6. References: FC 23-11, Chapters 2/ & 29, "Unit Rifle Marksmanship Training Guide," and FM 23-9, "M16A1/A2 Rifle and Rifle Marksmanship."
7. End of block test: None.

B. TRAINING OBJECTIVE:

TASK: Engage silhouette personnel targets with suppressive fire.

CONDITION: During daylight, on an assault course with silhouette targets in camouflaged positions.

STANDARD: Deliver suppressive fire on known and suspected enemy positions and hit silhouettes as they are presented.

C. INTERMEDIATE TRAINING OBJECTIVES: None.

D. SEQUENCE OF TRAINING:

1. Introduction: During this period of instruction you will be required to engage known or suspected enemy positions with suppressive fire. During past training periods you were taught to react quickly to close-in targets that appeared for brief exposures. Today, you will be tested on your ability to detect targets and apply suppressive fire techniques.

2. Definition and Goal: Effective suppressive fire is a high volume of

aimed rapid semiautomatic or burst fire impacting on known or suspected enemy positions. The goal is to hit and kill the enemy.

3. Background: As infantrymen you will receive many missions. Combat does not confine itself to "well-aimed shots." The majority of the shots fired in battle will be suppressive in nature. While quick fire is unaimed, i.e., "over the sights," suppressive fire is "hastily aimed," using the sights. You will be performing suppressive fire to gain fire superiority or to extract your unit from an undesirable situation. Opposing forces do not stand perfectly still in the middle of the battlefield. You must be alert, quick, and possess those marksmanship skills which will deliver effective fire on known or suspected enemy fighting positions. Effective suppressive fire may be rapid semiautomatic or burst fire. In either mode of fire, the bullets must impact in, on, or around the known or suspected target area. You must conserve your ammunition while engaging this course. You must engage all targets during the scenario. You may use rapid semiautomatic or bursts. Ammunition conservation is your responsibility.

4. Technique of Suppressive Fire:

- a. Be ready to engage targets.
- b. Carry rifle in the Quick Fire "Ready" position.
- c. React quickly.
- d. Use cover, if available.
- e. Engage single or double silhouettes with "hastily aimed" rapid semiautomatic fire.
- f. Engage three or more silhouettes with "hastily aimed" burst fire.
- g. Engage a 1 known or suspected enemy positions.

5. Conduct of Fire:

a. Explanation of the course: Each student will be issued three magazines containing twenty rounds of 5.56 mm ball ammunition. Students will negotiate the course in the role of "point man" for an infantry squad. ARM committee will act as safety controllers during live fire exercises.

b. Range layout: See Enclosure 1.

E. CONCLUSION:

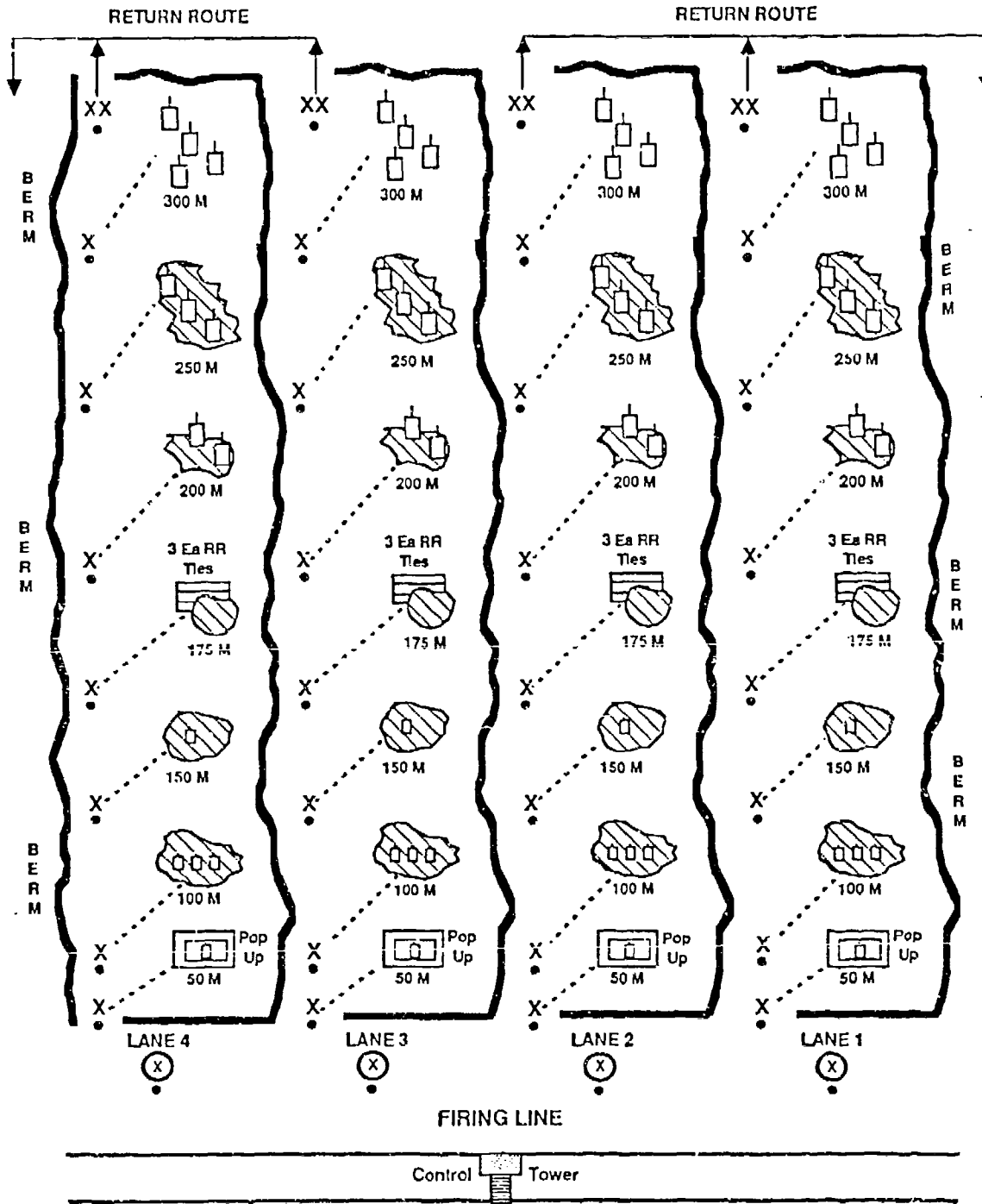
- a. Recap main points.
- b. Clarify student questions.
- c. Closing statement: Today's training was as close to reality as

is possible to conduct safely. Your success today has prepared you to take your place among infantrymen around the world.

F. SAFETY RESTRICTIONS: USAIC Reg 210-4.

G. ADDITIONAL COMMENTS AND INFORMATION: Enclosure 1 is the course layout that is desired for the conduct of this period of instruction. However, with minimum cost to USAIS, modifications and improvements may be accomplished on Pierce, Malone 22 or Malone 26 Rifle Ranges to accommodate the conduct of this critical training. In lieu of LOMAH or RETS equipment, evaluations will be made by the safety controllers. Soldiers must receive a critique by the controller after negotiating the Suppressive Fire Assault Course. Standards will be established after the course has been built. USAIS Safety Office is currently reviewing the recommended course. During preparation of this document, Range Division is constructing Malone 27A which would be suitable for the conduct of this training period.

SUPPRESSIVE FIRE ASSAULT COURSE



READY AREA

LEGEND	
•	Controller
⊗	Ammo Issue
X	Firing Position
□	"E" Silhouette
◊	Vegetation
XX	Clear Weapon

Enclosure 1

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ARM 005

August 1987

LESSON OUTLINE: ADVANCED RIFLE MARKSMANSHIP

LESSON TITLE: Protective Mask

A. ADMINISTRATIVE INSTRUCTIONS:

1. When training will be given: As announced by training schedule.
2. Training location: As announced by training schedule.
3. Who will be trained: One Station Unit Training (OSUT) Soldiers.
4. Principal and assistant instructors: ARM Committee.
5. Training aids: M16A1/A2 rifle, 3 magazines, 45 rounds of 5.56 mm ball ammunition, protective mask (w/ eyeglass inserts), and LCE.
6. References: FC 23-11, Chapter 23, "Unit Rifle Marksmanship Training Guide," and FM 23-9, "M16A1/A2 Rifle and Rifle Marksmanship."
7. End of block test: None.

B. TRAINING OBJECTIVE:

TASK: Engage personnel targets while wearing a protective mask.

CONDITION: During daylight, on a field fire range equipped with a LOMAH capability or with RETS targets.

STANDARD: Attain 15 target hits as described in paragraph D.2e.

C. INTERMEDIATE TRAINING OBJECTIVE:

TASK: Put on a protective mask.

CONDITION: While in a foxhole fighting position, given the command, "GAS."

STANDARD: Properly mask, clear, check and prepare hood within 15 seconds and be ready to engage targets as they appear.

D. SEQUENCE OF TRAINING:

1. Introduction: The forces which will oppose our Army firmly believe

in the use of chemical warfare. In the event of future conventional warfare, it is expected threat forces will begin the attack with an artillery barrage using chemical warheads. We must be ready to defend and counterattack in a chemically contaminated environment. Today, you will be required to engage personnel targets while wearing a protective mask.

2. Course of fire:

- a. Targets: "E" silhouettes.
- b. Range: 75, 175 & 300 meters.
- c. Firing position: Foxhole supported.
- d. Method of engagement: Three 15 round magazines, fired in the semiautomatic mode.
- e. Standard for each distance is as follows:
 - (1) 75 meters: 7 target hits of 10 rounds.
 - (2) 175 meters: 6 target hits of 10 rounds.
 - (3) 300 meters: 2 target hits of 10 rounds.

NOTE: The first 5 rounds fired at each distance are practice rounds to establish a precise aiming point (sight picture) and do not count towards attaining required standard.

NOTE: Post ARM committee demonstrator and explain aiming technique for both right and left handed firers. Release demonstrator.

3. Course scenario:

- a. The scenario consists of timed single target exposures at each distance of 75, 175, and 300 meters. Targets will be exposed for 45 seconds at each distance. Soldiers will fire one magazine of 15 rounds at each distance during the allotted time.
- b. Alibis for weapon or target malfunctions are allowed. Three (3) seconds for each unfired round are authorized.
- c. Coaching is allowed during the 5 practice rounds at each distance.

E. CONCLUSION:

- a. Recap main points.
- b. Clarify student questions.
- c. Closing statement: Your ability to engage personnel targets under NBC conditions will enhance your success on future battlefields.

F. SAFETY RESTRICTIONS: USAIC Reg 210-4.

G. ADDITIONAL COMMENTS AND INFORMATION: The range used to conduct of this training should be equipped with a LOMAH or RETS system. Current range facilities do not require modifications to conduct Protective Mask firing.

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ARM 006

August 1987

LESSON OUTLINE: ADVANCED RIFLE MARKSMANSHIP

LESSON TITLE: Night Fire with AN/PVS-4

A. ADMINISTRATIVE INSTRUCTIONS:

1. When will training be given: As announced by training schedule.
2. Training location: As announced by training schedule.
3. Who will be trained: One Station Unit Training (OSUT) Soldiers.
4. Principal and assistant trainers: ARM Committee.
5. Training aids: One AN/PVS-4 (with batteries and M16 mounting knob assembly), one M16A1/A2 rifle per four firers, Reticle charts (see enclosures), and 35 rounds of 5.56 mm ball ammunition per firer.
6. References: TM 11-5855-213-10, "AN/PVS-4 Night Vision Sight," FC 23-11, "Unit Rifle Marksmanship Training Guide," and FM 23-9, "M16A1/A2 Rifle and Rifle Marksmanship."
7. End of block test: None.

B. TRAINING OBJECTIVE:

TASK: Engage personnel targets using an AN/PVS-4 and an M16A1/A2 rifle.

CONDITION: Given an AN/PVS-4, an M16 rifle, and appropriate range facilities.

STANDARD: Mount, place into operation, zero*, and engage targets during daylight and hours of limited visibility. Required target hits for each distance are listed in paragraph 2b.

C. INTERMEDIATE TRAINING OBJECTIVES:

TASK: Mount the AN/PVS-4 on an M16A1/A2 rifle.

CONDITION: Given an AN/PVS-4 with mounting knob assembly and an M16A1/A2 rifle.

STANDARD: Mount AN/PVS-4 to the M16 rifle, ensuring proper techniques

are used and scope is tightly secured on the weapon. Scope and rifle should fit together snugly.

TASK: Place the AN/PVS-4 into operation.

CONDITION: Given an AN/PVS-4 with batteries.

STANDARD: When turned "ON", scope should operate and function properly.

TASK: Zero* the AN/PVS-4 to an M16A1/A2 rifle at 25 meters.

* For zeroing the AN/PVS-4 to an M16A1/A1 rifle the ARM committee will select one soldier, per rifle used. It is recommended, that soldiers with the highest BRM qualification score be used. Some soldiers may require as many as 18 rounds to establish the initial zero while others may attain a zero in less than 9 rounds.

CONDITION: Given an AN/PVS-4 mounted on an M16A1/A2 rifle, 9 rounds of 5.56 mm ball ammunition, a 25 meter zero range, and battlesight zeroing scaled silhouette targets, during daylight hours.

STANDARD: Place 3 consecutive shots 7 cm below the 4 cm circle of the scaled silhouette.

NOTE: If correct 25 meter zero is attained, EXTREME sight adjustments should not be needed between firers.

I SEQUENCE OF TRAINING

1. Introduction: Today, we face an enemy that prefers to fight at night and has advanced equipment to assist in this role. Because of the increased emphasis being placed on night operations, it has become necessary for you to be able to move and fight effectively during darkness. Many devices have been designed to improve the American soldier's ability to detect and engage targets at night. One such device is the AN/PVS-4.

Since its introduction, this night vision scope has greatly improved the night target detection, identification, and engagement capabilities of soldiers.

Due to the major combat role of the AN/PVS-4, we will discuss the principles of operation, mounting and zeroing the scope. Each of you will be required to engage personnel targets using the AN/PVS-4 during the hours of darkness.

a. Principles of operation and nomenclature.

(1) Principles of operation:

(a) The AN/PVS-4 is a portable, battery powered instrument for passive visual observation and aimed fire of weapons at night. Passive vision devices use natural light (moonlight, starlight, and/or starglow) of the night sky to illuminate a target. The AN/PVS-4 does not emit a visible or infrared light source (except through the eyepiece) and offers

virtual immunity from possible enemy detection. The scope has a 3.6 power magnification and is designed for employment on the M16A1, M16A2, M21 sniper rifle system, M203 grenade launcher, M60 machine gun and the M72A1 rocket launcher. Mounting brackets are available for each weapon.

(2) Nomenclature:

(a) The main housing is a lightweight tube which holds all the components and assemblies of the scope.

(b) The objective lens is located in the front of the main housing. There are three lens assemblies. These assemblies are focused by the use of the objective lens focus ring. They can be clearly focused at a target from 25 meters to infinity.

(c) The power supply system for the AN/PVS-4 consists of two BA 1567/U batteries (2.7 volts DC each). The batteries are dated for shelf life. For example 07/86 is read as July 1986. This is the expiration date.

(d) The rubber eyeguard is attached to the eyepiece assembly and protects the eye from the effects of recoil. This guard, when held snugly against the eye, prevents light being emitted from the rear of the eyepiece from illuminating the operator's face. When not held against the eye, the emitted light is blocked by the two rubber flaps mounted inside the eyeguard.

(e) Immediately forward of the eyepiece is the diopter ring. It adjusts the focus of the eyepiece and the aiming reticle.

(3) AN/PVS-4 should be inspected for the following:

(a) Dirt.

(b) Broken or cracked glass in objective lens or eyepiece lens cap.

(c) Missing, damaged, or broken daylight cover (objective lens cap).

(d) Damage to the sight body (housing).

(e) Missing, broken, or jammed control knobs.

(f) Missing, damaged, or corroded battery caps and wells. Also caps with reversed springs (small end should be up) or do not have a spring at all.

(g) Inoperative or damaged objective (front) and/or eyepiece (rear) focus rings.

(h) Loose, cracked or damaged rubber eyeguard.

(i) Loose or damaged sight mounting adapter (mounting block). Stripped threads in block.

(j) Missing, damaged or unreadable data plate.
Excessive or unauthorized paint on the housing.

(4) M16A1/A2 mounting assembly should be checked to insure threads are not stripped, lever is present and the lock washer is located between the spacer and the screw head.

b. Place the AN/PVS-4 into operation. The following steps will be performed:

(1) Remove battery caps by turning counter-clockwise.

(2) Insure both control knobs are "OFF" and insert a BA 1567/U into each cap, negative (-) terminals facing into the cap.

NOTE: On BA 1567/U batteries, the negative (-) terminal is the end of the battery with raised center area.

(3) Replace caps and hand-tighten.

(4) Insure lens cap is installed during daylight hours.

(5) Turn tube brightness and reticle brightness knobs to the "ON" position.

(6) Look through eyepiece and adjust knobs until desired tube and reticle brightness are achieved.

NOTE: During very bright daylight conditions (sun, sand or snow) the operator may have to tape or cover one or more of the holes in the daylight cover. During dusk or dawn, it may be almost impossible to see both the reticle and downrange area clearly enough to use the scope for live-fire exercises.

(7) Adjust eyepiece focus ring (diopter) until reticle is clear. Insure correct reticle (M16/M203/M79) is installed in the scope.

(8) Adjust objective focus ring until selected target is clear.

NOTE: Steps (6) through (8) must be repeated several times until optimum picture is visible through scope.

d. Mount the AN/PVS-4 to an M16 rifle. The following steps must be performed in sequence:

(1) Position the scope mounting block in the groove in the top of the carrying handle of the weapon. Align the threaded hole in the base of the block with the hole in the carrying handle.

(2) Insert the mounting knob assembly through the hole in the carrying handle and screw clockwise into the scope mounting block. Do not

tighten all the way at this time.

(3) While mounting knob assembly is still loose, push scope forward (toward muzzle) in carrying handle as far as the mounting knob will permit.

(4) Hold scope in this "forward" position and tighten mounting knob firmly. Place an empty cartridge over the lever arm to aid in tightening the knob. Hand tighten as much as possible.

NOTE: This "push forward" technique allows for the best chance of returning the scope to the same position if the scope is dismounted after zeroing and remounted for later use. It also lessens shifting as a result of recoil. To eliminate fumbling for hole/thread alignment, turn the rifle upside down for a clear view during initial mounting.

e. Identify and explain the use of the M16/M203 reticle pattern.

NOTE: Show Chart #1 (Enclosure 1).

(1) Use of the range scale:

(a) Vertical lines at the top of the reticle indicate range (in hundreds of meters) to a six foot tall man (standing). Measurement is made from the horizontal line to the top or bottom of each vertical line for the range indicated.

(b) The horizontal line of the range scale indicates the range (in hundreds of meters) to a twenty foot long target, such as a tank viewed from the side. Place the left edge of the tank at the left side of the horizontal line. The range to the tank is read from the scale at the right edge of the tank. Since the width of the tank is approximately half the length, placement of the frontal view on the ranging scale is read as half the value shown.

NOTE: Remove/cover Chart #1 and show Chart #2 (Enclosure 2). Instructor may choose to explain only the M16A1/A2 aiming point.

(2) Use of the aiming points:

(a) Aiming points for M203/M79 grenade launchers are shown as small dots in a horizontal row to the right of the reticle center. Aiming points are for 200, 300, and 400 meters.

(b) The M16A1/A2 rifle aiming point for ranges out to 250 meters is the center point of the three straight lines (the "T" reticle). The top of the aiming point is for 400 meters and the bottom of that same vertical line is the aiming point for 600 meters.

(3) The proper procedure is:

- (a) Locate target.
- (b) Estimate range to target.
- (c) Place proper aiming point (corresponding to target range) at center of mass.

NOTE: Remove/cover Chart #2 and show Chart #3 (Enclosure 3).

f. Initial zero at 25 meters (daylight). To obtain an initial zero with AN/PVS-4 during daylight conditions:

- (1) Place a scaled silhouette zero target at 25 meters.
- (2) Place the AN/PVS-4 scope into operation. Adjust windage and elevation controls until "T" reticle aiming point is centered in field of view.
- (3) From the foxhole or prone supported position, fire three-round shot groups, adjusting the sight until the center of the final shot group is located 7 cm (ten squares) below the point of aim. Point of aim is center of mass.
- (4) Each click of windage (azimuth) or elevation will move the strike of the bullet one full minute. One minute = 1/4 inch at 25 meters, 1 inch at 100 yards, 2 inches at 200 yards, etc.

g. Precision zero at 250 meters (daylight).

NOTE: This procedure may be performed if both range facilities and ammunition resources allow.

(1) Three-round shot groups will be fired at an "E" silhouette and sight will be adjusted until center of final group impacts at the point of aim.

NOTE: At 250 meters, each click of elevation or windage will move the strike of the bullet approximately 2 1/2 inches (250 meters is approximately 274 yards).

2. Conduct of fire:

NOTE: During daylight, each soldier will fire 5 rounds at 75 m to become familiarized with the aiming reticle.

a. Firers will engage "E" silhouette targets at distances of 75, 175, and 300 meters. Target exposure time will be 60 seconds at each distance.

b. Standard for each distance is as follows:

(a) 75 meters: 7 target hits of 10 rounds.

(b) 175 meters: 5 target hits of 10 rounds.

(c) 300 meters: 2 target hits of 10 rounds.

E. CONCLUSION.

1. Recap main points:

(a) Principles of operation and nomenclature.

(b) Inspection of equipment.

(c) Place in operation.

(d) Mounting procedures.

(e) Reticle pattern.

(f) Zero procedures.

(g) Field firing during the hours of darkness/limited visibility.

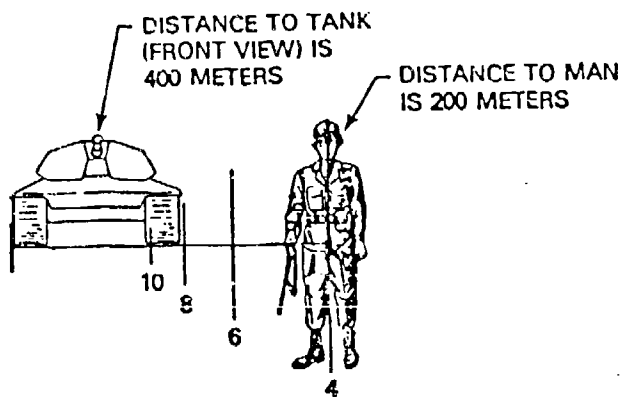
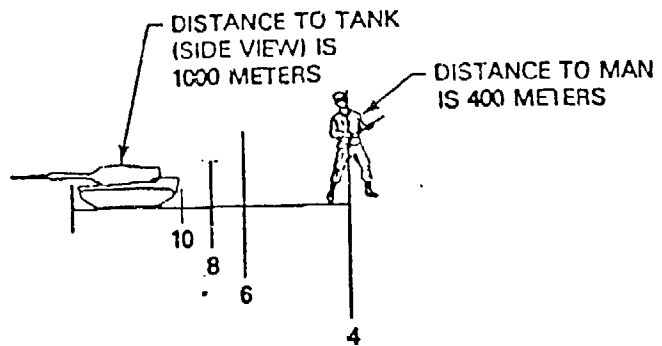
2. Clarify student questions.

3. Closing statement: Many targets will present themselves during the hours of darkness, your ability to detect and engage them effectively will insure your success on future battlefields.

F. SAFETY RESTRICTIONS. USAIC Reg 210-4.

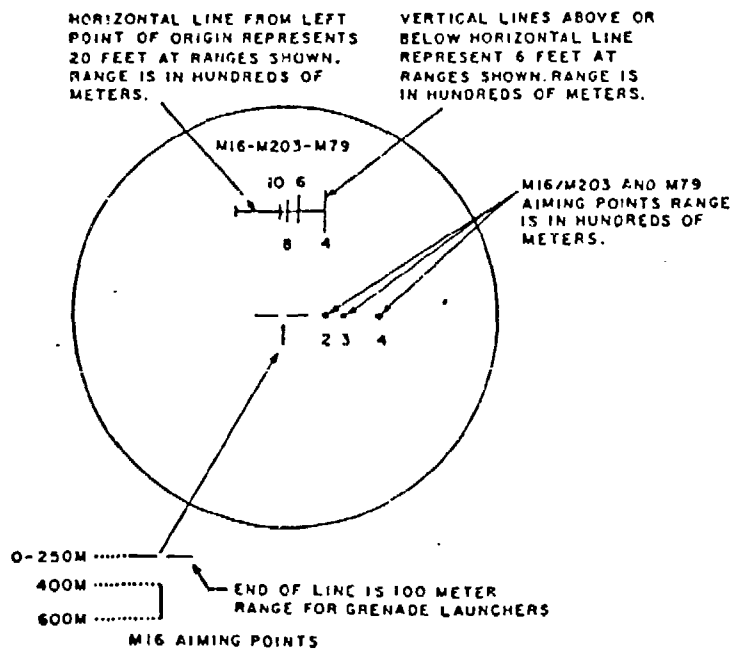
G. ADDITIONAL COMMENTS AND INFORMATION. Night fire training must be conducted with as much realism as possible. Night fire training presents unique safety problems and must be conducted with a "Safety First" attitude. All cadre personnel are reminded to seek innovative and safety conscious training strategies. Strict discipline and range organization procedures must be observed.

M16/M203/M79 RANGING SCALE



Enclosure 1

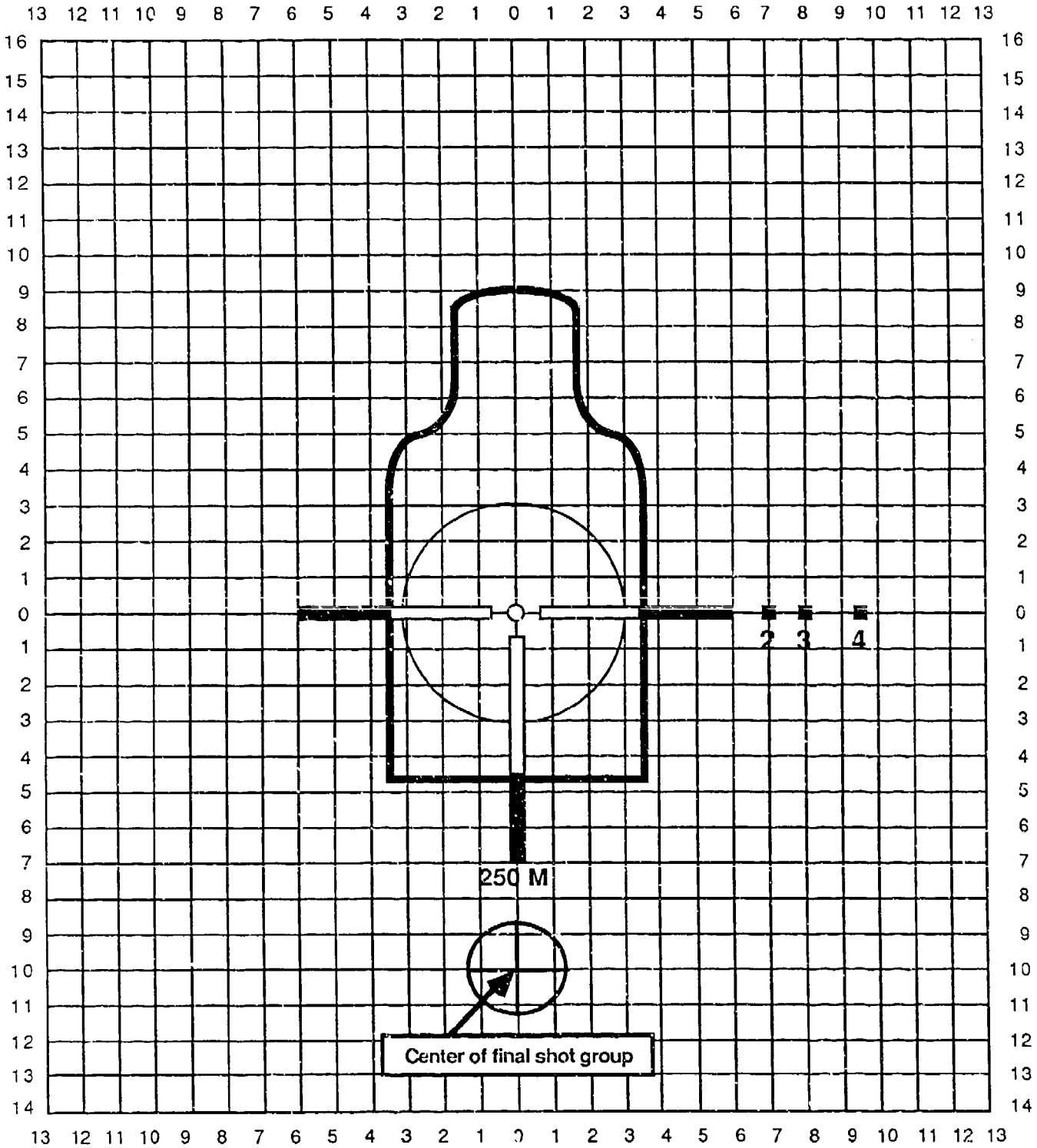
M16/M203/M79 RETICLE PATTERN



M16/M203 and M79 reticle pattern.

Enclosure 2

25 METER ZEROING TARGET FOR M16A1 RIFLE (WITH STANDARD SIGHTS)



AN/PVS-4 SIGHT PICTURE USING STANDARD 25 METER ZERO TARGET

US ARMY RESEARCH INSTITUTE
FOR THE BEHAVIORAL AND SOCIAL SCIENCES
Fort Benning Field Unit
Fort Benning, Georgia 31905

ARM 013

August 1987

LESSON OUTLINE: ADVANCED RIFLE MARKSMANSHIP

LESSON TITLE: Night Fire Training without Night Vision Devices

A. ADMINISTRATIVE INSTRUCTIONS:

1. When training will be given: As announced by training schedule.
2. Training location: As announced by training schedule.
3. Who will be trained: One Station Unit Training (OSUT) Soldiers.
4. Principal and assistant instructors: ARM Committee.
5. Training Aids: M16A1/A2 rifle, 2 magazines, 20 rounds of 5.56 mm ball and 10 rounds of 5.56 mm tracer (M196) ammunition, an M-3 Bipod, muzzle flash simulator, 4"x 4" reflecting tape, and Chart "Night Fire Techniques."
6. References: FC 23-11, Chapters 24 & 26, "Unit Rifle Marksmanship Guide," and FM 23-9, "M16A1/A2 Rifle and Rifle Marksmanship."
7. End of block test: None.

B. TRAINING OBJECTIVE:

TASK: Engage silhouette target using "over-the-sight" pointing technique.

CONDITION: During darkness, given an M16A1/A2 rifle w/ bipod, 30 rounds of ball ammunition and 15 rounds of tracer ammunition, on a range equipped with a LOMAH system or a RETS range with a 5' x 8' area target, from a prone bipod-supported position.

STANDARD: Impact 75% of rounds within an area of 5 feet high x 8 feet wide surrounding the "E" silhouette in your lane. (Standard will be 45% if tracer ammunition is not used due to dry weather conditions).

C. INTERMEDIATE TRAINING OBJECTIVES: None.

D. SEQUENCE:

1. Introduction: During this period of instruction you will be required to engage the area surrounding an "E" silhouette without the aid of a night vision device. The target mechanism (M31A1) has a muzzle flash device

affixed to simulate enemy small arms fire. As infantrymen you will be involved in numerous night operations in training and combat. You must learn and apply those necessary skills which will allow you to be effective during the hours of darkness.

2. Night fire preparation and target acquisition.
 - a. Dark adaptation.
 - b. Off-center vision.
 - c. Scanning the target area versus focusing on the target.
3. Night firing position:

NOTE: Post demonstrator.

- a. Assume a prone position.
- b. Press rifle firmly into pocket of shoulder.
- c. Apply rearward pressure using the pistol grip.
- d. Grasp handguard with the non-firing hand, index finger extended and pointed along the underside of the barrel.
- e. Align rifle and bipod with target in your lane.
- f. Look over rifle sights.
- g. Keep both eyes open.
- h. "Point" the barrel at the lower third at "what" is perceived to be the target.
- i. Use rapid semiautomatic or burst fire and make small pointing movements to adjust the impact rounds into the silhouette area.

NOTE: If using burst fire, adjust point of aim after each burst. Rapid semiautomatic fire is adjusted as needed until rounds impact in silhouette area.

NOTE: Perform live-fire demonstration and release demonstrator.

3. Conduct of fire:

- a. Firing position is the prone bipod supported.
- b. Daylight training: One magazine of 15 rounds, loaded one tracer - two ball rounds, one "E" silhouette at 75 meters. Targets will be presented for 45 seconds.

c. Night training: One magazine of 15 rounds, loaded one tracer -two ball rounds, one "E" silhouette at 75 meters. Muzzle flash simulators will be mounted at the base of each target 4" x 4" square reflecting tape will be affixed in accordance with FM 23-9. Targets will be presented for 45 seconds.

NOTE: Targets will fall when hit and return to the standing position during the allotted time.

E. CONCLUSION:

a. Recap main points.

(1) Night fire preparation and target acquisition.

(2) Night fire position.

b. Clarify student questions.

c. Closing statement: The forces we will face in a future conflict believe in night operations, therefore, the battle will continue beyond daylight hours. Your ability to fight at night effectively will determine if you ever see the dawn of the second day.

F. SAFETY RESTRICTIONS: USAIC Reg 210-4.

G. ADDITIONAL COMMENTS AND INFORMATION: In the event of dry weather conditions, ball ammunition will be used in lieu of tracer ammunition.

NIGHT FIRE TECHNIQUE
M16A1 RIFLE

Assume a prone position.

Press rifle firmly into pocket of shoulder.

Apply rearward pressure using the pistol grip.

Grasp handguard with non-firing hand extend index finger.

Align rifle and bipod with target in your lane.

Look over the sights.

Keep both eyes open.

"Point" barrel at target.

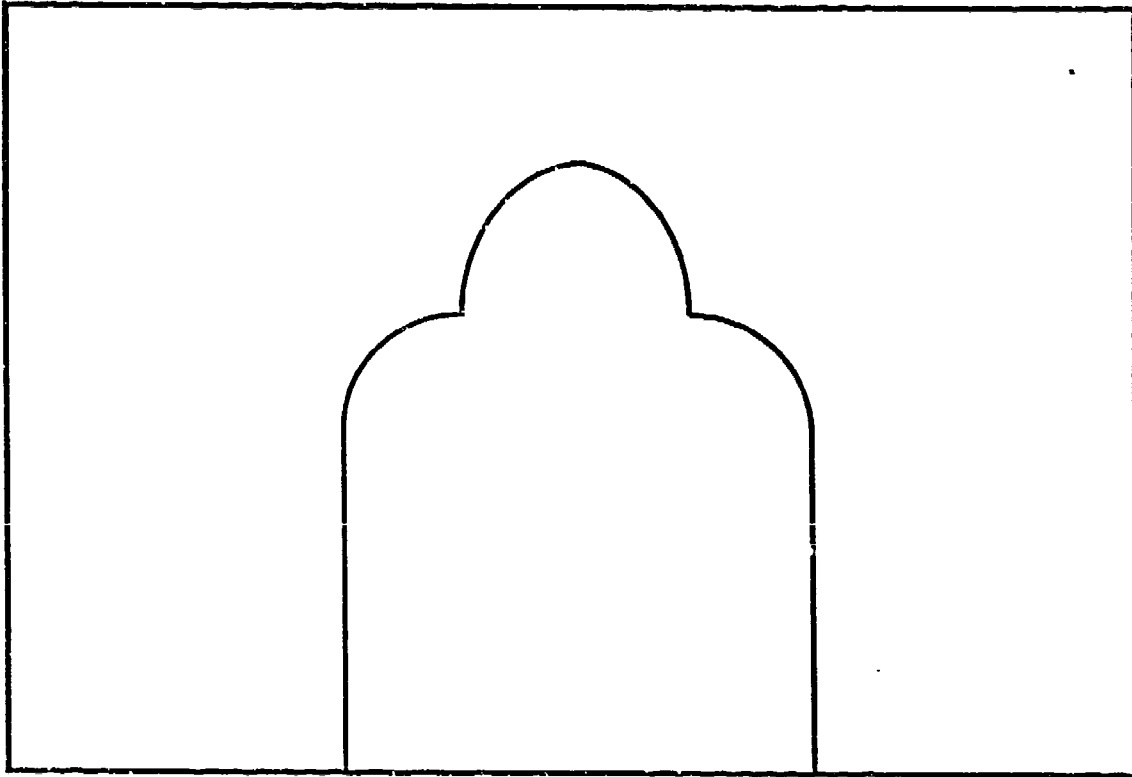
Use rapid semiautomatic or burst fire.

Make small pointing adjustments.

NOTE: If firing the M16A2 rifle, the large aperture (0-200) will be employed using daylight aiming procedures. Aiming point is center mass of the target.

Enclosure 1

Area of Target (5' x 8') for Night Fire Without Devices



Enclosure 2

APPENDIX B

INSTRUCTOR INFORMATION

PURPOSE

This instructional package is designed to provide standardized comprehensive training methods and techniques for teaching infantry OSUT soldiers those additional rifle marksmanship skills which will enhance their effectiveness on future battlefields. It is concerned with emphasizing those critical skills which every infantryman must demonstrate prior to departing from institutional training.

SCOPE

This training support package encompasses all aspects of the proposed ARM program. It incorporates proposed training objectives and standards which are to be presented during infantry OSUT. The proposed ARM training utilizes existing and proposed range facilities. Additional ammunition is required to implement the entire program. Renovations and/or modifications to some existing range complexes are necessary to implement the complete proposed ARM program.

CONDUCT OF TRAINING

The instructional format of this training program has been developed to accommodate situationally focused instruction at Fort Benning, GA. It consists of 46 hours of instruction that begins with preparatory training and progresses systematically, teaching other skills necessary to apply effective rifle fire at personnel targets under all simulated battlefield conditions. The proposed ARM POI is recommended to be given in sequence and in its entirety.

TRAINING MATERIALS

a. Required for Instruction: Lesson outlines are provided in the training package and the referenced training support package submitted and approved as a research product. Charts and training aids may be procured through Fort Benning Training Support Center (TSC). Lesson outlines required for each period of instruction are as follows:

<u>Type of training</u>	<u>Title</u>	<u>Number</u>
Remedial/concurrent training	MACS*	ARM 001
	Weaponer II*	ARM 002
25 Meter Battlesight Zeroing	25 Meter Zeroing	BRM 005
Quick Fire Training	Quick Fire	ARM 003
Suppressive/Assault Fire Training	Assault Course	ARM 004

Protective Mask Firing	Protective Mask	ARM 005
Night Fire Training	Night Fire	ARM 006 ARM 013
Moving Target Training***	Principles of Moving Target Engagement	ARM 007
	Aid to Improved	ARM 008
	Marksmanship (AIM)*	
	MACS*	ARM 001
	Weaponer II*	ARM 002
	Moving Target Practice Fire*	ARM 009
	Defense Test	ARM 010
	Range (DTR)*	
	Immediate Action**	ARM 012
	Rapid Magazine** Change	ARM 013

* Denotes "E" type handout (Enclosure 1) of Principles of Moving Target Engagement ARM 007 required as a training aid.

** Denotes used as primary, concurrent and reinforcement training.

*** Denotes lesson outlines contained in ARI research product titled, Training Support Package for Moving Target Engagement with Existing Ranges and Special Devices (Martere et al., in press-a).

b. Review/Reinforcement Training: Training will be given using primary lesson outlines and training aids. It is important that soldiers understand and can apply all critical skills prior to live fire.

EVALUATION OF STANDARDS

The proposed ARM program will embody 8 proficiency standards. Infantry OSUT graduates must have demonstrated (during practical exercises) their abilities to perform to standard at the end of each period of instruction.