

AD733384

Ne Usam... 2/2/71
[Signature]
①
100

MOVING PERSONNEL TARGETS
AND THE
COMBAT INFANTRYMAN

A thesis presented to the Faculty of the U.S. Army
Command and General Staff College in partial
fulfillment of the requirements of the
degree

MASTER OF MILITARY ART AND SCIENCE

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
Springfield, Va. 22151

by

BRUCE E. WILSON, MAJ, USA
B.S., California State Polytechnic College, 1959

Fort Leavenworth, Kansas
1971

R D D C
REFINER
DEC 8 1971
REGULATED
A

DISTRICT OF COLUMBIA
A
to release:
[illegible]

94

THESIS APPROVAL PAGE

Name of Candidate Major Bruce E. Wilson, Infantry

Title of Thesis Moving Personnel Targets and the Combat Infantryman

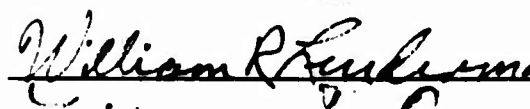
Approved by:



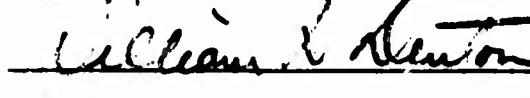
Lieutenant Colonel Thomas A. Rehm
Research and Thesis Advisor



Lieutenant Colonel Chetwin M. Hurd
Member, Graduate Research Faculty



Lieutenant Colonel William R. Lenderman
Member, Graduate Research Faculty



Major William D. Denton
Member, Consulting Faculty



Major Richard D. Hirtzel
Member, Consulting Faculty

The opinions and conclusions expressed herein are those of the individual student author and do not necessarily represent the views of either the U.S. Army Command and General Staff College or any other governmental agency.

ABSTRACT

The need to include moving personnel target training in the U. S. Army rifle marksmanship training program was the problem addressed in this thesis. This need was investigated to determine if such training is necessary to properly prepare a rifleman for combat.

The initial phase of research was to review all current U. S. Army doctrine concerning rifle marksmanship training. This established the current extent of such training. The second phase was to review all previously conducted studies pertinent to rifle marksmanship. This established what had already been investigated and identified the actions taken as a result of the studies. The third phase was to determine the extent of moving personnel target training conducted by other U. S. organizations and by foreign countries. The final phase of research investigated the need for such training to determine if a valid requirement existed. This was accomplished through literature review and personal interviews with experienced soldiers.

The findings of the study indicated that current marksmanship training doctrine does not include any practical exercise nor live fire engagement of moving personnel targets during the training of an individual rifleman. The review of previously conducted investigations revealed that the need for moving personnel target training has been established in the past. However, it has never been implemented. The absence of action suggested the existence of a restriction not identified

in the reports. Further review of associated studies tended to indicate the possible presence of engineering problems associated with the design, construction, operation and maintenance of a moving target system.

The research further revealed that other U. S. government organizations (Federal Bureau of Investigation and Marine Corps) and numerous foreign countries do conduct moving personnel target training. This finding indicated that the U. S. Army could feasibly conduct such training. The literature review and personal survey tended to support the presence of a valid need for moving target training. This was based on the expressed concern by most for the considered decline in marksmanship ability of the U. S. soldier.

The writer concluded a valid need for moving personnel target training does exist and the means to accomplish it is available.

TABLE OF CONTENTS

	Page
ABSTRACT	iii
LIST OF FIGURES	vi
LIST OF TABLES	vii
CHAPTER	
1. INTRODUCTION	1
2. PRESENTATION AND ANALYSIS OF COLLECTED DATA	11
Current Level of Training	11
Previous Investigations	20
Training Techniques of Others	47
3. ANALYSIS OF THE PROBLEM AND IT'S SOLUTION	58
Validity of the Problem	58
Analysis of the Problem	67
Solution to the Problem	70
4. CONCLUSIONS	76
APPENDIXES	79
A. Questionnaire (Allied Officers)	80
B. Questionnaire (US Officers)	82
BIBLIOGRAPHY	84

LIST OF FIGURES

Figures	Page
1. Average Number of Hits for All Targets (Trainfire)	24
2. Average Number of Misses for All Targets (Trainfire)	25
3. Derived Proficiency Scores on Marksmanship for All Groups (Trainfire)	26

LIST OF TABLES

Tables	Page
1. Training Modifications for Trainfire V	34
2. Range Configuration Values By Firing Position (MTEE)	39
3. Summary of Hits During Correlation Test (MTEE)	40

CHAPTER I

INTRODUCTION

Generally speaking, the average U.S. rifleman cannot usually hit a running enemy soldier because he is not adequately trained. Given this, the greatest deficiency in the Army's rifle marksmanship training program must be the failure to include live field firing against moving personnel targets.

The problem addressed in this thesis will be moving enemy personnel targets and the means to improve the fire effectiveness against such targets.

While serving as Army Chief of Staff, General J. Lawton Collins stated that the primary job of the rifleman is not to gain fire superiority over the enemy, but to kill with accurate aimed fire.¹ Proper marksmanship training is probably the best way to ensure that the U.S. combat soldier can deliver accurate aimed fire against the enemy encountered on the battlefield. Unfortunately, the level of most U.S. marksmanship training in time of war hardly goes beyond the educational equivalent of kindergarten.² While this level of training may have been acceptable in the past when the most important aspects probably were familiarizing the soldier with the military rifle and determining how well he could shoot, it is probably not adequate today. The earlier days of our country were characterized by a need to kill game for food, clothing,

¹John T. Corley, Colonel, "New Courses for Old Traditions," Combat Forces Journal, June 1953, pp. 14-16.

²Ashley Halsey, Jr., Editor, "Can U.S. Troops Still Shoot?" The American Rifleman, December 1969, p. 20.

and money and to protect oneself from the many dangers that threatened the early settlers. During this period, most men were accustomed to killing a living target and this experience was easily translated to the battlefield. Today, however, it is necessary to provide a transition from range shooting to combat.³ This transition has been attempted by implementing the Trainfire pop-up silhouette type targets and training program as the standard rifle marksmanship course.

The relationship between the marksmanship ability of the shooter with hunting experience, and the one without, was noted during a recent experiment conducted by the Experimentation Command of Combat Developments Command (CDCEC). It was found that the number of hits scored by firers with hunting experience was significantly greater than the hits scored by non-hunters when firing at moving targets.⁴ Therefore, since all soldiers are not hunters, the Army should accept the responsibility for training it's riflemen to hit a moving personnel target.

It appears that the need for well qualified marksmen will continue to be great. Noted military historian, Brigadier General S.L.A. Marshall, has identified Vietnam as being uniquely a rifleman's war. He found that in casualty producing impact, rifle fire is the predominating force as an excess of 70 per cent of the casualties inflicted and received on both sides are caused by rifle bullets.⁵

³Howard C. Sarvis, Motile Targets (Unpublished manuscript on file at Human Resources Research Organization (HumRRO), Ft Benning, Georgia), 1953.

⁴U.S. Army Combat Developments Command, Experimentation Command (CDCEC), Moving Target Exploratory Experiment (MTEE) (Draft), Fort Ord, California, 1 July 1970, p. V-2-K-13.

⁵S.L.A. Marshall, Brigadier General, USA, (Retired), "Can U.S. Troops Still Shoot? Part III: Vietnam: The Short-Range War," The American Rifleman, December 1969, pp. 26-27.

According to General Marshall and Lieutenant Colonel David Hackworth, the ability of U.S. riflemen to effectively hit enemy personnel is poor. An analysis of several hundred small unit contacts in Vietnam revealed that the American soldiers firing their M-16 rifles would, in the overwhelming majority of cases, miss a target fully in view. The results of these actions were about the same whether the firing was done in an ambush or by a moving point --- five total misses out of six tries!⁶ A survey of the infantry officers attending the 1970-71 class at Command and General Staff College revealed that over 90 per cent of the officers felt there was a need to improve small arms fire effectiveness. The results of this survey represent over 145 years of combat experience at infantry battalion level or below.⁷

An analysis of the American fighting man by author, professor, and military historian, Victor Hicken, revealed that military rifle marksmanship training has declined over the past fifty years.⁸ It seems that a decrease or de-emphasis of marksmanship training should not be allowed at this time. All marksmanship training should continually be reviewed and modernized to remain current with the latest weapons and changing combat situations, and to meet the needs of the individuals being trained. Generally speaking, today's recruit has less pre-service experience with a rifle than his predecessor due to the changing environment, increased population, and resulting trend towards urbanization. This decrease in pre-service rifle experience, which was apparently

⁶Department of the Army, DA Pamphlet 525-2, Military Operations: Lessons Learned: Vietnam Primer, 21 April 1967, p. 15.

⁷Reference Appendix B, this report, for complete results.

⁸Victor Hicken, The American Fighting Man, New York: Macmillan Co., 1969, p. 167.

dominated by hunting, has considerably reduced the number of soldiers that have experience in shooting at live, moving targets. This indicates a need to expand the current rifle marksmanship program to include live firing against moving personnel targets. This need is further supported by the survey of infantry officers attending Command and General Staff College.⁹ Over 90 per cent stated that moving targets were the type most frequently detected during combat operations while only 40 per cent responded that moving targets were the most frequently hit. The fact that moving targets are more easily detected than stationary ones is contained in U.S. Army documents. The final phase of target detection training intended to assist detection is characterized by rapid movement of the target.¹⁰ Yet, it appears that training to hit a moving target does not receive adequate emphasis.

The basic rifle marksmanship course does not include live firing against moving personnel targets.¹¹ Failure to emphasize marksmanship training designed to prepare a rifleman to hit battlefield targets seems to be both illogical and irresponsible on the part of the Army. The Sniper Instructor Training Course presented by the Army Marksmanship Training Unit at Fort Benning does, however, recognize that a moving target is the most difficult type of target to hit.¹² This information adds to the confusion of why it is not stressed during individual training of the rifleman

⁹Reference Appendix B, this report, for complete results.

¹⁰Department of the Army, Army Subject Schedule 23-72, M16A1 Rifle Marksmanship (Draft Revision Copy), October 1970.

¹¹Army Subject Schedule 23-72, loc. cit.

¹²U.S. Army Marksmanship Training Unit, Lesson Outline GMU 22, Engaging Moving Targets, Fort Benning, Georgia, October 1970, p. 1.

who will probably be the one most frequently faced with a moving target situation -- a situation that could result in either life or death. The results of the experiment conducted by Combat Developments Command, Experimentation Command (hereinafter referred to as CDCEC), showed a decrease in performance of over 50 per cent when shooting at a moving silhouette target as opposed to the same target in a stationary mode.¹³

Certain deficiencies in the Army's rifle marksmanship training program have been identified by members of the military and of civilian associations concerned with the furtherance of good marksmanship among our soldiers. This is evidenced by several recently appearing articles such as these titled "Our Needless Human Sacrifice: Ill-Trained Riflemen in War"¹⁴ and "Viet Vet Confirms M16 Training Needed."¹⁵ While these articles do not directly address the problems of moving personnel target training, they are concerned with the need for thorough marksmanship training for a rifleman prior to his commitment to battle. It is difficult to accurately isolate the contribution or detractor of a specific aspect of training when judging from the overall results achieved. However, exposure to realistic moving target situations could ease the soldier's transition from the rifle range to the battlefield.

It may appear from the foregoing that the Army has been totally inactive in pursuing improved rifle marksmanship techniques. Since this is not true, it would be inaccurate not to mention the numerous studies

¹³CDCEC, Moving Target Exploratory Experiment (MTEE) (Draft), op. cit., p. V-2-K-6.

¹⁴Ashley Halsey, Jr., Editor, "Our Needless Human Sacrifice: Ill-Trained Riflemen in War," The American Rifleman, December 1969, p. 16.

¹⁵Irwin H. Baeder, "Viet Vet Confirms M16 Training Needed," The American Rifleman, March 1970, p. 8.

and experiments conducted over the past twenty years that have resulted in modifications to the rifle marksmanship program.

Trainfire I conducted in 1954 was probably the most significant study in marksmanship techniques ever conducted. This resulted in elimination of the known distance, bull's-eye type marksmanship training and replaced it with the more realistic pop-up silhouette type targets randomly located at unknown ranges. Unfortunately, the moving target phase of the training was dropped from Trainfire when it was implemented Army wide as the new standard course. While improved scores were recorded by the test subjects when firing at moving targets, they did not represent a statistically significant improvement over the scores of the conventionally trained test subjects.¹⁶ This appears to have been the basis for discarding the moving target training.

Trainfire V was conducted in 1956 to determine the results obtained by increasing selected portions of the Trainfire course. This was prior to the Army wide implementation of Trainfire. The moving target phase was not specifically addressed. However, firing at moving targets was a part of the proficiency test. The results showed no significant improvement in scores based upon increased training. However, upon repetition of the proficiency test, a significant improvement was recorded on the third administering of the test.¹⁷ This indicates that added practice in firing against moving targets could possibly increase the number of hits.

¹⁶Human Resources Research Organization (HumRRO), Technical Report 22, Trainfire I: A New Course in Basic Rifle Marksmanship, Fort Benning, Georgia, October 1955, p. 38.

¹⁷Human Resources Research Organization (HumRRO), Research Memorandum, Trainfire V: Extension of Research of Trainfire I Rifle Marksmanship Course, Fort Benning, Georgia, November 1959, p. 13.

It was finally recommended in 1962 that training and practice in firing at moving personnel targets should be conducted. This resulted from the Performance Evaluation of Infantry Advanced Individual Training Graduates study conducted by Human Resources Research Organization (hereinafter referred to as HumRRO) at Fort Benning. It was found that satisfactory engagement of moving targets was approached only when the test subjects were firing from foxholes at targets at ranges of fifteen to thirty meters. It was concluded that the noted deficiencies in performance could be corrected by suitable emphasis in weapons training.¹⁸ This recommendation was never implemented.

During the time of increased action and involvement in Vietnam, a decrease in time, money, and stability of personnel probably contributed to a slowdown in marksmanship oriented research. Minor effort was continued by some Army agencies, but nothing of any major significance appeared again until 1970. The importance of operations in Vietnam was diminishing and several of the "lessons learned" were beginning to appear with disturbing repetition. Renewed interest and activity concerning marksmanship research and specifically moving targets was initiated.

Responsibility to design a moving personnel target experiment and range to be used in the evaluation of the XM-19 serially fired flechette rifle (SFR) was assigned to CDCEC at Fort Ord. The design of the experiment and range had to enable measuring at least a 25 per cent difference in fire effectiveness between the XM-19 SFR and the M16A1 rifle.¹⁹ A literature review conducted by CDCEC to obtain information concerning previous moving personnel target ranges revealed that little

¹⁸Human Resources Research Organization (HumRRO), Technical Report 81, Performance Evaluation of Light Weapons Infantrymen (MOS 111.0), Graduates of the Advanced Individual Training Course (ATP 7-17), Fort Benning, Georgia, December 1962, p. ix.

¹⁹CDCEC, Moving Target: Exploratory Experiment (MTEE) (Draft), op.cit., p. V-2-J-3.

had ever been done in this area. Consequently, CDCEC conducted a "running man" test to determine the speed for the target to move.²⁰ The requirement for newly developed rifles to possess certain characteristics that increase their hit probability when engaging moving personnel targets indicates recognition again by the Army that this type of target is prevalent on the battlefield.

Rifle marksmanship training research was begun at Fort Benning about the same time as the above experiment on range design was being conducted at Fort Ord. The investigations were conducted by a newly formed organization within the Weapons Department of the Infantry School called the Rifle Marksmanship Evaluation Study Group (hereinafter referred to as RMESG).²¹ One of the subtests conducted by this group investigated various training procedures for engaging moving targets and evaluated firer performance against moving personnel targets. The conclusions of the RMESG were that there is a need for moving target training and that additional testing of training devices and range requirements should be conducted.²² The testing by the RMESG was done in close collaboration with the HumRRO unit at Fort Benning that had conducted the Trainfire experiments and had determined during tests in 1962 that moving target training was needed.²³ So again, nearly ten years later, a similar recommendation appeared. At the time of this writing, however, the paper by RMESG had not been approved nor become official U.S. Army Infantry School doctrine.

²⁰CDCEC, Moving Target Exploratory Experiment (MTEE) (Draft), op.cit., p. V-3-H-1.

²¹Charles Askins, Colonel, USA (Retired), "Marksmanship Training Changes Tested," Army Times, 2 December 1970, p. 40.

²²U.S. Army Infantry School, Moving Target Training (Working Copy-Draft Only), Rifle Marksmanship Evaluation Study Group, Weapons Department, USAIS, Fort Benning, Georgia, December 1970, p.5.

²³HumRRO, Technical Report 81, Performance Evaluation, loc.cit..

The preceding pages have traced some of the attitudes that have prevailed over the past several years concerning moving targets. Some of the significant actions and non-actions have also been discussed. The most significant aspect of the preceding is that it appears the Army is not adequately training riflemen to effectively hit moving personnel targets. For this reason, the writer considers the need to investigate the requirement for such training to be of urgent importance.

The research presented in this thesis was conducted basically in four phases. The presentation is designed to support a hypothesis that the U.S. Army does need to include an extensive moving personnel target training program within its current rifle marksmanship course.

The initial phase of research was to determine the extent, if any, of the moving personnel target training currently being presented within the U.S. Army. This data was obtained by a review of all pertinent government publications. This included contacting the Infantry School to obtain the latest doctrine and draft copies of revised Army subject schedules concerned with rifle marksmanship training. The Infantry School is the proponent agency for the Army rifle marksmanship training program.

The second phase of research was an examination of the results of previously conducted studies, evaluations, or experiments that had been concerned with marksmanship training. This review extended in time back to the Trainfire I report titled "A New Course in Basic Rifle Marksmanship," dated October 1955, and up through a preliminary draft containing the results to date of the experiments currently being conducted by the RMESG. The scope of the reports ranged from a technical report of a moving personnel target system through the CDCEC exploratory

experimentation of a moving personnel target range designed for weapons evaluations to a complete evaluation of the rifle marksmanship training course.

The third phase of research was a study of methods of rifle marksmanship used by the other U.S. military services and government agencies and by several foreign countries. This information was obtained primarily by conducting interviews with the personnel of the liaison offices at the Command and General Staff College and by questionnaires completed by the many allied students attending the college. Numerous foreign and other U.S. government publications were also reviewed as a source of information for this phase.

The fourth phase of research was to obtain many varied sources of material for review. The purpose of this phase was twofold: (1) to determine the existing state of training and practical ability of the U.S. Infantryman to effectively engage moving enemy personnel and (2) to determine the considered need for moving target training based on the predominance of these type targets on the battlefield. The majority of information collected during this phase was subjective or judgmental in nature and was dictated by necessity based on an absence of scientifically supported data due to the difficulty of measurement. The sources of information for this phase included professional magazines and newspapers, military history books, and personal interviews and questionnaires.

The collected information was compared and analyzed throughout all phases of the research. Analysis of the problem resulted in determination of a solution to the problem and specific conclusions concerned with moving personnel target training.

CHAPTER II

PRESENTATION AND ANALYSIS OF COLLECTED DATA

The purpose of this portion of the research was to identify the present level of moving target training, examine previous work done concerning this subject, and determine the training techniques used by others. This was accomplished by literature survey and personal interview.

Current Level of Training

A review of official Department of the Army publications was conducted to determine the current extent of moving personnel target training being presented within the U.S. Army and the current doctrine concerned with the presence of these targets on the battlefield. The pertinent publications identified during this review include the following:

- (1) Army Subject Schedule 23-72, M16A1 Rifle Marksmanship;
- (2) Army Subject Schedule 23-73, Advanced Rifle Marksmanship;
- (3) Field Manual 23-71, Rifle Marksmanship;
- (4) Field Manual 23-12, Technique of Fire of the Rifle Squad and Tactical Application;
- (5) Field Manual 21-75, Combat Training of the Individual Soldier and Patrolling; and
- (6) Marksmanship Training Unit Lesson Outline GMU 22.

The basic Army document that specifies the extent of training presented within a certain course of instruction is the Army subject schedule. Upon checking with the U.S. Army Infantry School to confirm the accuracy of the material content of the documents located at Fort

Leavenworth, it was found in some cases that only a draft copy of the latest procedures was available -- even though already implemented Army wide. Therefore, the draft or revised copies were used for reference in order to present the most current policy.

The Army subject schedule that prescribes the M16A1 rifle marksmanship instruction presented during basic individual combat training is currently a revised draft version dated October 1970.¹ It was implemented in all Army training centers on 25 January 1971.² The stated training objective is to instill, maintain, and develop in the trainee the confidence and ability to detect and successfully engage enemy targets ... under combat conditions The training consists of eighty-four hours divided into twenty-three separate instructional periods. The only moving target training is presented during the target detection phases of periods 10, 11, and 17. This training consists of a conference, demonstration, and practical exercise in locating and marking moving targets and instruction in target engaging factors.³ Of the total five hours of instruction concerned with moving targets, the majority of time is directed towards the detection and marking aspects rather than the problems of target engagement. It appears that the training emphasis is incorrectly placed on target detection rather than on the techniques of engagement. A moving object is normally more easily detected than one that is stationary. Conversely,

¹Department of the Army, Army Subject Schedule 23-72, M16A1 Rifle Marksmanship (Draft Revision Copy), October 1970, p. 1.

²Based on personal correspondence between Captain Ronald E. Saxton, Project Officer, Rifle Marksmanship Evaluation Study Group, Weapons Department, U.S.A. Infantry School, Fort Benning, Georgia, and the writer. 10 February 1971.

³Army Subject Schedule 23-72, op. cit., pp. 1, 4, 8, and 10.

a moving object is normally more difficult to hit with aimed rifle fire than a stationary object.

It seems that effective training of a soldier in the performance of a physical skill would normally require more instruction than lecture and demonstration alone. A soldier given the additional opportunity to do something himself and to practice firing at an actual moving target is most likely to be well trained in that skill. Detection alone is not adequate to kill an enemy soldier on the battlefield -- it usually takes a bullet. Yet, the present basic rifle marksmanship program does not provide for firing a single round at a moving target. Therefore, since firing at moving targets is not included in the basic marksmanship course presented to all U.S. Army inductees during basic combat training, moving target firing could possibly be added during more advanced training. But this is not the case as revealed during the review of Army Subject Schedule 23-73, M16A1 Advanced Rifle Marksmanship (Draft Manuscript), dated December 1969.

The marksmanship training contained in Army Subject Schedule 23-73 is presented during Infantry advanced individual training (AIT). The purpose of Infantry advanced individual training is to train soldiers in advanced combat skills necessary for the Light Weapons Infantryman (MOS 11B). The marksmanship training is primarily oriented towards automatic fire and the individual techniques of fire used when functioning as part of a tactical unit. The objectives emphasize the need to fire effectively in combat when engaging enemy personnel.⁴

⁴Department of the Army, Army Subject Schedule 23-73, M16A1 Advanced Rifle Marksmanship, (Draft Manuscript), December 1969, p.1.

The need for riflemen to be able to hit enemy personnel targets in combat seems to occur frequently. A good opportunity for the Army to prepare the frontline rifleman to do his vital job of shooting could be during advanced rifle marksmanship training. Moving enemy personnel targets do appear on the battlefield and therefore our riflemen should be trained to hit these type of targets. However, during advanced rifle marksmanship training, the total amount of any moving target instruction is restricted to approximately a five minute presentation during a sixty-five minute review of target detection techniques presented during the fourth period.⁵ The advanced rifle marksmanship course consists of twenty-four hours of training presented during seven periods of instruction.⁶

In the advanced rifle marksmanship course as in the basic course, emphasis appears to be placed in the wrong area. While the importance of automatic rifle fire should not be minimized, the importance of effective engagement of moving targets should also be recognized. The primary use of automatic fire in combat is normally in a supporting role to help overwhelm the enemy with a high volume of fire. This assists in forcing the enemy to seek cover so that riflemen may maneuver to a position to kill the enemy with aimed fire. The above point of view may be contested by some due to the automatic fire capability of the M16A1 rifle and it's frequent use in Vietnam. Some feel that the high volume of fire resulting from automatic firing accounts for

⁵Based on personal correspondence with Captain Ronald E. Saxton, op. cit.

⁶Army Subject Schedule 23-73, op. cit., pp. 2-7.

the majority of our battlefield kills. Actually many rounds fired during a burst of automatic fire do not strike near their target due to the climb characteristics of the M16A1 rifle. This tends to refute the feeling that automatic fire accounts for so many kills. Regardless of the tendency in Vietnam to "hose down" the area with automatic fire or to use spray fire techniques, the U.S. follows the aimed fire concept of rifle marksmanship training and tactical employment.⁷ Automatic rifle fire techniques are not incorrectly presented during advanced rifle marksmanship training, however some time could be devoted to live fire engagement of moving personnel targets. This training course originally had an eighth and ninth period of instruction during which the rifleman fired on a reaction course that included moving personnel targets. But these two periods were deleted prior to implementation.⁸ This reaction course allowed up to forty rounds of ammunition to be expended by each man and possibly could have invaluable contributed to a soldier's preparation for meeting a live enemy on the battlefield.

Army doctrine concerning moving personnel targets is located in Field Manuals 23-12 and 23-71. Both of these are used as references for Army Subject Schedules 23-72 and 23-73. The purpose of Field Manual 23-12, Technique of Fire of the Rifle Squad and Tactical Application, is to prescribe the basic techniques and standing operating procedures that enable rifle squads to operate as effective teams in their

⁷Jac Weller, "Accuracy is Everyone's Aim," The American Rifleman, January 1970, p. 24.

⁸Army Subject Schedule 23-73, op. cit., pp. 8, 16, 17, 23 and figures 3 through 5, and personal correspondence with Captain Ronald E. Saxton, loc. cit..

application and control of fire.⁹

This manual establishes that detection of most combat targets is prompted by smoke, flash, dust, noise, or movement, and they are normally seen only fleetingly.¹⁰ This emphasizes the need to have riflemen trained to effectively engage the fleeting or moving target. Effective engagement of such targets can be achieved only through proper training and experience in shooting. The increased difficulty of hitting moving personnel targets is realized by the recognition that special aiming considerations are required to obtain a hit. The direction of target movement and its speed affect the amount of lead required. The range to the target and the muzzle velocity of the weapon being used must also be considered when figuring the aiming lead required for the target.¹¹ The determination of simply where to aim is extremely complex when so many different factors must be considered. A nearly impossible situation is created when these factors are combined with the element of time of target exposure which is normally only a matter of seconds and with the confusion and anxiety common to the battlefield. However, the criticality of this situation can be reduced considerably by training. With adequate training, a soldier becomes confident in himself, his equipment, and his unit. This either reduces or eliminates the significant factor of anxiety. Training further reduces the target considerations of speed, direction of movement, and range plus the muzzle velocity factor to a reaction type situation.

⁹Department of the Army, Field Manual 23-12, Techniques of Fire of the Rifle Squad and Tactical Application, 10 October 1967, p. 1.

¹⁰Field Manual 23-12, op. cit., para.3.b.

¹¹Field Manual 23-12, op. cit., para. 52.d.(2) and 55.d.(2).

Thus, the situation is changed from potential disaster to one of potential success. Realistic training is probably the single most important contribution to success in combat.

A field target firing range is described in the range facilities section of the chapter on training. The range is one that can be constructed by most units and it includes a moving personnel target consisting of an E-type silhouette target mounted on a four wheeled dolly. It is powered by a cable connected to a hand cranked reel. A second type of moving target is one that is suspended from a clothesline type cable utilizing a similar power arrangement.¹² It is both encouraging and disappointing to know that the need for moving target training is recognized even if not adequately acted upon.

Field Manual 23-71, Rifle Marksmanship, identified three types of combat targets: (1) stationary, (2) rapidly moving, and (3) slowly moving.¹³ This field manual is the reference used primarily for the target detection phase of training. The most easily detected combat target is a fast, laterally moving one while the targets most difficult to detect are stationary. Therefore, it is logical to assume that moving targets will be the most frequently detected. This emphasizes the need for our riflemen to be trained to hit such targets. It is interesting to note that the tactical training of U.S. soldiers stresses the point that movement against a stationary background stands

¹²Field Manual 23-12, op. cit., para. 69.c.(1)(d).

¹³Department of the Army, Field Manual 23-71, Rifle Marksmanship, 8 December 1966, para. 7.

out clearly and should be avoided if at all possible.¹⁴ This tends to confirm the idea that moving targets are the most easily detected.

The documents described above are applicable to all of our U.S. Infantry soldiers as they pertain to instruction presented during basic and advanced combat training.

A review of specialized marksmanship training reveals that there is an eight-hour lesson on engaging moving targets presented as part of the sniper instructor course. It is stated in the lesson outline for this course that moving targets are frequently present in combat and are the most difficult type to hit. The information presented during this course is very specific concerning the amount of aiming lead required. A full-lead for a walking man at one hundred meters range is 6-½ inches while it is twenty inches if the man is running. Three categories of leads are defined as full-lead, half-lead, and no-lead targets depending upon the angle of target presentation to the firer. The required leads appear easy enough to understand, but the actual hitting of the moving target is quite another matter.¹⁵ This sniper course is taught by the U.S. Army Marksmanship Training Unit at Fort Benning. Some of the top rifle marksmen in the world are members of this unit. The complex factors identified by the Marksmanship Training Unit that contribute to the difficulty of hitting a moving target are similar to those contained in Field Manual 23-12.

In summary, current U.S. doctrine stresses the difficulty associated with hitting a moving target and the ease with which these

¹⁴Department of the Army, Field Manual 21-75, Combat Training of the Individual Soldier and Patrolling, 10 July 1967, para. 7.

¹⁵U.S. Army Marksmanship Training Unit, Lesson Outline, GMU 22, Engaging Moving Targets, Fort Benning, Georgia, October 1970, pp. 1-3.

type of targets are detected. Therefore, a target is presented on the battlefield that is easy to detect, yet difficult to hit. Since detection or identification of a target is considered to be one of the most difficult tasks facing the rifleman, a reasonable action would be to properly train men to hit those targets most easily detected -- moving targets. This is not the case, however, as not a single round is allocated to firing at a moving target during either basic or advanced rifle marksmanship. It is illogical to devote training time to tasks that are more simply accomplished while virtually ignoring the difficult ones. Yet, this appears to be the current Army approach to rifle marksmanship training concerning moving personnel targets.

Previous Investigations

A review of reports published during recent years reveals that the Army has conducted numerous studies concerning moving personnel targets. Some of these studies have been oriented specifically towards moving targets and others have included moving targets as a part of an overall marksmanship evaluation or experiment. The interest and resulting activity concerning this subject seems to be cyclic depending upon the degree of U.S. involvement in active combat. A complete evaluation of the Army marksmanship training program was ordered immediately following the Korean War. This order resulted in the extensive Trainfire studies that were begun in 1953. Similar evaluations of marksmanship training were started in 1970 and are still in progress. These current evaluations follow several years of involvement in Vietnam.

A presentation and discussion of the significant results obtained from selected studies will follow. Inclusion of experimentation techniques followed during the conduct of the studies will be restricted to only that essential information necessary to assist the reader in better understanding of the results.

The most extensive study reviewed was the Trainfire I experiment conducted by the Human Resources Research Organization (HumRRO) located at Fort Benning, Georgia.¹⁶ The purpose of the Trainfire I research was: (1) to develop a practical basic course of rifle marksmanship instruction designed to prepare the soldier to use his rifle effectively in combat, and (2) to develop proficiency tests, based upon combat

¹⁶Human Resources Research Organization (HumRRO), Technical Report 22, Trainfire I: A New Course in Basic Rifle Marksmanship, Fort Benning, Georgia, October 1955.

criteria, to measure the adequacy of this training. The development of this purpose was based upon several studies indicating that the rifle had not been used effectively in combat within recent years. Comprehensive analyses of the situations confronting the rifleman in combat provided the bases for developing an experimental course of training and two proficiency tests (marksmanship and target detection). To evaluate the experimental Trainfire course, three groups of trainees were used. Two of these groups were trained at Fort Benning, one under Trainfire and the other under the conventional black on white bull's-eye method. The third group underwent conventional training at Fort Jackson and was moved to Fort Benning for the evaluation phase. All three groups were tested on a Trainfire type marksmanship range that none -- to include the experimental group -- had been previously exposed to. Additionally, each group was tested on a target detection range. The results showed that the experimental group was overall the most proficient in detecting and marking targets, estimating ranges, and hitting the targets. The conclusion was that the experimental Trainfire course better prepares an Infantryman for combat.¹⁷ The above briefly described the entire experiment. The following will address certain pertinent details and isolate those aspects specifically pertaining to moving personnel targets.

At the beginning of this research, HumRRO interviewed several Infantry combat veterans in order to arrive at certain premises concerning combat marksmanship conditions found on the battlefield.

¹⁷HumRRO, Trainfire I, op. cit., p. iii.

One of these premises determined to be valid was that indications given by enemy personnel targets are usually fleeting and consist of such clues as smoke, flash, dust, noise, or movement.¹⁸ This premise was used as the basis for the development of the target detection phase of the experimental course. No such training was presented as part of the conventional training that consisted primarily of known distance firing. The experimental course emphasized firing at realistic personnel targets placed in simulated combat positions. As the experimental course was developed, three fundamental principles of combat marksmanship were determined. These were basically that the combat rifleman's targets consist of: (1) enemy personnel, (2) normally within three hundred yards, and (3) that his effectiveness as a rifleman depends upon his ability to neutralize individual targets. The rifleman's tasks were identified as threefold: (1) detecting the target, (2) aiming the rifle, and (3) firing the rifle. The individual instruction required to develop the essential skills in a rifleman to accomplish the above tasks called for the use of four different targets. They were identified as (1) randomly appearing stationary surprise silhouette, (2) approaching surprise silhouette, (3) retreating surprise silhouette, and (4) laterally moving surprise silhouette.¹⁹ The underlining of the preceding type targets was added by the author to emphasize the importance of moving targets. Three out of the four types of targets were simulated moving personnel.

This recognized need for realistic combat targets prompted the development of the electrically powered, stationary pop-up target

¹⁸HumRRO, Trainfire I, op. cit., p. 10. ¹⁹Ibid., p. 17.

mechanism that presents a camouflaged silhouette that "kills" when hit. A hand-powered, cable-pulled, track-mounted carriage was also developed to present the moving target simulating a human figure quickly changing positions during combat.

The experimental course consisted of seventy-four hours divided into eighteen separate training periods. Moving target instruction was presented during three different four hour periods of instruction. This included allocating twenty-four rounds of ammunition for firing practice at moving personnel targets.²⁰

The training of the three groups of soldiers by either the conventional or Trainfire methods was followed by the administering of two separate proficiency tests. One was designed to measure the marksmanship ability of an individual rifleman to hit an enemy personnel target in a combat environment. The other was to measure his ability to detect such targets in a combat environment.

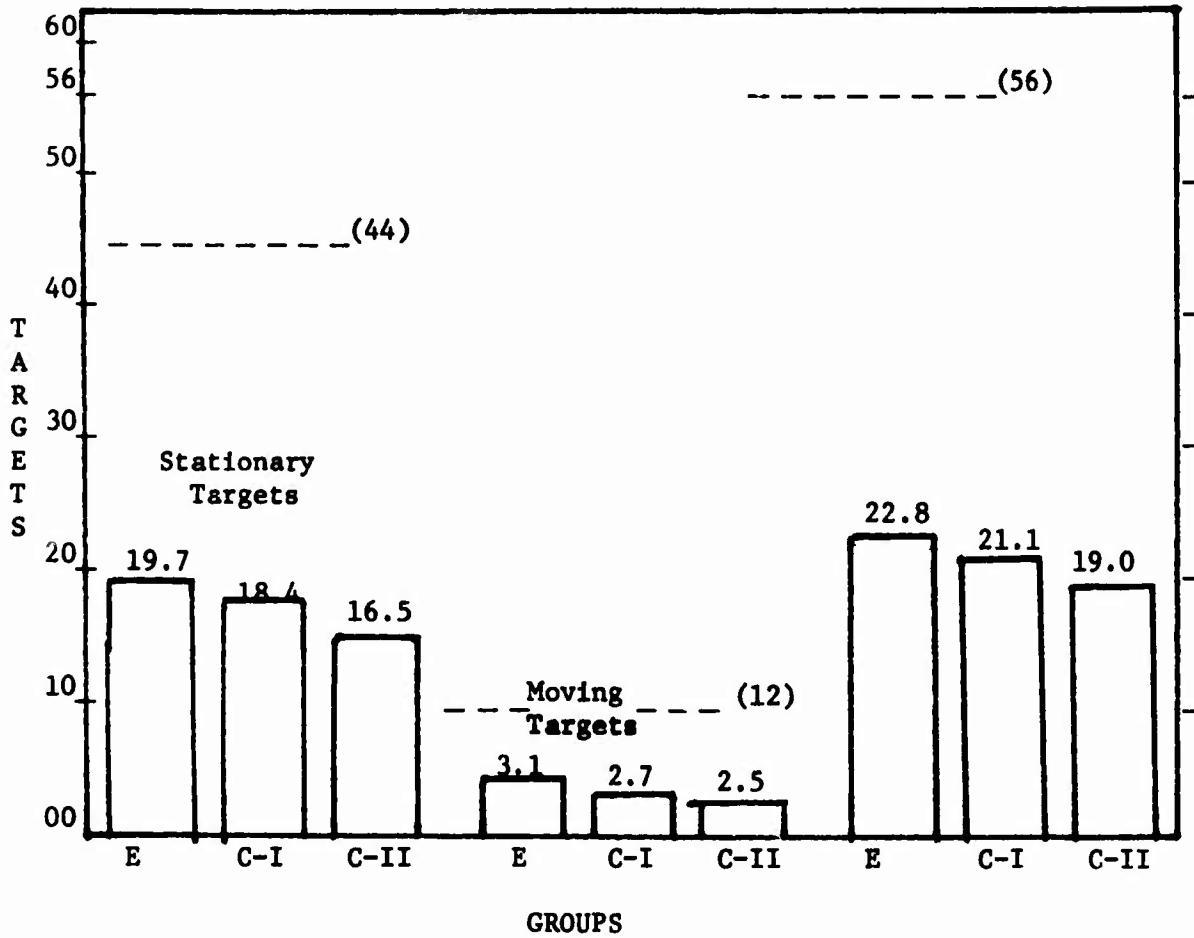
Trainfire type silhouette targets were used on the marksmanship proficiency test range. The range included laterally moving personnel targets placed at ranges of one hundred and three hundred yards.²¹ The test consisted of fifty-six total target exposures. Of the total exposures, twelve were moving. The marksmanship data obtained was analyzed in terms of number of target hits, target misses, and the resulting derived proficiency scores obtained by subtracting the misses from the hits.²² This information is presented graphically in figures 1 through 3. The

²⁰HumRRO, Trainfire I, op. cit., pp. 20-21, 86 and 96.

²¹Ibid., p. 26.

²²Ibid., p. 33.

Figure 1

AVERAGE NUMBER OF HITS FOR ALL TARGETS²⁴

NOTE: Numbers in parentheses () indicate target exposures.

Legend for figures 1 through 3.

E = Experimentally trained Trainfire group.

C-I = Control group trained at Fort Benning.

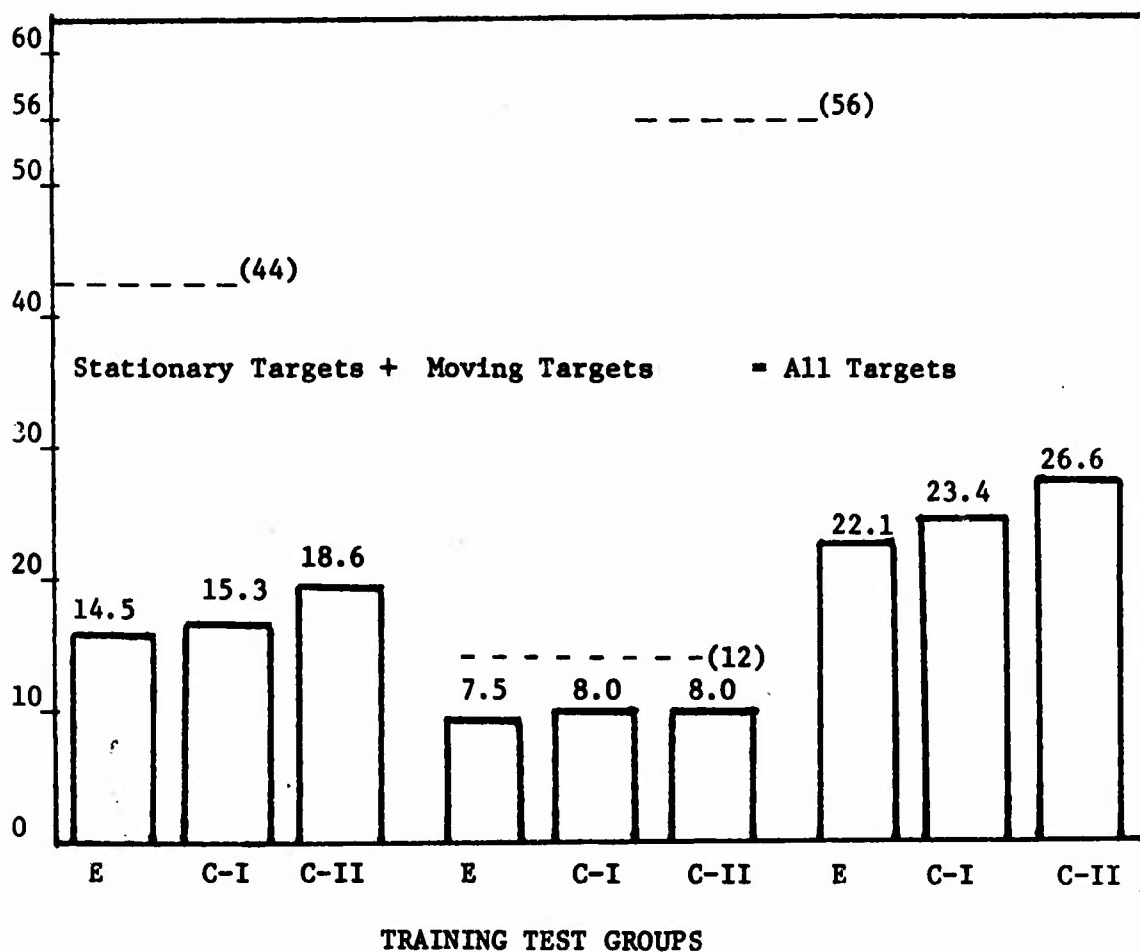
C-II = Control group trained at Fort Jackson.

= Indicates a significant difference

²⁴Trainfire I, op. cit., Tables A-3, 5, and 7, pp. 57-58.

Figure 2

AVERAGE NUMBER OF MISSES FOR ALL TARGETS²⁵



NOTE: Numbers in parentheses () indicate target exposures.

LEGEND: E = Experimentally trained Trainfire group.

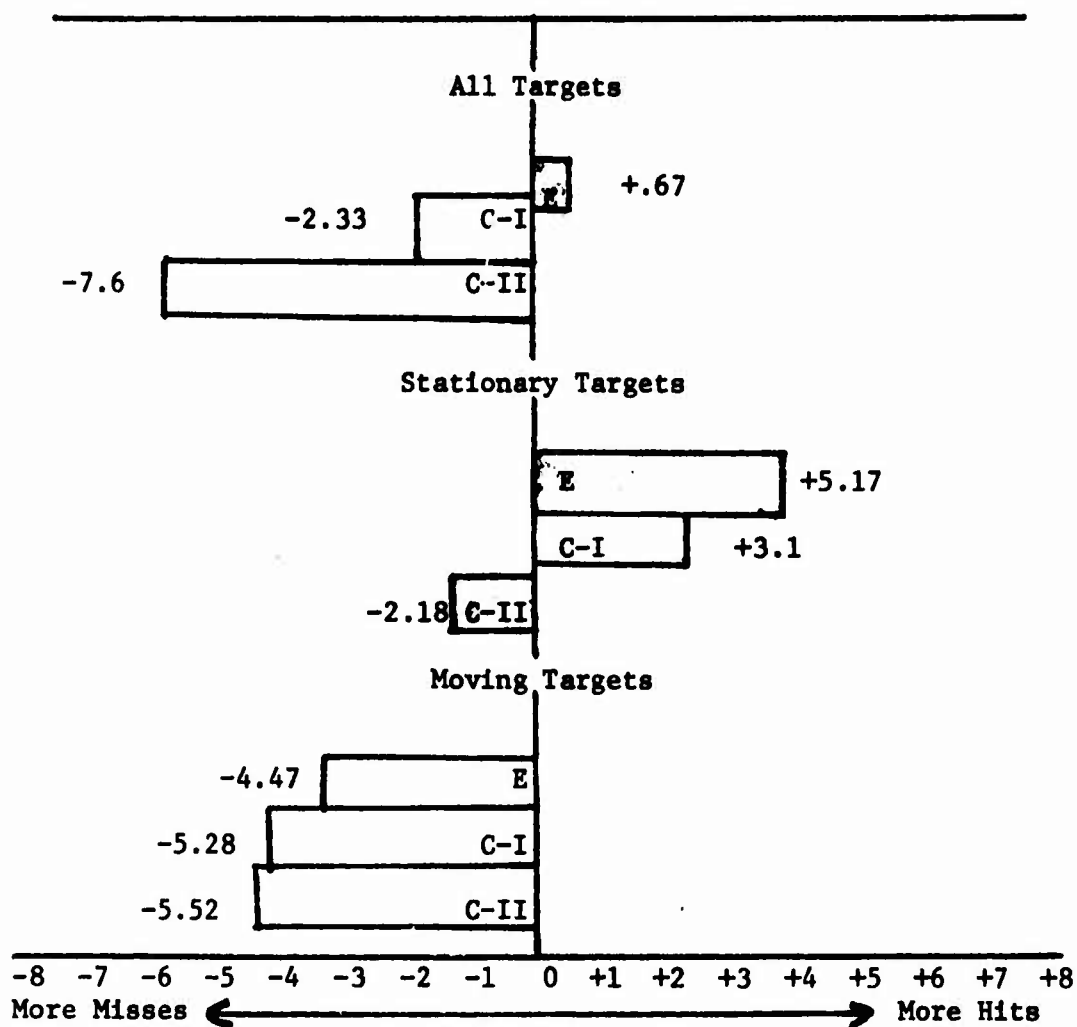
C-I = Control group trained at Fort Benning.

C-II = Control group trained at Fort Jackson.

= Indicates a significant difference.

²⁵Trainfire I, op. cit., Tables A-3, 5 and 7, pp. 57-58.

Figure 3

DERIVED PROFICIENCY SCORES ON MARKSMANSHIP FOR ALL GROUPS²⁶

LEGEND: E= Experimentally trained Trainfire group.

C-I = Control group trained at Fort Benning.

C-II = Control group trained at Fort Jackson.

= Indicates a significant difference.

²⁶Trainfire I, op. cit., Tables A-3, 5 and 7, pp. 57-58.

statistical analysis of the data showed that the Trainfire experimental group obtained a significantly greater average number of hits than either of the conventionally trained control groups.²³

In summary, the experimentally trained group proved superior over the conventionally trained groups in the total marksmanship proficiency test, even though the differences in favor of Group "E" were not statistically significant for moving targets. However, since the average hit scores on moving targets were in favor of the experimental group, the data suggests that to increase the number of rounds allotted to moving target training would significantly improve the ability of the rifleman to hit these targets.²⁷

The failure of the experimental group to fire significantly better than the control groups when engaging moving targets could have been caused by a variety of factors. The speed of the target movement has a great effect upon a firer's ability to hit such a target. If the speed is very slow, then the added proficiency gained through training will not be detectable since a true moving target situation requiring target leads is not presented. Unfortunately, the speed of the moving target was not discussed in the report and may not have received necessary consideration. The speed of the target should be established to realistically portray the speed of a running rifleman on the battlefield. Another factor effecting the results obtained is the consistency of the movement. The targets were powered by a cable connected to a hand cranked reel and pulley. This type of arrangement could introduce

²³Ibid., p.34.

²⁷HunnRRO, Trainfire I, op.cit., p. 42.

the possibility of considerable irregularity in the speeds obtained during the various trials. Without the exact duplication of conditions during each trial, it is difficult to obtain a valid comparison of proficiency between the groups.

In the background chapter of the Trainfire report, it was emphasized that the experimental course was redesigned in package form. A patchwork type of improvement was deliberately avoided and no attempt was to be made to evaluate the individual contributions of different features to the achievement of the whole program.²⁸

Yet, in the analysis, the results were separated between marksmanship proficiency and target detection proficiency -- moving targets and stationary targets -- supported positions and unsupported positions -- plus numerous other breakouts. This is all understandable, however, as it assists in the interpretation of the results.

The unfortunate aspect of the above is that the moving target portion of the experimental course was discarded when Trainfire was implemented Army wide. This elimination was presumably based upon the failure of the experimental group of firers to obtain significantly higher scores than the control groups when engaging moving targets.

²⁸HumRRO, Trainfire I, op. cit., pp. 7-8.

The second in the series of Trainfire experiments was conducted in 1956 also at Fort Benning. The purposes of Trainfire II were:

- (1) to investigate and measure the problems and techniques involved in both Technique of Fire and Squad Tactical Training, (2) to design and develop training methods for those phases of combat firing not covered in sufficient detail in existing training doctrine, and
- (3) to improve means and procedures available for a realistic test of the combat firing efficiency of small groups similar to the rifle squad. The experimental training program represents a logical progression from the individual marksmanship training, Trainfire I, to small unit training in which individual members learn to function as a fighting team. The eight week long experiment was conducted using 220 inductees randomly divided into two equal groups. During the first four weeks, the experimental group received the Trainfire I marksmanship course while the control group was trained under the conventional course commonly referred to as the known distance or "KD" firing course. The final four weeks of training were devoted to an experimental technique of fire and squad tactics course presented to the experimental Trainfire I trained group and to administering of the conventional course to the control group.²⁹

The significance of this experiment to this thesis is that moving targets were included in the training given to the experimental group. Constant emphasis on combat realism was stressed during the final four weeks for the Trainfire II trained group as during Trainfire I.

²⁹HumanResources Research Organization (HumRRO), Technical Report 41, Trainfire II: A New Course in Basic Technique of Fire and Squad Tactics, Fort Benning, Georgia, July 1957, p. 3.

The emphasis on realism combined with a significant increase in the amount of actual shooting at targets resulted in better trained squads. The final four weeks of training allotted 232 rounds of ball ammunition to each man for the Trainfire II course compared to only 152 rounds for the conventionally trained control squads.³⁰

The proficiency tests administered to both groups following completion of the two courses included three tactical problems: Defense, Attack, and Combat Patrol. The primary evaluator of performance was the number of hits scored by the respective squads. In all three tactical situations, the squads from the experimental group performed in a superior manner to the conventionally trained squads. In fact, in the defense problem, the poorest experimental squad had a higher score than the best control squad.³¹ The conclusion was that the experimentally trained squads performed significantly better than did the conventionally trained squads on all three problems.³² It was recommended that the experimental program be considered for adoption by the Army.³³

The results obtained certainly add credence to the recognized superiority of the Trainfire I marksmanship course when applied in a tactical situation by a small combat unit of Infantrymen. The timing of this experiment is considered critical in its overall evaluation pertaining to moving targets. Trainfire II was conducted when Trainfire I still included moving target training -- that is, prior to Army wide adoption. Trainfire II was designed as an overall

³⁰HumRRO, Trainfire II, op.cit., p.14.

³¹Ibid., p.3.

³²Ibid., p. 25.

³³Ibid., p. 4.

package program that included Trainfire I as the initial four weeks of training.³⁴ It is presumed that the moving target portion of Trainfire I contributed to the overall superiority of the Trainfire II squads. Considering this, the elimination of the moving target phase of training becomes even more illogical.

The next report reviewed described an experiment designed to develop a realistic, close-in moving personnel target. This experiment was also conducted by HumRRO at Fort Benning -- but not until 1959! This was six years after the completion of Trainfire I that included moving target training. This report is the first written indication that there may have been more factors influencing the elimination of moving target training from Trainfire than the mere failure to show a significant difference in performance. The report is titled "Rifleman II: An Advancing Small Arms Target." The introduction states that the absence of suitable training devices and techniques has not permitted realistic training in the area of close combat firing. Lacking effective methods for simulating and practicing this type of training, it traditionally has been neglected or has been given only token consideration.³⁵ It was felt that this existing gap in small arms training could be filled if the soldier was given the opportunity to experience the difficulties involved in hitting close-in moving personnel targets.³⁶

³⁴HumRRO, Trainfire II, op. cit., p. 3.

³⁵Human Resources Research Organization (HumRRO), Research Memorandum, Rifleman II: An Advancing Small Arms Target, Fort Benning, Georgia, March 1959, p. 1.

³⁶HumRRO, Rifleman II, op. cit., pp. 1-2.

The physical appearance and behavior of the close target was considered extremely important. Because of this, several principal relevant variables of close-personnel target characteristics were developed. They were as follows:

1. Time of exposure in any single aspect is very brief.
2. Ranges are medium (150 meters) to short (10 meters.)
3. At these ranges, target movement is present or imminent, constantly altering the shape, size and position of the target.
4. The alterations of three general types:
 - a. Simple enlargement (target coming straight toward the firer's position).
 - b. Angular movement (target moving diagonally to firer, or directly towards a position on his flank).
 - c. Sudden change of shape and area (target changes direction).

Search for a suitable target, either in existence now or soon to be available, yielded nothing.³⁷

The experimental target system developed by HumRRO was capable of being presented in multiples and in such other ways as to meet the characteristics described above. The target carrier was powered by field wire (WD-1/TT) lying along the ground that engaged simple pulleys designed to control the direction of movement. The power source applied to the field wire could either be a tow vehicle or a power winch. The target system was designed to operate over various types of terrain at approximately ten miles per hour (16.5 feet per second.)³⁸

³⁷HumRRO, Rifleman II, op. cit., pp. 2-3. ³⁸Ibid., pp. 4 and 6.

The resulting target that was designed appeared to be adaptable to a variety of training exercises, not only for initial training but for maintenance of skill in remote places where informal means must be improvised. The device was released before it had been used extensively in the hope of stimulating thinking about its employment in other problems for which it might be suited.³⁹

The recognition in this report that there was an absence of a functional moving personnel target system is the first indication of the engineering difficulties associated with the design, operation, and maintenance of such a target mechanism. This specific point will be developed further within this thesis. The greatest significance of this report is that a need was recognized and some action was taken to correct the situation.

The third Trainfire experiment reviewed was Trainfire V: Extension of Research on Trainfire I Rifle Marksmanship Course. The experiment was intended to produce an improved version of the individual basic rifle marksmanship course developed in Trainfire I. The specific objective was to determine the performance increment which would result from increasing the amount of training in selected areas of the Trainfire I marksmanship course.⁴⁰ This experiment was conducted in 1956 prior to adoption of Trainfire for basic training.

The research consisted of investigating the resulting effects of additional training given in four areas. The four areas were:⁴¹

³⁹HumRRO, Rifleman II, op. cit., p. 11.

⁴⁰Human Resources Research Organization (HumRRO), Research Memorandum, Trainfire V: Extension of Research on Trainfire I Rifle Marksmanship Course, Ft. Benning, Ga., Nov 59, p.1.

⁴¹HumRRO, Trainfire V, op. cit., pp. 1-4.

1. Preliminary rifle instruction (to include 1000 inch firing.)
2. Field firing.
3. Target detection.
4. Proficiency test repetitions.

The modifications to the training are shown below.

Table 1

TRAINING MODIFICATIONS FOR TRAINFIRE V⁴²

<u>Training area</u>	<u>Trainfire I Training</u>		<u>Extra Training</u>	
	<u>Hours</u>	<u>Rounds</u>	<u>Hours</u>	<u>Rounds</u>
Prelim. Rifle Instru.	28	102	8	33
Field Firing	36	285	8	96
Target Detection	16	-	8	-
Proficiency Tests				
Administration #1	4	56	-	-
Administration #2 ^a	-	-	4	56
Administration #3 & 4 ^b	-	-	8	112

NOTE: a = One additional firing after a 2-day interval.

b = Two additional firings, separated by a 2-day and 4-day interval.

The proficiency tests, while recognized as not being training as such, were considered to be of training value. The results indicated that additional training in preliminary rifle marksmanship, field firing and target detection did not produce significant improvements. However, repetition of the proficiency test did result in a significant improvement for the supported firing position. This increase was recorded on the third firing and therefore indicates that better

⁴²HumRRO, Trainfire V, op. cit., p. 2.

performance is obtained by one additional administration of the proficiency test.⁴³

The results obtained tend to support a theory that repetition of practical exercises in a realistic environment produces the best results in training riflemen. The proficiency test and field firing included moving personnel targets. A possible explanation for the failure to obtain significant improvements in the first three areas could be found in the percentage of increase of each. The increase in time for each, respectively, is 28, 22, and 50 per cent. The increase in ammunition allocated for the PRI and field firing, respectively, is 32 and 34 percent. The above increases compared to the full 100 per cent duplication of the proficiency tests may explain the results. Regardless of why, however, the results support the theory of practice makes perfect.

The next report reviewed was concerned with the performance evaluation of graduates of basic individual training and Infantry advanced individual training. This evaluation was conducted at Fort Benning in 1962 by the Human Resources Research Organization (HumRRO). The objective was to evaluate the combat readiness of current Infantry AIT graduates and to determine specific improvements in individual training needed to achieve the desired level of combat readiness.⁴⁴

This evaluation was conducted as a part of Task RIFLEMAN. Previous research had produced a listing of thirteen critical individual combat performances designated as in need of training improvement.

⁴³Ibid., p.12.

⁴⁴ Human Resources Research Organization (HumRRO), Technical Report 81, Performance Evaluation of Light Weapons Infantrymen (MOS 111.0), Graduates of the Advanced Individual Training Course (ATP 7-17), Fort Benning, Georgia, Dec 62, p. iii.

These performances were used in the construction of tactical situations that formed a realistic combat field exercise.⁴⁵ The thirteen performances were arranged in order of priority according to their combat relatedness and need for training improvement.⁴⁶ Performances one through four specifically addressed the problem of riflemen armed with the M1 rifle engaging enemy personnel targets -- suddenly appearing, singly and in multiples, and stationary and moving.⁴⁷ This established weapons marksmanship ability as one of the principal areas of investigation.

Proficiency in the use of the M1 rifle was evaluated for both stationary and moving targets in a variety of simulated combat situations. In the engagement of moving targets, satisfactory proficiency was approached only when the firers were shooting from foxholes at targets ranging from fifteen to thirty meters distance.⁴⁸ It was concluded that deficiencies in performance can be corrected by suitable changes in emphasis in weapons instruction. It was recommended that training and practice in firing at moving personnel targets be conducted within the framework of the sixteen week basic and advanced training programs.⁴⁹

The moving personnel target was patterned after the one previously described in the discussion of Rifleman II. However, the speed was considerably reduced to less than ten feet per second from the earlier speed of 16.5 feet per second. The running-man targets were presented as a retreating-man situation, an advancing-man situation, and as an

⁴⁵Ibid., p. v.

⁴⁶Ibid., p. 3.

⁴⁷HumRRO, Performance Evaluation, op. cit., p.6. ⁴⁸Ibid., p.vi.

⁴⁹Ibid., p. ix.

assaulting-man situation. These presentations appeared at a wide variety of ranges for varying distances and exposure times.⁵⁰

This performance evaluation was conducted in 1962 after Trainfire had been implemented Army wide. All of the test subjects had just completed the Trainfire I course of instruction presented during their first sixteen weeks in the Army.⁵¹ But the moving target portion of Trainfire had been discarded prior to implementation due to a lack of statistical significance. So, nearly ten years after moving target training was originally included in a modernized rifle marksmanship training course, it is again being recommended to improve the combat effectiveness of the U.S. rifleman.

The publication of the preceding report tended to mark the beginning of a lull in the active pursuit of improved marksmanship training techniques. This time also coincided with the start of a buildup of forces in Vietnam. It is certain that no action was taken on the moving target recommendation of the performance evaluation study. The lull continued until 1969-1970 when withdrawal from Vietnam became the focal point of interest. Concern began to increase on "how well" we had done in Vietnam and a review of combat after action reports could well have prompted the renewed interest in marksmanship training.

The first report reviewed after the lull was not specifically marksmanship oriented, but was concerned with engineering aspects of a moving target system. The report, dated 19 August 1969, described

⁵⁰Ibid., pp. 24-28 and 41.

⁵¹Ibid., p. v.

a test conducted by the U.S. Army Infantry Board at Fort Benning. The target system tested consisted of an electrical drive unit with cable, cart and track. The system was found to adequately meet the needs of the Infantry Board.⁵²

This report certainly did not represent a significant action, but it did indicate that some interest had continued and was on the increase concerning moving personnel targets.

There were two major actions started in 1970 concerning moving personnel targets. Both of these are only semi-complete at this time. The first one to be reviewed was a moving target exploratory experiment conducted by the U.S. Army Combat Developments Command, Experimentation Command (CDCEC) at Fort Ord, California. It was primarily oriented towards the development of a range design for the conduct of a weapons comparison. However, some valuable information applicable to the training problem was obtained. The second 1970 action to be reviewed was an overall rifle marksmanship training evaluation that included an investigation of moving personnel targets. This study was conducted by the U.S. Army Infantry School at Fort Benning.

The Moving Target Exploratory Experiment (MTEE) resulted from a stated need to measure the fire effectiveness of a developmental rifle when employed against moving personnel targets. The absence of an operational moving personnel target range and the non-availability of suitable information concerning the subject necessitated an extensive

⁵²U.S. Army Infantry Board, Engineering Test of MTV-200 Moving Target System, Fort Benning, Georgia, 19 August 1969, pp. ii and 1.

preliminary experiment (MTEE). The purpose of the MTEE was to obtain data to assist in the design of the main experiment intended to measure the fire effectiveness of the rifle, XM-19 Serially Fired Flechette Rifle (SFR) compared to that of the M16A1 rifle.⁵³

The range used for the experiment was a modified moving tank range located at Hunter Liggett Military Reservation. The initial problem encountered was to determine a realistic speed for the target. A series of time trials with combat loaded soldiers running over distances ranging from five to forty meters established the maximum speed of the moving target at 22±1 feet per second in order to simulate a running enemy soldier.⁵⁴ A kneeling type silhouette target was mounted on a cart that moved along 210 meters of track. The cart was pulled by a cable that was powered by a German made Target Towing Device (Flender Polydrive.) The existing range was modified to provide four firing berms so that a variety of ranges and firing angles could be investigated. The following presents the summarized characteristics of the range by firing position.

Table 2
RANGE CONFIGURATION VALUES BY FIRING POSITION⁵⁵

Firing Position	Mean Range (meters)	Mean Angle of Engagement (degrees)	Mean Exposure Time (seconds)
2	140	27	6.3
3	175	24	5.8
4	245	19	5.9

NOTE: Firing position 1 was eliminated from investigation.

⁵³U.S. Army Combat Developments Command, Experimentation Command (CDCEC), Moving Target Exploratory Experiment (MTEE) (Draft), Fort Ord, California, 1 July 1970, pp. V-2-H-1; V-2-J-1; and, V-2-K-1.

⁵⁴CDCEC, Moving Target Exploratory Experiment (MTEE) (Draft), op. cit., p. V-2-H-1.

⁵⁵Ibid., pp. V-2-J-7; V-2-J-8; and V-2-J-9.

There were three target exposure distances along the length of the track. These were twenty-seven, thirty-four, and forty meters each. The angle of engagement ranged from four degrees to forty-seven degrees and the exposure time ranged from 4.7 seconds to 7.5 seconds.⁵⁶

A correlation test was conducted as part of the MTEE. The purpose of the test was to investigate the hypothesis that a mutual relationship exists between a firer's performance against stationary targets and against moving targets. The correlation test was conducted by having the players fire at the moving target while it was stationary and then when moving. Each firer shot at six stationary exposures and six moving exposures -- three with the target moving from the left to the right and three from right to left. The results are shown below.

Table 3

SUMMARY OF TARGETS HIT DURING THE CORRELATION TEST⁵⁷

	Stationary Targets						Moving Targets*					
	1	2	3	4	5	6	1	2	3	4	5	6
Nr. of Times Targets Hit	25	23	22	21	23	26	12	11	14	10	9	11
Percent Hit	96	88	85	81	88	100	46	42	54	38	35	42
Percent Hit for 3 Targets	90			90			47			38		
Percent Hit for 6 Targets	90						43					

##For 26 firers, Firing Position 2 (Range from 116 to 169 meters)

⁵⁶Ibid.

⁵⁷CDCEC, MTEE (Draft), op. cit., pp. V-2-K-6 and V-2-K-9.

Target Mode - - -	Stationary Targets						Moving Targets*					
Exposure number --	1	2	3	4	5	6	1	2	3	4	5	6
Nr. of Times Targets Hit	5	6	7	6	8	7	4	4	4	4	1	2
Percent Hit	62	75	88	75	100	88	50	50	50	50	12	25
Percent Hit for 3 Targets	75			88			50			29		
Percent Hit for 6 Targets	81						40					

##For 8 firers, Firing Position 3 (Range from 154 to 198 meters)

*Moving target exposures 1 through 3 moved from left to right; 4 thru 6 R to L.

The number of hits scored against the moving targets as compared to the stationary targets was less than half. An even greater decrease in performance was recorded when the moving target was traversing from the right to the left. The above information is of considerable interest in relation to marksmanship training.

Analysis of the results showed that a positive, although not statistically significant, correlation did exist between a firer's moving and stationary target scores obtained on the experimental range. However, since the sizes of the correlation coefficients were so slight, there would be little use in trying to predict a firer's ability to hit a moving target based on his demonstrated ability to hit stationary targets.⁵⁸ The implication is that factors involved in firing at moving targets are not necessarily involved in firing at stationary targets.

⁵⁸CDCEC, MTEE (Draft), op. cit., p. V-2-K-12.

Numerous human factors considerations were evaluated in conjunction with the correlation test. Several interesting conclusions were derived as a result of player interviews and questionnaires plus scientific and subjective observations during the experiment.

One observation revealed that the moving target scores of hunters were significantly better than the moving target scores of those firers with no hunting experience. Of the twenty-seven firers that were hunters, twenty-two felt that their previous experiences as hunters helped them to hit the moving target.⁵⁹ Therefore, it appears that the provision for such experience through training might significantly improve fire effectiveness against moving targets.

Accuracy against moving targets depends on special skills, particularly the firer's ability to track smoothly and his sense of lead. Of the thirty-four firers, twenty-three said they "followed and passed" the target to get the correct lead. Eleven said they used "snap shooting" in front of the target for the correct lead.⁶⁰ The computed theoretical lead necessary to successfully engage the target moving at approximately eighteen feet per second (the actual average speed attained during the MTEE) when firing from position 2 was approximately two feet and from position 3 approximately three feet.⁶¹

When questioned concerning Army marksmanship training, thirty-two of the thirty-four firers stated that moving target training would be

⁵⁹Ibid., pp. V-2-K-13 and V-2-K-19.

⁶⁰CDCEC, MTEE (Draft), op.cit., pp. V-2-K-24 and V-2-K-26.

⁶¹Ibid., p. V-2-K-21.

worthwhile in preparing for actual combat. Only twelve of the thirty-four firers felt that their Army training prepared them to fire at moving targets. Since soldiers do not receive live fire, individual, moving target training during either Basic or AIT, their potential as riflemen during an armed conflict may not be fully developed.⁶²

The results obtained from the MTEE have contributed significantly to the available knowledge concerning moving personnel targets. The MTEE was the most extensive experiment reviewed that was conducted with the specific purpose to investigate moving targets. The results presented in this thesis merely touch on those considered most applicable to a training situation. All of the information obtained during the MTEE was requested by and furnished to the U.S. Army Infantry School as the Rifle Marksmanship Evaluation Study Group (RMESG) began plans to develop a moving target training program. This was the second study mentioned earlier that started in 1970.

The purpose of the study was to propose a moving target training program which would enable the average rifleman to attain an acceptable hit probability when engaging moving personnel targets.⁶³ The study group evaluated previously conducted investigations associated with moving personnel targets and conducted a specific subtest (Subtest 21) to determine the most effective mode and technique of fire for engaging moving targets with the M16A1 rifle. It was tentatively concluded by the RMESG that moving target training is needed and should be

⁶²Ibid., p. V-2-K-25.

⁶³U.S. Army Infantry School (USAIS), Moving Target Training, (Working Copy-Draft Only), Rifle Marksmanship Evaluation Study Group (RMESG), Weapons Department, USAIS, Ft. Benning, Georgia, December 1970, p. 2.

tested for inclusion in Infantry AIT.⁶⁴ (NOTE: At present, this is NOT recognized as official U.S. Army Infantry School doctrine. It is contained only in a working copy draft prepared by the RMESG and has not been approved by any higher authority.)

The RMESG initially reviewed some work completed by the Human Engineering Laboratory (HEL) concerning the presence of moving personnel targets on the battlefield. The results of a survey of 121 U.S. Army soldiers and eighty-three U.S. Marines conducted by HEL revealed that approximately 35 percent of the personnel targets seen on the battlefield in Vietnam were running.⁶⁵ Another study conducted by the Infantry School (USAIS) concluded that a rifleman should be able to successfully engage a moving target. This conclusion was one of many resulting from a conference with thirty-nine Vietnam returnees.⁶⁶

RMESG Subtest 21 was the next item included in this study. Its purpose was to determine the most effective mode and technique of fire for engaging moving targets with the M16A1 rifle. It was noted that there is no current doctrine available for engagement of moving targets with the M16A1 rifle. The subtest investigated various firing techniques and modes from both the standing and prone positions at targets moving at either four or eight miles per hour at a range of both fifty and one hundred meters.⁶⁷ The results of the firing indicated that the changing lead technique of fire in the semi-automatic mode produced significantly more hits when combined with the prone position against the four mile per hour target at firing ranges of both fifty and one hundred meters.⁶⁸

⁶⁴ Ibid., pp. 4-5. ⁶⁵ Ibid., pp. 8 and 10. ⁶⁶ Ibid., p.12.

⁶⁷ USAIS, Moving Target Training, op. cit., pp. 21-22.

⁶⁸ Ibid., pp. 30-31.

The RMESG then proposed a program of instruction (POI) to be tested for inclusion within Advanced Rifle Marksmanship training presented during Infantry AIT. The POI was for ten hours of instruction and included the firing of eighty rounds at the slow moving (four miles per hour) targets at ranges of fifty and one-hundred meters.⁶⁹

Analysis of the proposal reveals that reconsideration needs to be given to the target speed indicated in the POI. A common tendency in the past has been to set an unrealistically slow speed for the target. A speed should be selected that is capable of accurately simulating a running enemy soldier on the battlefield. The speed of four miles per hour is less than six feet per second. A soldier being shot at in combat does not move at a mere six feet per second. The average speed required for a U.S. soldier to meet the minimum established standard in the mile run is ten feet per second -- and that is for a distance of sixteen hundred meters -- not just a short dash of a few meters.

A speed of only four miles per hour is also contradictory to the entire purpose of the training. The purpose is to train a rifleman in the difficult skills required to hit a moving target. One of the most critical skills requiring development is the use of target leads. Yet, aiming forward of the leading edge of a moving target travelling at only four miles per hour is not required.⁷⁰ Therefore, the firer is actually learning through practice to aim at the leading edge of the target instead of the center of mass -- but he is still aiming on the target. The greatest difficulty occurs when the

⁶⁹Ibid., pp. 5 and 61.

⁷⁰USAIS, Moving Target Training, op. cit., p. 22.

firer's aiming point must move forward of the target where no fixed aiming point can be established. The training, to be realistic and beneficial to the rifleman in combat, must progress beyond target tracking to target leading.

Training Techniques of Others

The final phase of data collection was to determine the training techniques used by others to hit moving personnel targets. This phase included an investigation of the marksmanship methods of other U.S. military services and governmental agencies and of the military services of several foreign countries. This material was obtained through the use of a questionnaire, of personal interviews, and of a literature survey.

The U.S. Marine Corps currently has operational moving personnel targets at both Camp LeJeune, North Carolina and Camp Pendleton, California. All Marine recruits are required to undergo moving personnel target training as part of their overall rifle marksmanship training.⁷¹ The Marines receive four hours of instruction and fire between fifteen to twenty rounds of ammunition at the moving targets. The firing range to the targets varies from one hundred to two hundred fifty meters, and the speed of the targets is from two to twelve miles per hour (average of eight).⁷²

Marine Corps doctrine recognizes the difficulty associated with the selection of an accurate aiming point for a moving target. It is stated in FMFM 1-3, Basic Rifle Marksmanship, that an enemy soldier will normally move by rushes from one position to another. While making the rush, he presents a rapidly moving target that is most vulnerable to aimed rifle fire as he begins and ends each rush. However, to hit a target moving laterally across his front, a rifleman

⁷¹Based on personal telephone interview between Major George Hubbard, USMC, Assistant S-3, 2d Infantry Training Regiment, Camp Pendleton, California and the writer. 17 February 1971.

⁷²USAIS, "Moving Target Training," op. cit., p. 60.

must aim far enough in advance so the bullet will meet the target. The use of leads as a function of range to the target and speed of the target is discussed for presentation to the rifleman during moving target training.⁷³

The telephone interview with Marine Major George Hubbard at Camp Pendleton revealed that the Marine Corps, like the Army, is increasing it's concern for the need of realistic moving target training for the rifleman. They are continuing to research and explore new techniques and would like to expand their current program.⁷⁴

A written inquiry to the Federal Bureau of Investigation (FBI) Academy at Quantico, Virginia produced some interesting and informative material. One of the bulletins received on firearms training was titled, "New Combat Course Added to Training at FBI Academy." The course described was a "running man" type target that traverses 190 feet in sixteen seconds (twelve feet per second.) The training presented in conjunction with firing this course emphasizes the need to lead moving targets. Depending upon the type of weapon being fired and the range to the target, varying leads must be applied to the target in conjunction with smooth follow-through action in order to score a hit. The average score of the FBI agents nearly doubled after only minimum exposure to the range and the mastering of the swing or

⁷³Department of the Navy, U.S. Marine Corps, Fleet Marine Field Manual 1-3, Basic Rifle Marksmanship, 8 February 1968, pp. 104-105; and Lesson Plan, Field Firing Exercise, Code: W-15a, 2d Marine Training Regiment, Camp Pendleton, Calif., 10 September 1969.

⁷⁴Based on personal telephone interview with Major George Hubbard, USMC, op. cit..

follow-through of their weapons.⁵

The lead sentence in the FBI Firearms Bulletin clearly states the importance to the FBI of accurate marksmanship under all conditions at all types of targets. "No part of the training of a police officer is more important than that part devoted to firearms training. The officer's life, as well as the lives of his fellow officers, might depend some day entirely upon the officer's skill with a revolver, machinegun, or shotgun."⁷⁶

The above statement could be appropriately adapted to apply to the U.S. Army Infantry soldier -- by replacing the words "police officer" and "officer" with "rifleman" and to add "rifle" to the list of weapons. Belief in this message at high levels within the Army could possibly assist in placing the needed impetus behind implementing a moving target training program. The date of 1962 on the "New Combat Course" was noted with extreme interest. It appears the Marine Corps and the FBI recognize the importance of moving personnel target training for legally armed individuals expected to fire effectively at all types of targets.

An interview with Lieutenant Colonel James Cowan, the Canadian Army liaison officer to the Command and General Staff College, resulted in discovery of a very practical moving target training program. LTC Cowan referred to a copy of the Canadian Forces professional

⁷⁵U.S. Department of Justice, Federal Bureau of Investigation, "New Combat Course," FBI Law Enforcement Bulletin, Washington, September 1962, pp. 1, 3, and 6.

⁷⁶U.S. Department of Justice, Federal Bureau of Investigation, "Firearms Training," FBI Law Enforcement Bulletin, Washington, May 1969, p. 1.

magazine, SENTINEL, which contained an article titled, "Balloon Busting With A Purpose." The article described a field expedient means to provide for moving personnel target training with a minimum expenditure of money and effort. Inflated, man-shaped balloons were attached to sleds towed quickly over the ground by Army vehicles. As the sleds bounced along, the balloons attached by a piece of string tended to bob and weave, giving the realistic appearance of running men.⁷⁷

The measurable results realized from this training indicated the ability of the firers to "pop-off" the enemy was increased in range from two hundred to 450 yards. Additional results of the training were the men developed more confidence in the other men in the section and the units became more closely knit. The men and the officers liked the program and enthusiastically support it. It was pointed out, however, the use of balloons as targets was not exactly new since they were purchased from a German balloon maker who still had some khaki-clad "Tommys" left over from a few years ago.⁷⁸

Further discussion with LTC Cowan revealed that he had commanded the Canadian Infantry battalion that won the NATO Prix LeClerc marksmanship competition in Europe in 1970. A study of the scores showed that the United States Army Battalion had not only placed last (seventh place) in the competition -- but they were further below the sixth placed battalion than the total point spread within the

⁷⁷J.R. Tracy, Lieutenant, "Balloon Busting With A Purpose," Sentinel, Directorate of Information Services, Canadian Forces Headquarters, Ottawa 4, Canada, March 1969, pp. 16-17.

⁷⁸Ibid., p. 18.

first six teams. LTC Cowan recalled the embarrassment for the U.S. -- especially after having dominated the event for the past several years. Prix LeClerc competition is characterized by field firing under realistic combat conditions. This poor performance of a selected U.S. battalion should serve to alert the Army to the true state of preparedness for combat of our Infantrymen.

The West German Army includes moving target instruction within the training of the individual soldier. The moving target portion of the training includes instruction on the use of target leads and requires the trainee to live fire against moving personnel targets.⁷⁹ A moving target system is included as part of the standard German rifle marksmanship range. The targets are installed on a track mounted cart that is powered by a target towing device. The system employs a series of drums, pulleys and cables to activate the targets as desired.⁸⁰ The German documents reviewed were received from Colonel Hans Link, the West German Army liaison officer to the Command and General Staff College. The German moving target training program is the most advanced of those studied.

The Japanese liaison officer, Colonel N. Matsuura, related the Japanese attitude towards the problem of moving personnel targets from Lieutenant Colonel Tomosaburo Inamori of the Individual and Unit Training Division of the Japanese Ground Staff Office.

⁷⁹Der Bundesminister der Verteidigung, Führungsstab des Heeres II 5, ZD 3/12, Schiessausbildung mit Handwaffen, Bonn, West Germany, October 1970, pp. 25 and 273 (Translation: Ministry of Defense, West German Army, Field Manual for Handweapons Marksmanship)

⁸⁰Target Towing Plants and Target Equipment, Fritz Theissen and Sohne, Posener Str 156, Dusseldorf, West Germany, pp. 1-17.

LTC Inamori stated that the Japanese consider moving personnel target training to be extremely important, but a lack of adequate resources has prevented establishment of a standard training program. Therefore, individual units are encouraged to conduct this type of training and are limited only to the extent of their imagination and initiative. The use of tank ranges modified to present moving personnel targets is one example of the expedient techniques used by unit commanders to accomplish the training.⁸¹ Regardless of the absence of a standard moving target marksmanship course, the need for such training is officially recognized.

The most extensive coverage of the difficulties associated with engaging moving targets was found in training publications of the Soviet Union (USSR). The peculiarities of firing at moving targets are thoroughly discussed in one chapter of the Soviet manual on small arms firing fundamentals. The chapter begins with a statement that moving personnel targets are frequently encountered in combat. The speeds of such targets are recognized as being extremely variable up to five meters per second (sixteen + feet per second). Speed estimation and direction of movement are considered critical for accurate engagement of moving targets. Direction of target movement relative to the firer is classified as either frontal, flanking or oblique. The continuous change of the relative position of a moving target significantly complicates firing.⁸²

⁸¹Based on personal correspondence between Lieutenant Colonel Tomosaburo Inamori, Individual and Unit Training Division, Japanese Ground Staff Office, Tokyo, Japan, and Col. N. Matsuura, Japanese Liaison Officer, Command and General Staff College, Ft. Leavenworth, Kansas.

⁸²U.S.S.R. Ministry of Defence, "Firing at Moving Targets," Small Arms Firing Fundamentals, (U.S. Army, Assistant Chief of Staff, Intelligence (ACSI) Code Nr. J-2117), 1968, pp. 30-31.

The Soviets consider two methods of firing against moving targets to be practical: (1) the method of accompanying the target (leads with tracking) and (2) the method of awaiting the target (fire assault at selected forward points.) The most effective method is to accompany the target firing in short bursts. Considerable detail is presented concerning the way to determine the correct number of leads required for a specific target. A table of leads is shown as a function of range and speed. Target leads must be doubled in conjunction with firing longer bursts if the "awaiting the target" method of fire is employed.⁸³ The lead for firing by the "accompanying the target" method is accounted for either by displacing the point of aim or by applying a correction to the windage scale. Delivery of fire is simplified in the latter case as the point of aim is located on the target itself.⁸⁴

Two significant points were noted in the Soviet doctrine. The first is the use of the "awaiting the target" method of fire. It is admittedly inferior to the other method, but it does provide the less physically coordinated soldier a means to engage moving targets. The second point concerns the use of the windage scale to account for the necessary lead. It is doubtful that a firer will still have a target after adjusting his sights. This method or technique is not considered to be practical.

⁸³ USSR, "Firing at Moving Targets," op. cit., pp. 34-35.

⁸⁴ Ibid., p. 34.

The final source of information concerning the practices of foreign countries was the Allied student officers attending the 1970-71 class of the Command and General Staff College. There were twenty-nine separate countries represented by forty-eight Infantry officers ranging in rank from Captain to Brigadier General. Questionnaires (Appendix A) were distributed to each officer dealing primarily with whether or not their country includes training to engage moving personnel targets. Questionnaires were completed and returned by nineteen of the Allied officers representing fifteen countries. The responses reflected eight of the fifteen countries do not include live firing practice at moving personnel targets during basic training. The seven countries that do conduct live fire moving personnel target training are Afghanistan, Brazil, Denmark, Israel, Malaysia, Norway, and Thailand. The countries of Greece, Iran, Tunisia, and Saudi Arabia include moving target training at unit rather than basic training level. The remaining four countries that do not include moving target training are Ecuador, Ethiopia, Nepal and South Vietnam.

Some of the officers provided some interesting comments of how their country accomplishes the training and the attitude towards it. In Denmark, moving target training is continued beyond basic training only in platoon and company size units. The type of targets used are normally a "running man" or a "turning man." Additional live range firing for machinegunners against moving vehicle targets is included at unit level.⁸⁵

⁸⁵Based on questionnaire response from Captain Jan Ewald, Danish Army Student, Class 1970-71, U.S. Army Command and General Staff College, Fort Leavenworth, Kansas.

Greece does not present moving target instruction during basic training, but does emphasize it during unit training. Targets moving on a small rail system or on a cable around a pole are used by the units. An excellent point was made by two of the three Greek officers. They stated stationary targets are nearly impossible to detect on a battlefield due to the effectiveness of camouflaging techniques. This increases the need for moving target training. The importance of this training appears to be great in Greece and the most serious limitation is a lack of developed doctrine on the subject.⁸⁶

Iran is similar to Greece as they do not include moving target training during basic, but do stress it at unit level. An absence of adequate facilities is the greatest problem as the importance of such training is recognized in Iran. Priority for such training and equipment is provided to their special combat units such as Special Forces. Rifle fire is apparently considered important as Iran has won the Central Treaty Organization (CENTO) marksmanship championship for the past six years.⁸⁷

The countries of Israel and Malaysia take a somewhat different approach to moving target training. In Israel the concern is primarily of the results obtained by a team or squad as opposed to the scores of individual firers.⁸⁸ However, in Malaysia, the importance of an

⁸⁶Based on questionnaire response from Major Nicholas Dimoulis and Alex Kalenterides, Grecian Army Students, Class 1970-71, U.S. Army Command and General Staff College, Fort Leavenworth, Kansas.

⁸⁷Based on personal interview and questionnaire response from Major Houshang Mafi, Iranian Army Student, Class 1970-71, U.S. Army Command and General Staff College, Fort Leavenworth, Kansas.

⁸⁸Based on questionnaire response from Colonel Jacob Shat-Ran, Israeli Army Student, Class 1970-71, U. S. Army Command and General Staff College, Fort Leavenworth, Kansas.

individual's ability in marksmanship is so great that the pay increment system is based largely on how well a soldier qualifies annually in his basic weapon. This qualification includes moving personnel targets. The real importance of moving personnel target training is probably no greater in any country than in Malaysia. A variety of devices are used to present moving targets. Soldiers in trenches may run with silhouette targets on poles or a series of cables and pulleys can be used to hand pull targets or release sliding targets. These types of targets are particularly emphasized in the "jungle lane" phase of marksmanship training, practice or qualification.⁸⁹ Based on the nature of the conflict in Malaysia over the past several years, the importance placed by Malaysia on rifle marksmanship against moving personnel targets helps to establish the need for this type of training particularly in preparation for small unit operations.

In Norway advanced marksmanship training is presented in each unit during the last nine months of a soldier's one year obligated military service. In fact, moving personnel targets are included in live fire tactical maneuvers -- not just on a rifle range. Advancing and laterally moving personnel targets are presented by mounting silhouettes on sleds or suspending them from cables. Great emphasis is placed on this type of training and some of the systems are refined to the extent that television cameras are used as hit indicators.⁹⁰

⁸⁹Based on questionnaire response from Major Mohamed Kassim, and personal interview and questionnaire response from Major Abdul Manaf, Malaysian Army Students, Class 70-71, U.S. Army Command and General Staff College, Fort Leavenworth, Kansas.

⁹⁰Based on personal interview and questionnaire response from Major Jacob Skipenes, Norwegian Army Student, Class 70-71, U.S. Army Command and General Staff College, Fort Leavenworth, Kansas.

In summary, eleven of the fifteen countries present moving personnel target training in some phase of their rifle marksmanship program -- either during basic training or within a tactical unit. Some of the equipment used was self-labelled by the officers as being relatively crude and primitive -- "not of the quality found in the U.S." The fact not understood is the U.S. does not have operational moving personnel target systems to train it's riflemen. The most significant aspect of the preceding is that many other countries are presenting the soldier with a moving target situation -- whether it be a bobbing-balloon, a gravity powered cart, or a man-pulled trolley.

CHAPTER III

ANALYSIS OF THE PROBLEM AND PROPOSED SOLUTION

The subject of the research, background and identification of the problem, and hypothesis were presented in the introduction. The second chapter recorded the phases of research that determined where we are now, where we have been, and where others are concerning moving personnel target training. This chapter will present information that supports the existence of a problem and propose a realistic solution to the problem.

Validity of the Problem

An abundance of material exists that supports the general need for improved rifle marksmanship training techniques and the specific need to include moving personnel target training. A review of the attitudes of numerous civilian and military authors was conducted along with a collection of the attitudes of many professional Infantry soldiers concerning the need for and importance of moving personnel target marksmanship training.

In the book, "The American Fighting Man," the author, Victor Hicken, surveys the qualities of the men who have fought for our country from the Revolution through Vietnam. The traditional importance of rifle marksmanship to the American soldier receives special mention. He stated that the gun -- musket or rifle -- has been the single most

important military weapon of the last two hundred years, and that marksmanship has always been a special pride of the U.S. soldier.¹ Despite this importance, rifle training has somewhat declined in the last fifty years. By mid-1966 a major American news magazine was able to report that only 14 percent of the new recruits taken into the Army were given concentrated training on the firing of weapons. It appears to the author that the war in Vietnam has brought an emphasis on the need for excellence in the basic essentials of soldiering. This need is most apparent on the battlefield where the quality of training becomes obvious.²

The implication of the above is the U.S. soldier is not adequately trained for combat. This point is substantiated in Department of the Army Pamphlet 525-2, "Vietnam Primer," dated 21 April 1967. While the pamphlet is an official DA publication, the contents were specified as not necessarily reflecting official DA policy or doctrine. This qualifier was added as the pamphlet was co-authored by noted military historian and author Brigadier General S.L.A. Marshall, USA, Retired, and Lieutenant Colonel David H. Hackworth, USA, Infantry. The pamphlet was prepared following a ninety-day observation period by the two in Vietnam in mid-1966 and a review of small unit combat operations from May 1966 to February 1967.³

It was observed in Vietnam that Americans firing their M-16 rifles, when suddenly confronted by small numbers of the enemy, will,

¹Victor Hicken, The American Fighting Man, (New York: Macmillan Co., 1969), p. 164.

²Victor Hicken, op. cit., pp. 167-68

³Department of the Army, DA Pamphlet 525-2, Military Operations: Lessons Learned: Vietnam Primer, 21 April 1967.

in the overwhelming majority of cases, miss a target fully in view and not yet turning. By analysis of several hundred such incidents, the results were all about the same -- five total misses out of six tries. It was determined that this inaccuracy prevails even though the ranges frequently varied from only ten feet to fifteen meters. An outright kill was found to be most unusual and most of the waste could be attributed to unaimed fire, done hurriedly which resulted in the fire going high over the target.⁴

The December 1969 issue of the National Rifle Association of America official journal, *The American Rifleman*, contained an article titled, "Can US Troops Still Shoot?" The introduction written by Ashley Halsey, Jr., Editor, explained the article would present a comprehensive insight into US military marksmanship -- it's past, present, and beclouded future. The article was presented in four parts with each summarizing certain aspects of rifle marksmanship during World Wars I and II, Korea and Vietnam and finally presenting ways to improve US marksmanship. Each part was authored by an expert.⁵

The author of Part II had served in Guadalcanal and with Merrill's Marauders during World War II. He described marksmanship practice aboard ship enroute to the Pacific theater to ensure that riflemen previously untrained with the M-1 rifle could at least load, fire and occasionally hit a target. They fired from the rail of the ship at floating five gallon drums. He further described a field expedient of

⁴DA Pamphlet 525-2, Vietnam Primer, op. cit., p. 15.

⁵Ashley Halsey, Jr., Editor, "Can US Troops Still Shoot?", The American Rifleman, December 1969, p. 20.

"Trainfire" -- fifteen years before it was formalized -- that he and others had built on New Caledonia using cardboard, poles, and pull wires. He emphasized the importance placed upon marksmanship training to Merrill's Marauders as they prepared for their mission into Burma. He said they fired a course of bobbing silhouettes, moving objects, floating tin cans and live game. He stated that those riflery skills saved their lives time and again and demonstrated the extraordinary destructive power of well-aimed semi-automatic rifle fire."⁶

The author of part III was Brigadier General S.L.A. Marshall. He stressed the point that Vietnam is uniquely a rifleman's war with over 70 percent of the casualties on each side the result of rifle fire. He stated that the maximum rifle ranges in Vietnam were the minimums in World Wars I and II and Korea. The author continued throughout the article with examples dramatizing the need for and relative lack of good quality marksmanship of the US soldier.⁷

Lieutenant Colonel John O. Cooper, USA, Retired, was the author of the final part that dealt with the ways to improve marksmanship. He had been an Infantry officer for nearly forty years and had also been a member of the original team that devised "Trainfire." He leads off his article by stating the US Army has forgotten how to shoot! He accepts, however, that the current human raw material is much less experienced in the handling of firearms than those of a few years ago. LTC Cooper emphasized the need for better marksmanship training techniques and

⁶John B. George, "Can US Troops Still Shoot? Part II: How Riflery Helped in World War II," The American Rifleman, December 1969, pp. 24-25.

⁷S.L.A. Marshall, Brigadier General, USA, Retired, "Can US Troops Still Shoot? Part III: Vietnam: The Short-Range War," The American Rifleman, December 1969, p. 27.

attacked what he described as incompetent, dishonest marksmanship qualification in order to meet a quota. He states that the most serious obstacle to good marksmanship training is the incompetence of the Army marksmanship instructors - the officers and non commissioned officers that don't know rifle marksmanship. He continues to say the existing situation can be corrected, but it will require a true shooting renaissance, a revival of the "spirit of the rifle."⁸

In the same edition of the American Rifleman appears an editorial titled, "Our Needless Human Sacrifice: Ill Trained Riflemen in War." The editor stated that while the rifle marksmanship picture is not all bad -- it is not nearly good enough. Where it is not good, the ground is littered with the corpses of American boys who need not have died. That is the sickening cost that we pay for a sorry lack of judgment which, in an era of frequent warfare emphasizing ground combat, has cut down pre-induction marksmanship training but not wars.⁹

In the March 1970 issue of the American Rifleman a letter from a Vietnam veteran described his M-16 rifle training received just prior to being shipped to Vietnam. This training consisted of issuing the weapon, firing two 3-round shot groups to sight in, firing thirty-five rounds on the proficiency range to "qualify," and then turning in the weapons. No further training was allowed upon arrival in Vietnam. While the veteran readily stated that his M-14 rifle training had been well prepared and

⁸John O. Cooper, Lieutenant Colonel, USA, Retired, "Can US Troops Still Shoot? Part IV: Ways to Improve US Marksmanship," The American Rifleman, December 1969, p. 29.

⁹Ashley Halsey, Jr., Editor, "Our Needless Human Sacrifice: Ill Trained Riflemen in War," The American Rifleman, December 1969, p. 16.

presented, he felt poor M-16 rifle orientations have resulted in a totally unnecessary waste of lives.¹⁰

In the 7 October 1970 issue of the Army Times newspaper, the Guns and Shooting Editor, Colonel Charles Askins, USA, Retired, titled his feature article, "New Marksmanship Training Ideas Needed." Colonel Askins traced the history of Trainfire and pointed out that this was the first major innovation in marksmanship training over the past half-century. He added that there has been little done since then. He granted that some work had been done by the Army Marksmanship Training Unit (AMTU), but that the knowledge gained had been pretty generally disregarded by the Army. Colonel Askins added that marksmanship thinking was stagnated, rather than being progressive and constantly seeking ways to improve the existing techniques as it should be. He concluded the BB-gun approach of "Quick Fire" at Fort Benning was an encouraging step in the right direction, but a great deal more exploration was needed. He concluded by stating that the US rifle marksmanship training needed a big goose.¹¹

The reaction to the above was rapid, and the response was carried in the 2 December 1970 issue in an article titled, "Marksmanship Training Changes Tested." The response was received from the Rifle Marksmanship Evaluation Study Group (RMESG) as they described their activities as previously discussed in this thesis. Colonel Askins commented that the efforts of the RMESG to refurbish the marksmanship training program

¹⁰Irwin H. Baeder, "Vietnam Vet Confirms M16 Training Needed," The American Rifleman, March 1970, p. 8.

¹¹Charles Askins, Colonel, USA, Retired, "New Marksmanship Training Ideas Needed," Army Times, 7 October 1970, p. 45.

indicates a lively comprehension on the part of the Infantry School for the necessity for constant improvement in methods and techniques.¹²

Investigation of moving personnel targets was specifically addressed in the second article. In an attempt to obtain greater background to support the need for this type of training, an inquiry was made directly to Colonel Askins. While not able to provide any sources of additional research material, his professional concern for this subject was well expressed. He stated a target is seldom detected that is not moving and there is a vital need for instruction in hitting these moving enemy personnel targets.¹³

The examples presented on the preceding pages represent only a few of an endless number of articles oriented towards the theme that the rifleman is the most important single ingredient to the battlefield. And that his ability to bring his potential influence to the battlefield can be realized only if he can effectively use his rifle. This is the critical point. In the recent past, the effectiveness of the rifle on the battlefield has diminished. While much criticism has been directed at the rifleman's shooting ability, too little effort has been directed at analyzing the nature of his target. This is possibly where the solution to the problem of poor marksmanship lies. This possibility prompted the following survey.

The survey was conducted among the student Infantry officers attending the Command and General Staff College. The responses obtained

¹²Askins, "Marksmanship Training Changes Tested," Army Times, 2 December 1970, p. 40.

¹³Based on personal correspondence between Colonel Askins and the writer, 18 January 1971.

represent 560 years of experience in an Infantry battalion or below; 145 of the 560 years were while in combat; and, 124 years of experience in training new soldiers at Army training centers. This experience extends back to the Korean War, but is predominantly based on the experience of the past fifteen years to include combat in Vietnam. The figures cited above are based on the responses from 170 Infantrymen. The questionnaire consisted of nine separate questions plus the request for additional elaboration on any desired area. The most significant results were that over 90 percent responded that the most frequently detected personnel targets in combat were moving. And over 98 percent felt that moving personnel target training included in Infantry advanced individual training would be both desirable and feasible as it would improve the fire effectiveness of the Infantrymen. A copy of the questionnaire with results is located at Appendix B.

In addition to the responses of the direct questions, the value of the additional comments was great. Some of these are reflected below in order to convey the feeling of what could be described as the "average" Infantry officer. The recognition that these results are based entirely on subjective data does not decrease from their validity. It is impossible to scientifically collect the required data during an active combat situation, and it is equally impossible to duplicate the true and complete attitude of combat in an environment that would allow a scientific collection of data. Following are some of the comments received on the questionnaire.¹⁴

¹⁴Based on questionnaire responses obtained from members of the 1970-71 Command and General Staff College class, Ft. Leavenworth, Kansas. Officers are identified following each comment.

I have used rolling tires, balloons, and floating objects in water to simulate moving targets. I feel the most significant improvement in training should be at the TOE unit level. The training should encompass increased individual weapons firing, the development of new target devices, and more stress on moving targets. (Major Bill V. Holt)

In combat seldom received acceptable results against moving targets -- even though the volume of fire was somewhat great. (LTC James E. Davis)

Most targets hit were the result of mass fires. Gravity and weight differentials could provide the basis for many field expedients. (Major Ronald J. Jebavy)

Marksmanship training for the rifleman should be a continuing thing -- not just conducted during AIT and then forgotten. Only with a continuous program of training and practice can the Army expect to have riflemen who can effectively engage all types of targets at varying ranges and under varying conditions. (Major Richard C. Dickson, former commander of the Fifth Army Marksmanship Training Unit)

Trainfire, I think, was a step in the right direction, with emphasis on target detection and engagement under somewhat "combat" conditions. I feel that involving moving targets would be even more realistic and beneficial. (LTC Frank O. Gould)

The preceding material has primarily dealt with rifle marksmanship in general, with some special mention of the moving target aspect as part of the whole. While there appears to be a never ending abundance of information written concerning the need to improve military marksmanship training, there is an equally noticeable shortage of information addressing some of the specifically weak or deficient areas such as engaging moving personnel targets.

The preceding information, combined with the material contained in the official studies reviewed earlier, suggests the presence of a rifle marksmanship training problem and adds support to the premise that a major portion of the possible problem is due to a failure of proper training in moving targets.

Analysis of the Problem

A complete analysis of the problem must include a determination of why this training has not been conducted in the past. The implication is that no valid requirement has existed. This is difficult to understand, however, as a moving target phase was included in the original Trainfire course.¹⁵ Moving target training was also recommended in the Performance Evaluation of Infantrymen.¹⁶ Yet, it was never implemented. These two facts tend to confuse the issue as they are both the opposite of the action taken. That is, moving target training has been recommended but never implemented. To consider the two studies just cited as being invalid is not very feasible based on the recent recommendation of the Rifle Marksmanship Evaluation Study Group (RMESG) — to present moving personnel target training to the rifleman.¹⁷ This recurring trend suggests the presence of some limitation that prevents the accomplishment of a valid training requirement. Yet, no limitation has been identified in either of the three tests just mentioned.

A review, however, of marksmanship related tests conducted during the same time period does reveal a possible limitation — a suitable moving target system. The first such test was conducted in 1959 — six years after Trainfire was initiated. The purpose was to

¹⁵Human Resources Research Organization (HumRRO), Technical Report 22, Trainfire I: A New Course in Basic Rifle Marksmanship, Fort Benning, Georgia, October 1955.

¹⁶Human Resources Research Organization (HumRRO), Technical Report 81, Performance Evaluation of Light Weapons Infantrymen (MOS 111.0), Graduates of the Advanced Individual Training Course (ATP 7-17), Fort Benning, Georgia, December 1962, p. iii.

¹⁷U.S. Army Infantry School (USAIS), Moving Target Training, (Working Copy-Draft Only), Rifle Marksmanship Evaluation Study Group (RMESG), Weapons Department, USAIS, Ft. Benning, Georgia, December 1970, p. 2.

develop a close-in, realistic moving personnel target.¹⁸ The next test was of another moving target system conducted by the Infantry Board in 1969.¹⁹ The final test was conducted in 1970 by CDCEC. It was intended to establish the design of a moving personnel target system.²⁰ The conduct of this testing has extended for over ten years without the apparent development of a fully acceptable target system. It appears possible that engineering difficulties have prohibited the development of a suitable moving target system and have thus prevented the accomplishment of such training.

The Army should accept the responsibility to adequately train soldiers to hit moving personnel targets. It seems to be time to forgo the apparent search for the ultimate moving target system -- and settle for a system that will at least provide the rifleman with the opportunity to practice hitting moving targets and experience the difficulties of this type shooting. The following quote from von Clausewitz is particularly apropos.

It is of first importance that the soldier, high or low, should not have to encounter in war, things which seen for the first time, set him in terror or perplexity.²¹

¹⁸Human Resources Research Organization (HumRRO), Research Memorandum, Rifleman II: An Advancing Small Arms Target, Fort Benning, Georgia, March 1959, p. 1.

¹⁹U.S. Army Infantry Board, Engineering Test of MTV-200 Moving Target System, Fort Benning, Georgia, 19 August 1969, pp. ii and 1.

²⁰U.S. Army Combat Developments Command, Experimentation Command (CDCEC), Moving Target Exploratory Experiment (MTEE) (Draft), Fort Ord, California, 1 July 1970, pp. V-2-H-1; V-2-J-1; and, V-2-K-1.

²¹S.L.A. Marshall, Colonel, USA, Men Against Fire, (Washington: Combat Forces Press, 1947), p. 49.

To further delay seems unnecessary as moving target systems are available. The feasibility of moving target training is attested to by the current US Marine Corps training and the FBI training against moving personnel targets. This is further enforced by recalling that nearly 75 percent of the allied countries surveyed conduct moving target training during either individual or unit training. Even officers within the US Army have conducted moving target training at unit level using field expedient means. This final statement clouds the fact further as to why nothing, beyond talk, has apparently been done to incorporate this training Army wide.

Analysis of the problem suggests the main difficulty to be oriented to the mechanical hardware requirements of a moving target system.

Solution to the Problem

Comprehensive recognition of the problem is a necessary prerequisite for a full understanding of the solution. Simply stated, the results of the research suggest that the problem is the US rifleman requires training he is not presently receiving in order to be adequately prepared for combat. The training required is to engage moving personnel targets with aimed rifle fire. The means by which this training will be administered is the solution. The most critical complications of the solution appear to be the difficulties associated with the design, construction, operation and maintenance of a suitable moving personnel target system.

The key point of the solution is the training program should stress live fire exercises against realistically portrayed moving personnel targets. This establishes the most desirable circumstance. However, recognition that certain engineering and economic constraints will restrict development of the ideal program is accepted. Based on this recognition, solutions will be scaled upward from the minimum necessary program (a complete program includes range facilities plus time, personnel, etc. -- scaling will be based on facilities only.)

Live fire practice at moving targets is the minimum acceptable on the scale of solutions. This implies that the target presentation is not necessarily positioned in a realistic environment. However, the speed of the target movement must resemble the speed of a man running in combat -- and at such a speed as to require a lead to obtain a hit. Without movement at a realistic speed, training would be of questionable

value. The most realistically established speed was set at approximately 18 ± 1 feet per second by CDCEC.²²

By lessening the demand for combat realism, it appears that many of the engineering problems could be relieved. This is based on an understanding of the complexity of constructing a target system that will accelerate as rapidly as a man and yet be compact enough to present only a silhouette target the size of a man. Additional engineering problems related to realism involve the ability of the target to climb or descend hills, negotiate curves and turns, operate silently (i.e., no motor, cable or railroad sounds detectable by the firer) and to count and/or kill when hit.

The important point to be remembered of this minimum solution is the rifleman will at least obtain practical experience in firing at a moving target. This is worthy of emphasis as the only sure way to produce a good rifleman is by thorough training.²³

Moving up the scale of solutions to the optimum program is controlled predominantly by a lessening of the previously imposed constraints. To some extent, however, initiative and imagination can be significantly contributing factors to the success of a program. By actively seeking to improve marksmanship training, a program must inevitably be favorably influenced.

The optimum program should include realistic multiple moving personnel targets integrated with conventional pop-up targets on a

²²CDCEC, Moving Target Exploratory Experiment (MTEE) (Draft), op. cit., p. V-2-H-1.

²³Jac Weller, "Accuracy Is Everyone's Aim," The American Rifleman, January 1970, p. 24.

combat rifle range run in conjunction with a live fire tactical problem. Only in this way can the rifleman best be confronted with a variety of tactical situations complicated by the need to continue firing at the targets. The importance of fire and maneuver can be demonstrated and experienced by the riflemen in such a realistic combat training situation. The beneficial effects such an experience would have on Army trainees could be invaluable to them and the Army in their preparation for combat.

The fully integrated tactical program is similar to the Norwegian Army system.²⁴ This type of program is also supported by the proposal in *The American Rifleman* for improved marksmanship training. The proposal emphasized the need for realism and recommended an integrated marksmanship course that combines the features of "Trainfire," "Quick Kill," known distance, night, field and landscape firing techniques.²⁵

The problem of how to accomplish what is desired remains the greatest obstacle. A moving target system in the simplest form could suffice for the minimum acceptable program. A cart or sled towed by a vehicle could be constructed to mount one or more silhouette targets.

There are innumerable moving personnel target systems. Each has certain advantages and disadvantages. New systems or concepts are being developed continually. The decision facing the Army is to determine which system is the best. Based on the research conducted

²⁴Based on questionnaire response from Major Jacob Skipenes, Norwegian Army Student, Class 1970-71, U.S. Army Command and General Staff College, Fort Leavenworth, Kansas

²⁵John O. Cooper, Lieutenant Colonel, USA, Retired, "Can U.S. Troops Still Shoot?" Part IV: Ways to Improve U.S. Marksmanship," The American Rifleman, December 1969, p. 29.

as part of this thesis, the best system appears to be the one used by the German Army. It is well refined and has been operational sufficiently long to provide an experience factor of reliability.

The German system operates by a series of pulleys and cables. The power source can vary from hand cranked drums to automobile engines. The system found most satisfactory for the CDCEC moving target exploratory experiment was the German made M92 Target Towing Device (Flender Polydrive.) It consisted of either a Porsche or Volkswagen engine mounted in a 1½-ton trailer with pull-in and play-out drums for cable. The movement of the target was controlled by two sets of clutches and brakes plus dual speed controls. This same system is also scheduled to be retained for use by CDCEC during the main evaluation of the XM-19 SFR. The target towing device was originally obtained to power tank targets during testing of the TOW antitank weapon. The system pulled a cart constructed to operate on aluminum channel track.

A visit to Germany would be necessary for the responsible Army developing agency. This would enable observation of the moving target system in operation, permit a full survey of available equipment, and provide insight into techniques of realistic employment.

Development of a program of instruction should follow the securing of a moving target system. The program should stress the importance of live fire practical exercises at ranges from twenty-five to 250 meters. The targets should move at realistic speeds and portray the image of a running rifleman. Depending upon how the program develops, consideration could be given to a two speed concept -- a slow, walking unsuspecting target and a close-in, more rapidly moving target. The slower targets

should be placed at the greater ranges. The majority of target appearances should be located in the fifty to 150 meter range. The most desirable program would present a variety of situations to the firer -- laterally moving at all ranges and obliquely advancing or retreating targets. Situations presenting multiple moving targets would be ideal for advance stages of the training.

A good start point for a program of instruction would be the one recently proposed by the Rifle Marksmanship Evaluation Study Group.²⁶ It allows ten hours total time plus eighty rounds of ammunition. The first hour includes a lecture and demonstration in the techniques of firing against moving targets (use of leads.) This is followed by nine hours of practical exercise. The only modification necessary as a start would be to increase the speed from four miles per hour to at least eight miles per hour. This program may not be faultless -- but it would get the training started. Modification would be expected as experience is gained.

A problem is identified and the solution to the problem includes training. The ability to hit moving targets is dependent upon many physical variables -- but the single most important contribution to the development of this ability comes from training. Training must develop the two basic skills required to successfully engage a moving target-- leading the target and keeping the rifle moving.²⁷ This skill cannot be developed without practice.

²⁶U.S. Army Infantry School (USAIS), Moving Target Training, (Working copy-Draft Only), Rifle Marksmanship Evaluation Study Group (RMESG), Weapons Department, USAIS, Fort Benning, Georgia, December 1970, p.2.

²⁷Melvin Johnson, Jr., Practical Marksmanship, The Technique of Field Firing, (New York: William Morrow and Co., 1945) pp. 93,94, and 108.

The alert military leader constantly stresses training in the essential battlefield arts and skills. The old but absolute maxim: The more sweat on the training field; the less blood on the battlefield²⁸ --- certainly supports the solution to this problem.

²⁸Department of the Army, DA Pamphlet 525-2, Military Operation Lessons Learned Vietnam Primer, 21 April 1967, p. 15.

CHAPTER IV

CONCLUSIONS

Investigation of the need for moving personnel target marksmanship training to properly prepare a rifleman for combat was the purpose of the research conducted as part of this thesis.

A review of current marksmanship doctrine established a virtual non-existence of moving target training within the U.S. Army.

A review of previous studies concerned with rifle marksmanship training suggested that a valid need for moving target training had been established even though never implemented. This determination was reached based on the Trainfire experiment of 1954, the Performance Evaluation of Light Infantrymen of 1962, and the Rifle Marksmanship Evaluation Study Group's investigations conducted in 1970. The original Trainfire course included live range firing against moving personnel targets. The recommendation of the Performance Evaluation test was to include a moving personnel target phase within the rifle marksmanship course. And the conclusions of the Rifle Marksmanship Evaluation Study Group investigations included the need for firing practical exercises as part of moving target training.

The lack of action to implement moving target training indicates the possible existence of a limiting factor not identified in the previous reports. However, a review of other tests associated with marksmanship training provides some insight into the presence of certain restrictions.

These tests were the Rifleman II test conducted in 1959, the engineering test of the MTV-200 moving target conducted in 1969, and the Moving Target Exploratory Experiment (MTEE) conducted in 1970. Analysis of these associated tests suggests the possibility of engineering complications of design, construction, operation and maintenance that could serve to restrict the development of a moving target program.

Considering the presence of a need for moving target training and the existence of a restriction, investigation of the training of others was considered necessary. A review of the actions taken by others indicates that the possible presence of certain restrictions is not prohibitive to the conduct of moving target training. This tends to support the feeling that such training could be conducted by the U.S. Army.

In view of the data collected, the question arises of whether or not the U. S. Army should conduct such training. The results of the questionnaire survey and the review of periodicals add validity to the need by generally supporting a position that such training be conducted. The information obtained tends to indicate a strong concern throughout the military and civilian population of a recognized decline in military marksmanship ability -- and a need for more training.

In summary, it appears there is a definite need for moving target training to properly prepare a rifleman for combat. However, this need has not been met due to apparent engineering difficulties associated with the moving target system. This situation could be complicated due to a possible tendency of the U. S. Army to accept only the ultimate of it's equipment. Regardless of the reason, however,

the fact remains the U. S. soldier does not receive live fire training to engage moving personnel targets with a rifle.

Considering all of the above, the writer concludes that a need for moving personnel target training does exist and the means to accomplish it is available. A good beginning appears to be limited initiation of the program of instruction developed by the Rifle Marksmanship Evaluation Study Group. The German moving target system shows much promise for U. S. Army use. Continued study of the program during the initial limited stage could result in further development, refinement and improvement of the firing techniques and the hardware apparatus of the target system.

The single most significant result of the research appears to be the presence of sufficient data to support both the need and feasibility of conducting moving personnel target training. Given this, the time for action is long overdue.

APPENDIXES

Appendix A

QUESTIONNAIRE

TO: _____

PLEASE RETURN TO:

MAJOR WILSON, SECTION 13

To my fellow Allied Infantry Officers: I am certain that you have all heard the many moans and groans from the US officers as they receive questionnaire after questionnaire. I certainly don't want you all to feel left out or slighted (sorry, this is not NOFORN), besides, I urgently need the information only you can give to me. As explained on the attached questionnaire distributed earlier to US Infantrymen, I am investigating the need to include moving personnel target training as part of the rifle marksmanship course. You are invited to complete that questionnaire (if applicable) in addition to this one specifically designed to determine your country's approach towards this subject. Even though you may not be aware of some of the specific information I am requesting, I would appreciate your response to that which you can answer plus a statement that added details will have to be requested from your country. THANK YOU VERY MUCH FOR YOUR HELP.

Circle your
response

1. Is basic Infantry training mandatory for all new soldiers? Yes No
If yes, how long is the training period? (___ weeks)
2. Is rifle marksmanship training included in basic training? Yes No
If yes, how much time is programmed for it? (___ hours)
3. Is moving personnel (a running man) target training included
in your rifle marksmanship training program? Yes No
If yes, how much time is programmed for it? (___ hours)
and does this include live range firing against moving
targets? Yes No

NOTE: My definition of "moving personnel target" refers to a moving or running enemy soldier (target).

4. Do you have an advanced Infantry training course specifically
for those soldiers selected to be Infantrymen? Yes No
If yes, does this course include advanced marksmanship
training? and how much time is programmed for
it? (___ hours) Yes No
5. Does the advanced marksmanship course include moving personnel
target training? Yes No
If yes, how much time is programmed for it? (___ hours)
and does this include live range firing against moving
targets? Yes No

6. Are all military personnel required to either qualify or fire familiarization with their basic weapon each year? Yes No
If yes, are moving personnel targets included in the course? Yes No
7. Do Infantry units conduct moving personnel target training at the unit level? If yes, Please elaborate below. Yes No
8. Due to my unfamiliarity with your country, I quite possibly failed to address or properly identify a phase of your rifle marksmanship training that is considered significant. I would appreciate your comments concerning anything related to this subject, specifically the firing techniques presented during the conduct of the training and the physical establishment of a moving target range.

Appendix B

QUESTIONNAIRE

*** PLEASE RETURN TO
MAJ WILSON, SEC 13

TO ALL FELLOW INFANTRYMEN:

I am investigating the need to include moving personnel target training in the Army's rifle marksmanship training program. I would appreciate your cooperation in my attempting to establish an actual need for this training based upon your experience. I realize and accept the fact that you do not have any statistics to draw on for your answers and will have to rely on your "gut" feeling that results from daily association with small unit combat operations. My definition of "moving personnel targets" includes targets (possibly fleeting ones) that are either retreating, advancing, or moving laterally to the direction of fire.

	TOTAL	
	<u>Months</u>	<u>In Combat</u>
1. Please indicate your level of experience in a		
-- TOE unit	<u>6723</u>	<u>1745</u>
(Inf bn & below)		
-- Training center	<u>1426</u>	
(BCT or AIT)		
NOTE: The following questions relate to an Infantryman firing a rifle.		
	<u>Moving</u>	<u>Stationary</u>
2. During combat operations, what type of enemy personnel targets were most frequently - - - detected?	<u>91.4</u>	<u>8.6</u>
NOTE: Try to disregard detection - - engaged?	<u>81.7</u>	<u>18.3</u>
prompted by sound (gunshot)		
- - hit?	<u>40.9</u>	<u>54.1</u>
COMMENTS: _____		
	<u>Yes</u>	<u>No</u>
3. Were you satisfied with the observed or reported fire effectiveness against - - - moving targets?	<u>16.3</u>	<u>83.7</u>
- - stationary targets?	<u>38.1</u>	<u>61.9</u>
COMMENTS: _____		
	<u>Yes</u>	<u>No</u>
4. Do you feel that moving targets were as effectively engaged as stationary targets?	<u>15</u>	<u>85</u>
COMMENTS: _____		

5. Were your responses to questions 2-4 based primarily on experience - - -
 - - - in generally open, rice paddy type terrain (44.4), or
 - - in generally rugged, densely vegetated jungle terrain? (55.6).

COMMENT: _____

- | | <u>YES</u> | <u>NO</u> |
|---|-------------|-------------|
| 6. Do you feel that the fire effectiveness identified in question 3 needs to be improved against -- | | |
| moving targets? | <u>98.1</u> | <u>1.9</u> |
| stationary targets? | <u>84.7</u> | <u>15.3</u> |

COMMENTS: _____

- | | <u>YES</u> | <u>NO</u> |
|---|-------------|------------|
| 7. Do you feel that the fire effectiveness against moving targets could be improved by including it in AIT? | <u>98.2</u> | <u>1.8</u> |

COMMENTS: _____

- | | <u>YES</u> | <u>NO</u> |
|--|-------------|------------|
| 8. Do you feel that such training would be--desirable? | <u>97.6</u> | <u>2.4</u> |
| --feasible? | <u>98</u> | <u>2.0</u> |

COMMENTS: _____

- | | | |
|---|------------|-----------|
| 9. If not considered feasible, was this due to anticipated difficulties in engineering, operation, and maintenance? | <u>YES</u> | <u>NO</u> |
| | <u>83</u> | <u>17</u> |
- NOTE: Based on only 6 answers

COMMENTS: _____

10. Additional comments are welcome on any field expedient means previously experienced concerning moving targets. Thanks for the help.

I would appreciate your name on this questionnaire should I desire (and you be willing) to elaborate on any of your comments. Again, thank you for your time.

Rank	Name	Section
------	------	---------

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Books

- Hicken, Victor. The American Fighting Man. New York: Macmillan Co. 1969.
- Johnson, Melvin Jr. Practical Marksmanship, The Technique of Field Firing. New York: William Morrow and Co., 1945.
- Marshall, S. L. A., Colonel, USA. Men Against Fire. Washington: Combat Forces Press, 1947.

2. Government Documents

- Department of the Army. ASubjScd 23-14, Interim Automatic Rifle, M14 (Modified) and BAR Qualification. 15 October 1962.
- _____. ASubjScd 23-15, Engagement of Aerial Targets with Small Arms. 2 May 1968.
- _____. ASubjScd 23-16, Sniper Training. 23 November 1962.
- _____. ASubjScd 23-20, M16A1 Rifle Training. 31 August 1967.
- _____. ASubjScd 23-31, Rifle Marksmanship. 23 June 1964.
- _____. ASubjScd 23-36, Combat Firing and Close Combat. 10 August 1967.
- _____. ASubjScd 23-72, M16A1 Rifle Marksmanship. (Draft Revision Copy). October 1970.
- _____. ASubjScd 23-73, M16A1 Advanced Rifle Marksmanship. (Draft Manuscript). December 1969.
- _____. ATP 21-114, Male Military Personnel Without Prior Service. 27 July 1966.
- _____. DA Pamphlet 525-2, Military Operations: Lessons Learned: Vietnam Primer. 21 April 1967.
- _____. FM 21-75, Combat Training of the Individual Soldier and Patrolling. 10 July 1967.
- _____. FM 23-12, Technique of Fire of the Rifle Squad and Tactical Application. 10 October 1967.

- _____. FM 23-71, Rifle Marksmanship. 8 December 1966.
- Department of the Navy. U.S. Marine Corps. FMFM 1-3, Basic Rifle Marksmanship. 8 February 1968.
- U.S. Department of Justice, Federal Bureau of Investigation. "Firearms Training," FBI Law Enforcement Bulletin, May, 1969.
- _____. "New Combat Course," FBI Law Enforcement Bulletin. September 1962.

3. Periodicals and Articles

- Askins, Charles, Colonel, USA (Retired). "Marksmanship Training Changes Tested," Army Times, 2 December 1970, p. 40
- _____. "New Marksmanship Training Ideas Needed," Army Times, 7 October 1970, p. 45.
- Baeder, Irwin H. "Viet Vet Confirms M16 Training Needed," The American Rifleman, March 1970, p. 8.
- Cooper, John O. Lieutenant Colonel, USA, (Retired). "Can US Troops Still Shoot? Part III: Ways to Improve US Marksmanship," The Amer Rifle, December 1969, pp. 28-29.
- Corley, John T. Colonel. "New Courses for Old Traditions," Combat Forces Journal, June 1953, pp. 14-16.
- George, John B. "Can US Troops Still Shoot? Part II: How Riflery Helped in World War II," The American Rifleman, December 1969, pp. 24-25.
- Halsey, Ashley, Jr. Editor, "Can US Troops Still Shoot?" The American Rifleman, December 1969, p. 20.
- _____. "Our Needless Human Sacrifice: Ill-Trained Riflemen in War," The American Rifleman, December 1969, p. 16.
- Marshall, S.L.A., Brigadier General, USA (Retired). "Can US Troops Still Shoot? Part III: Vietnam: The Short-Range War," The American Rifleman, December 1969, p. 26-27.
- Tracy, R.J., Lieutenant. "Balloon Busting With a Purpose," Sentinel, Directorate of Information Services, Canadian Forces Headquarters, Ottawa 4, Canada, March 1969, pp. 16-18.
- Weller, Jac. "Accuracy is Everyone's Aim," The American Rifleman, January 1970, pp. 24-26.

4. Unpublished Works

Askins, Charles, Colonel, USA (Retired). Personal correspondence, 18 January 1971

Japanese Ground Staff Office, Tokyo, Japan. Personal correspondence between Lieutenant Colonel Tomosaburo Inamori, Individual and Unit Training Division, and Colonel N. Matsuura, Japanese Liaison Officer, Command and General Staff College, Fort Leavenworth, Kansas.

Human Resources Research Organization (HumRRO). Research Memorandum, Rifleman II: An Advancing Small Arms Target. Fort Benning, Georgia, March, 1959.

_____. Research Memorandum, Trainfire V: Extension of Research of Trainfire I Rifle Marksmanship Course. Fort Benning, Georgia, November, 1959.

Sarvis, Howard C. Motile Targets, (Unpublished manuscript on file at Human Resources Research Organization, Fort Benning, Georgia), 1953.

U.S. Army Combat Developments Command, Experimentation Command (CDCEC). Moving Target Exploratory Experiment (MTEE) (Draft). Fort Ord, California, 1 July 1970.

U.S. Army Command and General Staff College. Questionnaire responses and/or personal interviews of 170 U.S. Army Infantry officers attending Class 1970-71, Fort Leavenworth, Kansas, January 1971.

_____. Questionnaire responses and/or personal interviews with the following Allied Infantry officers attending Class 1970-71, Fort Leavenworth, Kansas, February 1971.

Dimoulis, Nicholas, Major. Greece.

Ewald, Jan, Captain. Denmark.

Kalenterides, Alex, Major. Greece.

Kassim, Mohammed, Major. Malaysia.

Mafi, Houshang, Major. Iran.

Manaf, Abdul, Major. Malaysia.

Shat-Ran, Jacob, Colonel. Israel.

Skipenes, Jacob, Major. Norway.

U.S. Army Infantry Board. Engineering Test of MTV-200 Moving Target System. Fort Benning, Georgia, 19 August 1969.

U.S. Army Infantry School (USAIS). Moving Target Training (Working Copy-Draft Only). Rifle Marksmanship Evaluation Study Group (RMESG), Weapons Department, Fort Benning, Georgia, December 1970.

_____. Personal correspondence between Captain Ronald E. Saxton, Project Officer, Rifle Marksmanship Evaluation Study Group (RMESG), Weapons Department, Fort Benning, Georgia and the writer, 10 February 1971.

U.S. Army Marksmanship Training Unit. Lesson Outline, GMU 22, Engaging Moving Targets. Fort Benning, Georgia, October 1970.

U.S. Marine Corps. Lesson Plan, Field Firing Exercise Code:W-15a. 2d Marine Training Regiment, Camp Pendleton, California, 10 September 1969.

_____. Personal correspondence and telephone interview between Major George Hubbard, USMC, Assistant S-3, 2d Infantry Training Regiment, Camp Pendleton, California and the writer, 17 February 1971.

5. Other Sources

Der Bundesminister der Verteidigung, Führungsstab des Heeres II 5. ZD 3-12, Schiessausbildung mit Handwaffen. Bonn, West Germany, October 1970. (Translation: Ministry of Defense, West German Army, Field Manual for Handweapons Marksmanship.)

Human Resources Research Organization (HumRRO). Bibliography of Publications (As of 30 June 1969). Alexandria, Virginia: HumRRO, 300 North Washington Street, September 1969.

_____. Technical Report 22, Trainfire I: A New Course in Basic Rifle Marksmanship. Fort Benning, Georgia, October 1955.

_____. Technical Report 41, Trainfire II: A New Course in Basic Technique of Fire And Squad Tactics. Fort Benning, Georgia, July 1957.

_____. Technical Report 81, Performance Evaluation of Light Weapons Infantrymen (MOS 111.0), Graduates of the Advanced Individual Training Course (ATP 7-17). Fort Benning, Georgia, December 1962.

Target Towing Plants and Target Equipment. Fritz Theissen and Sohne, Posener Strasse 156, Dusseldorf, West Germany.

U.S.S.R. Ministry of Defence, "Firing at Moving Targets," Small Arms Firing Fundamentals. (U.S. Army, Assistant Chief of Staff, Intelligence (ACSI), Code Number V-2117), 1968.