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For several decades infantrymen have argued over the requirements for the small arms weapons for the infantry. Battlefield experience in the Republic of Vietnam and the involvement of the author in weapons development testing raised doubts as to the validity of the US Army's approach to small arms development.

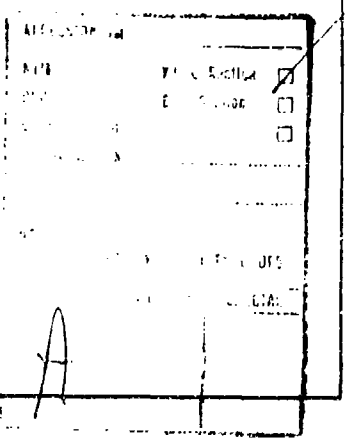
The proliferation of new weapons systems in the rifle squad, emerging doctrinal changes for employment of the mechanized infantry rifle squad, and the traditional views of many within the development community all point to a need for an improved small arm for the rifleman.

This study was undertaken to determine the proper role of the small arm in the mechanized rifle squad and investigate a requirement for an assault submachine gun light enough and small enough to improve the capability of the mechanized infantry squad to better perform its mission with increased firepower.

The results of historical studies and current doctrinal development literature are used to determine the proper role of the individual small arm in combat related to supporting weapons. Having established the role, the requirements for small arms is argued with attention to performance characteristics and relative importance in terms of combat effectiveness. The results of empirical research conducted by the US Army Combat Developments Command Experimentation Command, Psychological Research Associates and the US Army Infantry Combat Developments Agency as well as historical commentaries are used to support the argument.

Two essential elements of analysis serve as the basis of the argument. The first deals with the types of effective fire required by the infantry small arm, and the second, with expected engagement ranges requiring effective fire. Component factors of the elements of analysis are target effects, sustainability of effects, tactical employment of the rifle squad, effectiveness by range, small arms characteristics and the doctrinal role of the small arm.

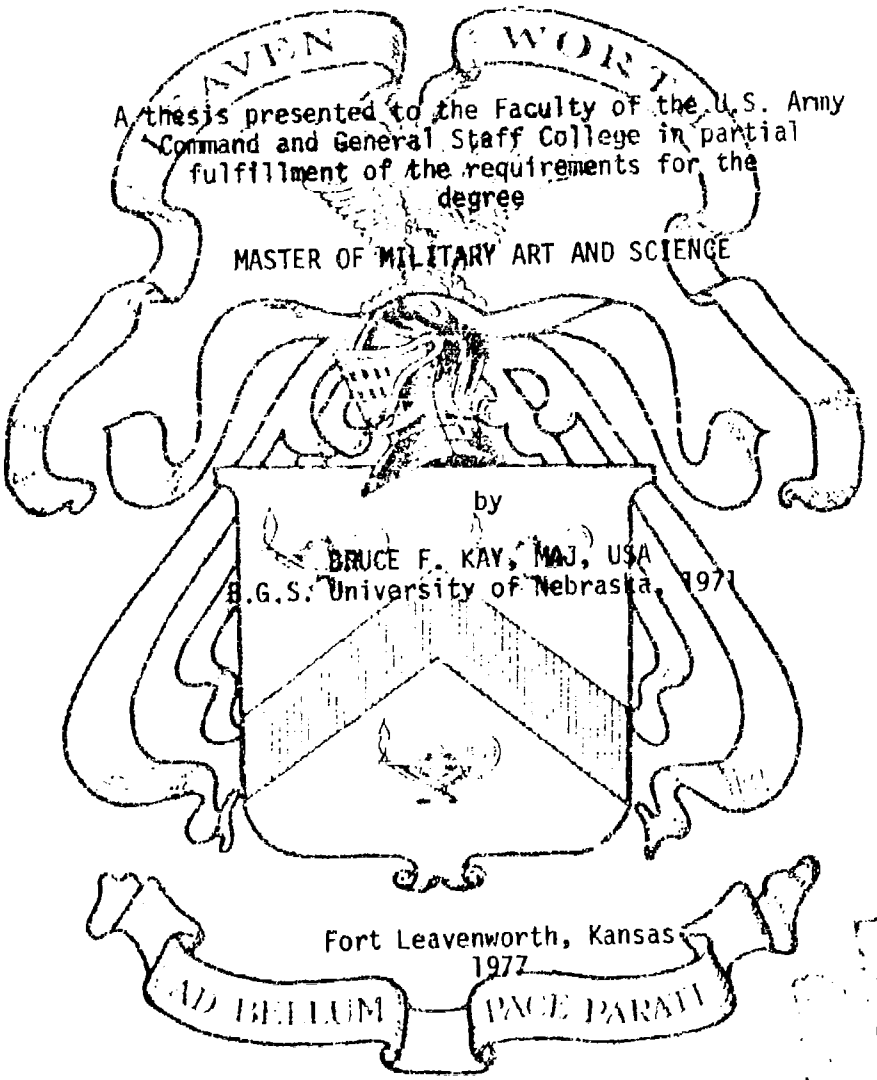
The conclusions are that the adoption of a compact, lightweight assault submachine gun would enhance the capability of the mechanized infantry squad to accomplish its mission by improving target effects, sustainability of effects, tactical versatility, mobility, and maneuver. Further, that the psychological impact on the esprit and élan of its users would collectively be advantageous.



AN ANALYSIS OF THE INFANTRY'S NEED FOR AN ASSAULT SUBMACHINE GUN

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

MASTER OF MILITARY ART AND SCIENCE



by

BRUCE F. KAY, MAJ, USA
B.G.S. University of Nebraska, 1971

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Bruce F. Kay, MAJ, USA
U.S. Army Command General Staff College
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Name of candidate Bruce Frederick Kay, Major, Infantry

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, Research Advisor

, Member, Graduate Research Faculty

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The opinions and conclusions expressed herein are those of the individual student author and do not necessarily represent the views of either the US Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

For several decades infantrymen have argued over the requirements for the small arms weapons for the infantry. Battlefield experience in the Republic of Vietnam and the involvement of the author in weapons development testing raised doubts as to the validity of the US Army's approach to small arms development.

The proliferation of new weapons systems in the rifle squad, emerging doctrinal changes for employment of the mechanized infantry rifle squad, and the traditional views of many within the development community all point to a need for an improved small arm for the rifleman.

This study was undertaken to determine the proper role of the small arm in the mechanized rifle squad and investigate a requirement for an assault submachine gun light enough and small enough to improve the capability of the mechanized infantry squad to better perform its mission with increased firepower.

The results of historical studies and current doctrinal development literature are used to determine the proper role of the individual small arm in combat related to supporting weapons. Having established the role, the requirements for small arms is argued with attention to performance characteristics and relative importance in terms of combat effectiveness. The results of empirical research conducted by the US Army Combat Developments Command Experimentation

Command, Psychological Research Associates and the US Army Infantry Combat Developments Agency as well as historical commentaries are used to support the argument.

Two essential elements of analysis serve as the basis of the argument. The first deals with the types of effective fire required by the infantry small arm, and the second, with expected engagement ranges requiring effective fire. Component factors of the elements of analysis are target effects, sustainability of effects, tactical employment of the rifle squad, effectiveness by range, small arms characteristics and the doctrinal role of the small arm.

The conclusions are that the adoption of a compact, lightweight assault submachine gun would enhance the capability of the mechanized infantry squad to accomplish its mission by improving target effects, sustainability of effects, tactical versatility, mobility, and maneuver. Further, that the psychological impact on the esprit and élan of its users would collectively be advantageous.

ACKNOWLEDGEMENTS

One of the greatest deficiencies inherent in any large organization is the lack of time to reflect on where it is and where it is going. The day to day, hour by hour crisis-like atmosphere precludes any meaningful attempt to reflect on what it is we are trying to do.

Because of this frenetic pace, little time is left to critically examine and learn from the historical experience. The examples of repeated mistakes and the relearning of fundamentals are too numerous to mention. It was with these thoughts in mind that this study was undertaken.

During the research and writing of the study I was at times euphoric and at other times in a state of deep depression and discouragement. Euphoric because the truth seemed so simple and clear; depressed and discouraged because the truth seemed to become cloudy and not so clear.

During the periods of euphoria my research advisor, Major John E. Miller quickly demonstrated to me that there was much work to be done. In particular I wish to express my sincere thanks to John for his guidance in development of the methodology used in the study. His comments and suggestions throughout the study were needed and deeply appreciated.

I want to thank my wife, Vicki, for her encouragement to continue the effort during periods of discouragement. A special

thanks too, to my children, Brett, Shana and Kerri for their understanding and forbearance while I have been involved with this study.

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CHAPTER I

"The firearm is everything, the rest nothing"

-Napoleon Bonaparte-[1]

THE PROBLEM

Throughout history the United States Army has been the target of criticism for its handling of rifle development. In particular, since World War II several Congressional investigations concerning the development and procurement of M-14 rifles and M-16 rifles have been conducted.[2]

For the last few decades infantry rifle platoon leaders have argued whether or not the infantry needed a light, compact, effective assault submachine gun.* Battlefield experience in the Republic of Vietnam, extensive readings on war experiences, and active involvement in a weapons test conducted by the Combat Developments Command Infantry Agency in 1965, have raised serious questions in the author's mind about the Army's approach to small arms development. It is suspected that the planning, development and adoption of the infantryman's rifle by the US Army has been predicated on wrong principles.

*Assault Submachine Gun. A submachine gun is usually chambered for a pistol sized cartridge. It is lighter, shorter and more compact than an assault rifle and may or may not have a selective rate of fire capability. The Assault Submachine Gun fires an intermediate cartridge and has a selective rate of fire capability. The size, configuration and weight are the same as for a submachine gun.[27]

The rifles adopted by the US Army during the last forty years have had a high probability of killing the enemy, given a hit, but a low probability of hitting him. Until the adoption of the M-16 assault rifle, in 1967, the Army seemed to prefer heavy, hard-hitting, .30 caliber rifles without a thorough appreciation of the disadvantages of excessive recoil, noise, weight and size, plus the difficulties associated with achieving and maintaining fire superiority in combat.[3]

To the infantryman engaged in close combat, firepower* capability and survivability become overriding considerations. Survivability is usually improved as firepower is increased. In order for the infantryman to achieve firepower he must be able to deliver effective fire on the enemy. Firepower cannot be measured solely by the theoretical volume of fire which is delivered to the target. Inherently, the actual volume of fire delivered, the accuracy of the fire, target effects, and the distribution of fire within the target area, must be considered. Theoretically, the volume of fire is dependent on the weapon used. However, the actual volume of fire, its accuracy, distribution, and overall effectiveness must be evaluated in terms of how the fire is used by a combat element.[4]

In an army, the man and the firearm provided him is the basic weapon system. However, this weapon system cannot be considered in isolation. The infantryman functions as part of a rifle squad, and as such, must be viewed in the context of that squad. The rifle squad**

---

*Firepower. The capacity of a combat unit or weapon to deliver prompt and effective fire on a specific target for a sustained period of time.[31]

**Rifle Squad. The smallest infantry maneuver element which has a fixed size. It contains eleven men when manned at full authorized strength. Contains a squad leader, two fire team leaders and when mechanized, a designated rifleman/driver.[34]

is the smallest combat element in the infantry which contains different types of weapons in a prescribed mix and is equipped to conduct close combat. For the purposes of this research the rifle squad will be used to evaluate the firepower capabilities of the infantryman and his weapon.[5]

One of the primary goals of close combat by the infantry is to gain fire superiority.* Small arms fire superiority permits mission accomplishment. Fire superiority requires that the infantry unit engaged in a fire fight achieve better target effects than the enemy. Commensurate with target effects is the need for sustainability of the target effects. Both the target effects and sustainability must be related to time. Moreover, the two-sided aspects of a fire fight require that the achievement of target effects should be accomplished faster than the enemy can achieve them.[6]

From the squad leader to the division commander, firepower and the ability to achieve fire superiority are really at the core of winning the battle. Although the division commander is more concerned with relative combat power in terms of tanks, artillery, and other supporting weapons, the central point is firepower and fire superiority.

The firepower capability of the rifle squad is the most important aspect of the squad's purpose. For the squad to be successful in the accomplishment of its mission it must be able to deliver effective fire on the enemy. The Army calls the firepower capability of a rifle squad "killing power".[7] This term represents a serious flaw in the

*Fire Superiority. Fire which is effectively superior to that of the enemy. Usually measured in terms of volume of fire, accuracy and delivered against a specific target or target area.[32]

Army's approach to development of the infantryman's rifle. The concern for lethality of the rifle and the ranges at which that lethality is required have continually led the Army to produce a rifle that is unnecessarily cumbersome.

In 1962, the Infantry Combat Developments Agency conducted a Rifle Evaluation Study. The study stipulated that the lethality requirements for the rifle should be:

> Point target capability at all ranges out to 400 meters.[8]

The stated rationale for the requirement was to match the effective range of the Soviet AK-47 assault rifle.* (See Figure 1)

Effective Range -	Semiautomatic Fire -	400 meters
	Automatic Fire -	300 meters
Maximum Lethal Range	-	1500 meters

Figure 1.[9]

AK-47, Soviet 7.62mm Assault Rifle

It was further stated in the study that the infantryman, "can detect and effectively engage" individual personnel at a range of 400 meters. The study also pointed out that the range of battle targets "rarely" exceeds 270 meters.[10]

Combat experience in World War II, Korea, and Vietnam has

*Assault Rifle. A rifle by general definition, is a shoulder fired, air-cooled firearm, which fires a spin-stabilized projectile. Because of its tactical role, the rifle fires a cartridge larger than that chambered by pistols and submachine guns. The Assault Rifle fires an intermediate cartridge (may be the same caliber, but utilizes shorter cartridge case) and is usually shorter and lighter than the rifle. Because of its tactical role it utilizes a large magazine capacity and has a selective rate of fire capability. The M-16 would be classed as an Assault Rifle.[26]

revealed that a deficiency exists in the infantryman's ability to hit enemy targets in combat with the rifle. Aimed fire connotes the use of a sight and the time to aim at the target. While this is possible on a target range, the situation in combat is quite different. In combat, targets are fleeting and moving. Moreover, combat stress and the pressure of time (how long will a target be visible? 1 second or 5 seconds?) and the factor of personal vulnerability all argue against aimed fire as a feasible technique of fire. The fact is, that the state of the art of aimed fire at point targets is such, that improvements in effectiveness are no longer possible. The solution is to point the rifle and fire without taking the time to sight.* Combat experience has also shown that one of the primary purposes of small arms (rifle fire) was to neutralize or suppress an area, or pin down the enemy to allow maneuver of friendly forces or prohibit the maneuver of the enemy force while heavier supporting arms were being brought to bear. This technique is referred to as area fire. Increasing the volume of fire will increase target effects. It is important to note that the increase in volume of fire does not necessarily result in an increase in target effects in the same ratio. The proportional increase in effectiveness, as a result of increased volume, have not been measured accurately. Recent research and development objectives for the rifle still call for an improvement in effectiveness of aimed fire.[11] The Army has recognized the need for automatic fires in the rifle squad.

The current Army position concerning automatic rifles recognizes

*Since 1967, training of soldiers has included the "pointing" technique of rifle firing. The method is taught by using a BB gun and tin can lids. It is designed to develop confidence and demonstrate the accuracy of such a technique.

the occasional need for the fully automatic capability. Automatic weapons have been a part of the rifle squad organization since the adoption of the Browning automatic rifle in the 1930's. The aforementioned requirement to increase effectiveness of area fire by increasing the volume of fire is best achieved by automatic fire. However, the Army feels that semiautomatic fire in combat is the norm and that automatic fire would only be used in certain situations such as:[12]

> 1. Defending against "human sea" type attacks by enemy personnel. Such tactics were employed in the Korean conflict and, conceivably, could be used in the future to overwhelm defenses by numerical superiority.
>
> 2. Attack and defense in close terrain situations similar to those currently encountered in Vietnam. In these situations an immediate heavy volume of countering automatic firepower on enemy personnel or positions generally is more important than semiautomatic aimed fire at fleeting targets.
>
> 3. In the conduct of the assault phase of the attack, a selective automatic fire capability will permit the additional heavy fires needed to pin enemy forces in their foxholes or trenches and prevent them from delivering effective return fires.[13]

The Army continues to deem necessary that the rifleman, when firing in the automatic role, be "capable of directing accurate and effective aimed fire against area targets at ranges of at least 400 meters; and at even greater ranges, lethal fire with reduced accuracy and effectiveness".[14] There are in fact several advantages to the rifleman using automatic fire against area targets, but "accurate and effective aimed fire" at ranges of 400 meters and farther is not one of them.

Brigadier General (Ret) S.L.A. Marshall found that other advantages were possible when and if riflemen were armed with automatic rifles. His reports from the Korean battlefield indicate that in combat

men tend to rally around automatic weapons fires, and that the ratio of personnel firing their weapons is much greater for those armed with automatic weapons than those armed with semiautomatic weapons.[15]

The increase in ammunition expenditure that is expected when every rifleman has an automatic fire capability would have to be offset through training and good command control methods. Commensurate with an increase in the number of automatic rifles is the requirement for the infantryman to carry more ammunition. This problem is related to the bulk of the load to be carried as well as the weight of the ammunition itself. The adoption of the 5.56mm weapon system has permitted the infantry rifleman to increase the amount of ammunition carried by 250 percent over the old 7.62mm system without adding additional weight to his already burdensome load of fifty pounds.

PURPOSE

The purpose of this thesis is to determine the proper role of the individual small arm in combat as related to supporting weapons. A requirement for the development and procurement of an assault submachine gun light enough and small enough to enable every infantryman in the rifle squad to better perform his mission with improved firepower will be investigated. To do this the variable and interacting weapons performance characteristics needed to satisfy small arms requirements and their relative importance in terms of combat effectiveness* will be examined.

---

*Combat effectiveness. Necessarily depends on military judgement or military experience. An evaluation of the man-weapon system or rifle squad system in terms of combat effectiveness, implies that the things measured must be valuable qualities of the systems, in the context and environment of their use.

BACKGROUND

Since the late 1930's to the present, the Army has insisted that the infantryman's rifle should have a maximum range of almost three kilometers and be capable of aimed, lethal fire of over 400 meters. Though it became a battle-tested weapon of a global war, John Garand's M-1 rifle was cursed for its weight, belittled because of its limited eight-round clip that could not be reloaded until empty, and damned because it could not fire as fast as enemy assault rifles. During the Korean conflict the infantryman was still armed with the M-1 rifle. Again, there were complaints about Americans being sent to war with obsolete weapons.[16]

After the Korean War, while the NATO Alliance was still in its formative years, US Army planners were told to consider interchangeability and standardization of weapons for NATO forces. The US Army seemed convinced that it needed a single weapon to replace the assortment of different weapons which had accumulated in the inventory since World War I.* This alone seemed to demonstrate a need for a broad range of small arms capabilities which a single weapon would have difficulty in providing. A congressional committee then investigating the adoption of the M-14 rifle had the following comment:

> In order for the new rifle to replace these four weapons effectively, it was necessary that it possess the long-range pin-point accuracy of the M-1 rifle; the selective semi-automatic and full automatic fire feature of the carbine; the short-range burst fire capability of the M-3 submachine gun; and the long-range automatic sustained fire capability of the Browning automatic rifle.[17]

*There were then four - the M-1 rifle, the carbine, the Browning automatic rifle and the submachine gun.

In 1958, the Army officially adopted the M-14 rifle. In the words of then Secretary of the Army Brucker:

> The new system . . . gives the modern Army a better and lighter rifle . . . while cutting the number of weapons in the small arms system from seven* to two . . . adopts a cartridge (7.62mm) that will be standard also for our NATO allies.[18]

The Army was emphatic in its pronouncement that the M-14 rifle was vastly superior to the M-1 rifle. Suddenly, however, in late 1963, after an investment of $500,000,000, the M-14 program was abruptly halted. In fact, all M-14 production lines were ordered to be closed upon completion of current contracts.

This action was the result of a report prepared by the Comptroller of the Defense Department in September 1962, which concluded that the M-14 rifle was "completely inferior" to the M-1 rifle of World War II. Further, that the M-14 rifle was also inferior to the AR-15.** Several tests and reports by the Department of the Army resulted in the decision to cancel the M-14 program. In August 1964 the Defense Department, then headed by Secretary McNamara, issued a report asserting the superiority of the M-16 (AR-15) over the M-14 rifle. The report emphasized the reliability, durability and ruggedness of the M-16 rifle.[19]

In 1964, the Army reluctantly procured 85,000 M-16 rifles as a one-time only purchase for special issue to Army airborne, air assault, and Special Forces units. The foot-dragging of the Army was revealed in 1966 by Secretary of Defense McNamara. While testifying before a

---

*The Secretary was probably including the light machinegun, the M-1 carbine and the Thompson submachine gun in his calculations.

**AR-15 was the original designation of the M-16 rifle during development testing by Armalite Corporation before adoption by the US Army.

House Committee on January 28, 1966, he had this to say about the M-16 rifle:

> It is a new weapon. I couldn't get them to take those M-16 rifles out there two years ago. We just arbitrarily sent ten thousand or something like that. We said bury them if you want them (SIC), but take this rifle and examine the possibility of a light, high-rate-of-fire weapon over there.[20]

In December 1965, the Commander, United States Military Assistance Command Vietnam, urgently requested additional M-16 rifles for Vietnam.[21] The request was based on the experience of US Army units which had been using the M-16 rifle in Vietnam. In his message the Commander, General William C. Westmoreland, pointed out that the use by the enemy of automatic small arms fire gave them a definite superiority in the short sudden engagement characteristic in South Vietnam. Later in that same month, General Westmoreland informed the Department of Defense that the ultimate equipping of all US Army, Vietnamese and all other free world forces with M-16 rifles would be necessary to offset the enemy's fire superiority.[22]

The M-16 rifle is currently the standard rifle for US Army infantry rifleman. It is considered to be as effective as the Russian AK-47 assault rifle.[23*] The primary advantage of the M-16 is its light weight. However, the length of the M-16 (38 inches) is a disadvantage. The AK-47 is only 34 inches long. The length of the M-14 rifle, which was replaced by the M-16, was 6 inches longer (44 inches). The adoption of the M-16 rifle by the Army was a step in the right direction. However, it will be shown that it is not enough.

---

*AK-47 assault rifle w/100 rounds weighs 16.4 pounds which is 60 percent more weight than M-16 w/100 rounds.

METHODOLOGY

The methodology to be used will require the use of essential elements of analysis (EEA) and investigation of various levels of effective fire factors pertinent to the EEA.

The EEA are concerned with the types of effective fire required by infantry small arms weapons in the context of Army doctrine for the employment of the mechanized rifle squad and the expected ranges of engagement by the small arms of the squad.

The review of related literature in Chapter II will attempt to provide answers to several research questions which are specifically concerned with the effectiveness of small arms fire and are directly related to the EEA. The questions to be investigated are:

1. What ranges of engagement are necessary for effective small arms fire?

2. What are the desired target effects of small arms fire in close combat?

3. What type of small arms fire (automatic or semi-automatic provides the desired target effects?

4. What are the correlational impacts of the psychological effects of small arms fire?

5. What are the comparative effects (lethalities and ballistic characteristics) of different rifle types and calibers?

6. What is the planned doctrinal employment of the mechanized infantry rifle squad?

The historical development of the US Army rifle is a necessary part of the thesis. Often intraservice politics and parochial views had as much to do with what rifle the Army adopted as the actual

testing of the weapons themselves. The period to be considered will be from 1930 to the present. This period is significant because it involves the three major rifle systems used by the Army in World War II, Korea, and Vietnam. The development and procurement of the rifles used by the US Army during this period will be developed in Chapter II, Review of Related Literature.

During the review of related literature it will be necessary to analyze qualitatively the uses and effects of infantry small arms fire. This part of the examination will also be in the historical context developed in Chapter II. A quantitative examination of the scientific and technical data available in the numerous weapon studies which have been conducted by the combat developments community and the Infantry Board will also be developed in Chapter II. The quantitative examination will deal with the requirements and effects of small arms. This part of the study will be initiated in Chapter II and expanded upon in Chapter III, Methodology.

A supporting hypothesis will be required to examine the question of what lethalities are required and the ballistic characteristics thereof. In simplified terms, what is the optimum caliber to achieve desired target effects? An investigation of this question will be developed in Chapter II.

An examination of current and emerging doctrine for the employment of the mechanized infantry squad will be discussed. This facet of the thesis will also be developed in Chapter II within the historical framework, but will be imbedded within the matrix of the EEA in Chapter III.

The results and findings will be analyzed in Chapter IV,

Findings. Conclusions, specific recommendations and solutions to identifiable shortcomings will be presented in Chapter V. Tactical or doctrinal implications will also be discussed in Chapter V.

HYPOTHESIS

A compact light-weight, assault submachine gun for the infantryman will improve the combat effectiveness, firepower, and the ability to achieve fire superiority.

DELIMITATIONS

Although much of the scope of this thesis has been alluded to earlier and pertinent delimitations established, it is important that they be fully understood and appreciated by the reader.

The period to be examined in the literature search will be limited to 1930 to the present. There will be limited reference to emerging doctrine. The weapons to be analyzed in the context of the rifle squad during that period will be only those pertinent to the rifle squad. Although there will be some mention of the M-1 and M-2 carbine, the M-3 submachine gun, the Thompson submachine gun and the Browning automatic rifle (BAR), an in-depth analysis of these weapons will not be attempted. Although these weapons were often found in the rifleman's hands, with the exception of the BAR, none were a standard item of issue to the rifleman of the infantry squad.

The basic weapons in question will be the M-1 Garand, the M-14 and the M-16. These weapons will be used as the basis for examining the development and procurement of rifles within the Army and the uses, requirements and effects of small arms fire in the contemporary context.

ASSUMPTIONS

The basic assumption to be made is that the rifle squad will, at times, be required to close with the enemy in ground combat. In spite of the myriad of weapon systems other than the rifle found in the Table of Organizations and Equipment (TOE), the infantry rifle squad will continue to be a necessary part of the combined arms team in battle.

While the infantryman may move over the battlefield in armored personnel carriers or helicopters, he cannot ignore the use of terrain, camouflage, marksmanship, stealth, and the basic tactics of fire and maneuver which imply frequent dismounted operations. The individual weapon of the infantryman will remain the basic weapon for close combat with the enemy.

DEFINITIONS

The majority of terms used throughout this study are standardized Department of the Army terms. Some definitions have been adopted from other sources. In an attempt to circumvent misinterpretation and to assist the reader in fully appreciating the author's thesis, pertinent definitions are provided in the body of the text.

CHAPTER I

FOOTNOTES

[1]John S. Tompkins, The Weapons of World War III (New York: Doubleday and Company, Inc., 1966), p. 86.

[2]US Congress, Senate, Committee on Armed Services, Preparedness Investigating Subcommittee, Special M-16 Rifle Subcommittee, Report, 90th Congress 2 September 1968 (Washington: Government Printing Office, 1968), p. 1.

[3]Tompkins, p. 119.

[4]US Army Infantry Combat Developments Agency, "Rifle Evaluation Study" (Fort Benning, Georgia, 1962), p. 3-9.

[5]US Army Infantry Combat Developments Agency, p. B-1.

[6]US Army Combat Developments Command Experimentation Command, "Small Arms Weapon Systems" (Fort Ord, California., 1966), p. 2-41.

[7]US Army Infantry Combat Developments Agency, p. B-9.

[8]Ibid., p. I-C-1.

[9]Ibid.

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[11]Ibid.

[12]Ibid., p. II-C-1.

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[14]Ibid., p. II-C-2.

[15]S.L.A. Marshall, "Infantry Operations and Weapons Usage," in Korea, Winter 1950-51," ORO-R-13, (Johns Hopkins University, 27 October 1951), p. 73.

[16]Frank T. Rathbun, "The Rifle in Transition," Army, August 1963, p. 19.

[17]US Congress, Senate, Committee on Armed Services, Preparedness Investigating Subcommittee, The M14 Rifle Program, Special Report, 87th Congress, 1st Sess., 1961 (Washington: Government Printing Office, 1961), p. 21.

[18]Rathbun, p. 19.

[19]US Congress, Senate, Committee on Armed Services, Preparedness Investigating Subcommittee, Special M-16 Rifle Subcommittee, Report, 90th Congress, 2 September 1968 (Washington: Government Printing Office, 1968), p. 1.

[20]Tompkins, p. 124.

[21]James L. Collins, The Development and Training of the South Vietnamese Army (Washington: Department of the Army, 1975), p. 101.

[22]US, Congress, Senate, Committee on Armed Services, Preparedness Investigating Subcommittee, Special M-16 Rifle Subcommittee, Report, 91st Congress, October 1968 (Washington: Government Printing Office, 1968), pp. 2-3.

[23]Jac Weller, "Good and Bad Weapons for Vietnam," Military Review, October 1968, p. 60.

[24]Dictionary of United States Army Terms (Washington: Government Printing Office, (June 1972).

[25]Ibid.

[26]Frank A. Moyer and Robert J. Scroggie, Combat Firing Techniques (Boulder: Paladin Press, 1971), p. 74.

[27]Authors definition used to delineate the specific characteristics of the type submachine gun envisioned n the context of the hypothesis.

[28]Author definition based on effectiveness measurement criteria used in the Small Arms Weapon Systems (SAWS) Study conducted by the US Army Combat Developments Command conducted in 1965-1966.

[29]Dictionary of US Army Terms.

[30]Ibid.

[31]Authors definition

[32]Ibid.

[33]Ibid.

[34]Ibid.

CHAPTER II

REVIEW OF RELATED LITERATURE

OVERVIEW

The review of related literature was designed to accomplish several objectives.

Qualitative Assessment:

An historical review of the development and procurement of infantry rifles from 1930 to the present. A discussion of the uses of small arms during World War II, Korea and Vietnam in terms of combat effects, firepower and fire superiority capabilities.

Quantitative Examination:

An examination of test and evaluation data developed since World War II which deals with the analytical aspects of infantry small arms. Includes the evaluation of different types of weapons and their potential effects.

Theoretical review:

A review of current and emerging doctrinal concepts for the planned employment of the infantry rifle squad and the tactical application of the organic and supporting weapons in terms of firepower, fire superiority, and combat effectiveness.

HISTORICAL DEVELOPMENT AND PROCUREMENT

The basic weapon that the US Army adopts as standard for its infantryman has always seemed to be a topic of interest and debate to

the American public. In particular, of the eight rifles* the US Army has adopted as standard since the Revolutionary War, at least three have generated some controversy: the M-1 Garand, the M-14, and the M-16.

The adoption of the M-1 Garand in 1936 generated great controversy among supporters of another "contender", the Johnson semiautomatic rifle. The M-1 Garand was also opposed by people who perennially oppose change on general principles. The argument between supporters of the Johnson rifle and advocates of the M-1 Garand during the 1930's was analogous to the M-16 versus M-14 controversy in the late 1950's.[1] Although the original Garand was designed in 1919 in caliber .276, John C. Garand decided, or was persuaded, to adapt the M-1 rifle for the then standard .30-06 cartridge.

The development of the M-1 rifle and the subsequent controversy was significant because of the argument over which caliber was the best for a semiautomatic rifle. In 1928 the War Department convened a board to recommend a specific caliber for the future development of the semiautomatic shoulder rifle. This board of officers was called the "Pig Board" because the ballistic tests used live pigs as targets. The board investigated three calibers, caliber .30, .276, and .256. The board concluded that if the .30 caliber cartridge was used in a semiautomatic rifle, the rifle "would be as heavy, if not heavier," than the then standard Springfield M-1903. The board concluded that in order to develop a lighter weapon, a small caliber, high velocity round

*The eight "rifles" are: flintlock musket-1795, Caplock rifle-1841 (erroneously called "1842"), Springfield Model 1873, Krag-Jorgensen caliber .30-1892, Springfield Model 1903, M-1 Garand-1936, M-14 rifle caliber 7.62mm (NATO Standard)-1957, M-16A1 caliber 5.56mm-1967.

would have to be used. Further, that the small, high velocity rounds were more lethal within the expected ranges of engagement of a rifle.[2]

The board recommended that the caliber .276 cartridge be adopted and that it be used in a semiautomatic rifle. The M-1 Garand (.30 caliber) was tested against several semiautomatic rifles (.276 caliber) in 1929. However, the Ordnance Department of the Army cited problems in supply and increased costs if the .276 caliber was adopted.[3] In 1932, General Douglas MacArthur, Army Chief of Staff, sided with the Ordnance Department and decided that any future weapon would use the standard .30 caliber cartridge.[4] The caliber .30 Garand M-1 was adopted by the Army in 1936 at the time the caliber .276 Johnson semiautomatic rifle was introduced. During the period 1936-1939, "dozens of minor alterations (to the M-1), to improve functioning or facilitate manufacturing," were made.[5] Although the Johnson rifle (.276) was tested against the M-1 Garand in 1940, the die had been cast for the use of the M-1 Garand during World War II.

The M-1 Garand .30 caliber rifle was the basic small arm used by the infantryman in World War II. The rifle was 43.6 inches in length and weighed 10.5 pounds when loaded with the eight round clip.[6] The M-1 was a semiautomatic rifle which meant that it could only fire one shot with each pull of the trigger. Although it was considered a durable weapon and, by most accounts, reliable under combat conditions, the M-1 lacked firepower when compared to the automatic weapons of the time. If the infantryman had the time to aim it was an accurate weapon at ranges exceeding 500 meters. However, combat experience from World War II indicates that in close combat men did not have confidence in the weapon's effectiveness.[7]

When compared with the previous rifle used by the US Army infantry* the M-1 Garand was an improvement. Firepower was increased due to the semiautomatic capability. The infantryman with the M-1 in his hands was able to increase his rate of fire which provided more firepower to the battle. In an excellent evaluation of the effectiveness of the M-1 Garand rifle in World War II, Lieutenant Colonel (Ret) John B. George in his book, Shots Fired in Anger, has this to say:

> The Garand or M-1 rifle was probably the very best in the war, and the best military hand weapon ever placed on the battlefield in appreciable numbers. Its employment had the very desirable effect of doubling the strength of our front-line platoons, in either defense or attack. . . .
>
> A soldier is able to shoot faster, to be more alert, keep his senses glued where they should be - away from the rifle he is shooting and on the target. Such a weapon allows the doughboy to fire several shots in rapid succession, trebling the effectiveness of his fire against briefly exposed or fleeting targets, which are the types most often encountered in combat. He does not have to aim at the exact outline of an enemy concealed in the brush, he can blaze away at an approximate location and distribute his fire so that he will be very likely to score a hit. And there is no bolt to be awkwardly fumbled between shots.[9]

In spite of those words of praise, Colonel George was perceptive enough to realize that the improved effects of the M-1 rifle were based on established standards of the time. Established standards are usually insufficiently critical. The established standards for the infantryman's small arm are based upon weapons that have already been produced and adopted, mostly by the armies of other nations. The historical perspective can only provide a part of the stimulus for

*US Rifle, caliber .30, Springfield M-1903. 43.21 inches in length and weighed 8.69 pounds, empty. Bolt action, 5 shot magazine capacity.[8]

weapons improvement.

During World War II and the Korean War, the M-1 rifle proved cumbersome because of its weight and inadequate against the human wave tactics of the enemy due to its relative low firepower capability.

The experience of the uses and requirements of the infantryman's rifle during both World War II and Korean precipitated the development of the M-14 rifle. In June 1945 the US Army stated a requirement for a lightweight automatic rifle. From 1946 to 1950, several feasibility studies were conducted and some ten different rifle designs were evaluated in an attempt to satisfy the Army's requirement. As a result, the M-14 rifle was found to be the best candidate for competitive testing. From 1952 to 1956 the M-14 rifle was compared with the Belgian Fabrique Nationale (FN), 7.62mm rifle. The M-14 rifle was restricted to the NATO standard round 7.62mm which had been adopted in 1953. This restriction all but precluded the development of a truly lightweight weapon. The procurement and development of the M-14 was slowed due to "a lack of emphasis and a scarcity of funding."[10]

The M-14 rifle was considered a minor improvement over the M-1 Garand and was standardized in 1957. It was not acceptable in the fully automatic role and it did not weigh less than the M-1 rifle. The M-14, although a fully automatic capable rifle, was really only a semiautomatic rifle with a 20-round magazine. It was too heavy and too long to replace the M-2 caliber .30 carbine* and the

*US Carbine caliber .30 M-2. Semi and full automatic capability. Weight with 30 round magazine 6.6 pounds; length 35.58 inches. Carried by selected troops for specialized missions.[12]

M-3A1 caliber .45 submachine gun.* The M-14 was 44.14 inches in length and weighed 10.0 pounds when loaded with the 20 round magazine.[11]

Concurrently with the adoption of the M-14 rifle, the AR-1 (later designated the M-16A1)** was being designed for testing by Mr. Eugene Stoner of the Armalite Corporation. During comparative evaluation tests in 1958, between the M-14 and the AR-15, the AR-15 did exceptionally well. Again, the rifle controversy was stimulated between the large caliber advocates and those who believed that the development of a lightweight, high velocity, small caliber weapon would improve the firepower capability of the rifleman. The analogy with the Johnson/Garand and M-14/AR-15 controversy is apparent.[14]

On 21 March 1957, the US Continental Army, Command (USCONARC) directed the US Army Infantry Board at Fort Benning, Georgia, to prepare military characteristics for a high velocity, small caliber rifle.[15] Before the Infantry Board submitted the draft characteristics to USCONARC however, General Willard G. Wyman, Commanding General, USCONARC, acted to expedite the development of a lightweight rifle by verbally requesting Mr. Stoner of Armalite Corporation, to develop a new lightweight infantry rifle chambered for high velocity caliber

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*M-3A1 caliber .45 submachine gun. Full automatic capability only. Weight 8.1 pounds with 30 round magazine; length 30.0 inches. Was produced to match British Sten gun and German Schmeisser Machine pistol. Used for specialized missions.[13]

**US Rifle M-16A1 (AR-15). AR-15 was original designation during testing. When adopted by US Army in 1967, it was designated the M-16A1. Weight 7.6 pounds with 20 round magazine; length 39 inches.

.22 cartridges.* A similar request was made to other gun manufacturers. The specifications required a maximum weight of six pounds when loaded; a capability of semi and fully automatic fire; killing power equal to or better than the M-1 Garand rifle up to 450 meters; and a capability of penetrating a steel helmet at 450 meters.[16]

In January 1958, General Wyman recommended to the Army Chief of Staff, General Maxwell D. Taylor, that caution be exercised in overselling the M-14 rifle to Congress during the Fiscal Year 1959 budget hearings. The recommendation by General Wyman demonstrated support of the small caliber rifle:

> As you know, in April 1958 we will receive two types of small caliber rifles, an Armalite and a Winchester, for evaluation at the USA Infantry Board. . . . Disregard of the potential presented by the small caliber rifle at this time might well preclude Army exploitation of a superior rifle system which could conceivably appear on the developmental scene at an early date.[17]

When the AR-15 was tested by the Infantry Board in 1958, test results indicated that it should be considered as a potential replacement for the M-14 rifle. During 1958, the M-14 was then being produced in small quantities by the Springfield Armory. The test results of the AR-15 were unsettling to the traditional .30 caliber advocates which generally constituted the military establishment. The situation was further aggravated by the 1953 NATO agreement for standardization of the 7.62mm round.

Near the end of 1958, the Powell Board reviewed the Army's

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*High velocity .22 caliber cartridges were designed to improve accuracy, increase lethality and lighten the load of the infantryman. The M-16 .223 caliber cartridge (5.56mm) is 2.5 times lighter than the M-14 .30 caliber cartridge (7.62mm). Further details can be found on page 44 of thesis.

rifle development program. The Board, composed entirely of general officers, liked the small caliber, high velocity rifle concept, but recommended no further consideration for the caliber .223 round. The Board also recommended that the M-14 rifle should be "retained for the automatic rifle role," and that development of an AR-15 type weapon, chambered for caliber .258 round, be expedited for replacement of the M-14 in the rifle role. The caliber .258 round was considered by the Powell Board to be the optimum for small caliber rifles.[18]

A comparative evaluation and field experiment was conducted by the Combat Developments Experimentation Center at Fort Ord, California, in April 1959. The experiment tested the relative effectiveness of rifle squads armed with M-14 rifles, and the Winchester and Armalite lightweight, high velocity rifles. The test results demonstrated the superiority of the lightweight rifles, in terms of volume of fire and target hits, over the M-14 rifle.

The testing of the lightweight, high velocity rifle systems in 1959, reopened the controversial battle which began with the "Pig Board" in 1928. The same arguments of cost, facilities, and inventory, coupled with the 1953 NATO Standardization Agreement, were used to convince General Taylor that the NATO 7.62mm round should be retained. That position was reaffirmed by General Wheeler, the new Army Chief of Staff, in September 1959. In effect, Army development of the lightweight, small caliber, high velocity rifle was stopped.

During the years 1960-1962, the controversial AR-15 remained in the limelight. The US Air Force requested adoption of the lightweight rifle for its use on several occasions.[19] In October 1962, the Secretary of Defense, requested that the Army conduct a comparative

evaluation of the effectiveness of the M-14, AR-15 and the Soviet AK-47 rifles.

In early 1963, the Army report showed that the M-14 was superior to the AR-15 in penetration, night firing, and reliability. The AR-15 was superior to the M-14 in automatic fire capability and transportability. Both the AR-15 and M-14 met or exceeded all other military requirements. The Army felt that the unsatisfactory rating for the AR-15 in reliability and night firing were easily correctable. The Army Chief of Staff, however, attached importance to the NATO Standardization Agreement of 7.62mm rifle ammunition. In a memorandum for the Secretary of the Army, the Army Chief of Staff stated:

> To introduce a .223 caliber system in Europe . . . would be an outright violation of a specific standardization agreement . . .
>
> I am also acutely aware of the great domestic interest in both the AR-15 and the M-14. No matter what the Army's decision in this matter may be, it will be subjected to criticism by proponents of one or the other of the weapons, or both, and by representatives of the regions economically affected.[20]

In spite of the divergence of opinions as to capabilities and deficiencies of the AR-15/M-16 rifle system, Army procurement of the AR-15 rifles began in 1962 with small quantities for testing. Another limited procurement was completed in 1964. With the urgent requirement for Vietnam in 1965, a large purchase was initiated in 1966. Subsequent procurements in 1968 and 1969 were based on production capacities rather than on a long-range program for Army wide use.[21] In 1967 the M-16A1 rifle was adopted as the standard rifle for the US Army worldwide.

HISTORICAL - USES AND EFFECTS OF INFANTRY SMALL ARMS

During World War II it became evident that most soldiers did

not fire their weapons in combat. When asked why, their response usually indicated that they "couldn't see anything to shoot at" or that they were afraid that they would "give their position away."[22]

S.L.A. Marshall, Brigadier General (Ret), a noted military writer and historian found that on the average less than 25 percent of the rifleman fired at enemy targets. S.L.A. Marshall's interviews and collected data showed that on the average not more than 15 percent of the men had actually fired at the enemy positions or personnel with rifles, carbines, grenades or bazookas during the course of an entire engagement.[23]

> The best showing that could be made by the most spirited and aggressive companies was that one man in four had made at least some use of his firepower.[24]*

Marshall states further, that:

> Usually the men with heavier weapons, such as the Browning Automatic Rifle (BAR)** . . . gave a pretty good account of themselves, which of course is just another way of saying that the majority of men who were present and armed but would not fight were riflemen.[25]

It might appear to many seasoned combat veterans and civilian observers that marksmanship training would overcome the propensity for infantrymen not to fire their weapons. However, Marshall believed that such was not the case. He says:

> We are on infirm (SIC) ground when we hold to the belief that the routine of marksmanship

*Marshall's conclusions were based on post-combat interviews with approximately four hundred infantry companies in the Central Pacific and European Theaters in World War II.

**BAR - caliber .30 automatic rifle. Usually one issued to each rifle squad. Length 45.2 inches and weight 22.6 pounds with 20 round magazine. Two rates of automatic fire (550 and 600 rounds per minute).

> training and giving the soldier an easy familiarity with his weapon will automatically prompt the desire to use the weapon when he comes under fire.[26]

To Marshall, the fundamental requisite for winning the battle in close combat was firepower and fire superiority.

> Fundamentally, fire must always be beaten by fire. Fundamentally, movement is the means of increasing the efficiency of one's own fire until at last the strength of the enemy's fire is reduced to the vanishing point. . . . Likewise with the equation, said by Napoleon and repeated by Foch: "In war the moral is to the material as three to one." This is a truth only as it is related to the state and possibilities of fire. Among fighting men morale endures only so long as the chance remains that ultimately their weapons will deal greater death or fear of death to the enemy.[27]

When one considers the massive assault landings on Omaha Beach during the 1944 Normandy invasion, it is easy to visualize thousands of rifleman firing their rifles as they advanced to secure the beachhead. The facts, however, further demonstrate that this was not the case. As documented and reported by Marshall, there were only five infantry companies which were "tactically effective" on Omaha Beach during D-Day. Again in the words of S.L.A. Marshall:

> In these particular companies an average of about one fifth of the men fired their weapons during the day-long advance from the water's edge to the first tier of villages inland - a total of perhaps not more than 450 men firing consistently with infantry weapons in the decisive companies. . . . The company which made the deepest penetration, losing a high percentage of its men in so doing, saw only six "live Germans" during its advance, and these turned out to be Russians.[28]

Because the average man finds joy in firing a weapon and adapts well to instruction on the rifle range, it is difficult to understand why a majority of these same men did not fire their weapons in combat. Unfortunately, training does not portray the actual conditions of

combat. A variety of fears afflict the soldier when in battle. The fear of enemy fire obviously lingers in everyone's mind. In training the targets are not real men. How a rifleman responds when he is required to take another man's life is another part of the reason for non-firers in combat.

Experience in World War II has shown that the instructor who has a rifleman hold his fire until he sees the enemy will have a long wait.[29] In this regard, S.L.A. Marshall stated:

> It seems reasonable to believe that there is a definite advantage to getting the soldier into the habit of free firing in combat while the situation is still such that his target is a position rather than a man moving clear.[30]

Free firing at suspected enemy positions may succeed in improving the volume of fire, but may create another nagging problem, fire control and fire discipline. On this subject, Marshall wrote:

> The doctrine of fire discipline has accented for so long the need of controlled fire that it has almost obscured the fact that the fundamental problem is how to build up fire volume and develop more willing firers. . . . it is better by far to have a company of green, trigger-happy soldiers than a company which lacks the will to use its weapons. The former will make a recovery from nervousness as they become more accustomed to the sights and sounds of combat and the tense silence of the lulls in between fighting; the latter will never be given the chance.[31]

During the Korean War the M-1 rifle remained the infantryman's basic weapon. The majority of infantry battles during the Korean War, as in World War II, were conducted by what is referred to as light infantry. "The last 200 yards still had to be taken by a determined man on the ground with his rifle and hand grenade."[32]

S.L.A. Marshall's report on infantry weapon usage during the Korean War indicated an increase of the infantryman's willingness to

participate in close combat over that experienced during World War II. Of course, the situation often precluded many men from delivering effective fire. An example of this would be when a unit is proceeding single file on hill crests or on precipitous slopes. Marshall concluded that the chronic nonfirer, which was often the rule in World War II, was the exception in Korea. The improvement in the percentage of willing firers in Korea, according to Marshall, was because of improved training and better leadership by the junior leaders. Marshall also believed that the willingness of the men to shout and yell during close combat produced unity of action and more participation with weapons.[33]

In close combat the infantry squad mainly depends on the sufficiency of its own weapons. In fact, infantry fire is the chief preservative of the unit, especially during engagements with large massed enemy formations when supporting weapons are faced with a multiplicity of targets. In this respect, S.L.A. Marshall reported that, "If it were not for the general effectiveness of infantry weapons in defense, the artillery could not survive."[34]

When considering the effectiveness of infantry weapons during the Korean War, it is important to investigate the average effective ranges at which close combat took place. Marshall had this to say about effective ranges:

> The average effective infantry fire with weapons lighter than the machinegun was consistently less than 200 yards (180 meters). In no instance was it established, in the operations brought under survey, that any significant move by enemy forces had been stopped and turned by rifle and carbine fire alone at ranges in excess of that figure.[35]

Marshall recognized the limitations of the significance of that

evaluation and goes on to explain, that:

> It rarely happens in the Korean fighting or elsewhere that a tactical situation of large order arises which tests the effectiveness of the rifle alone as a stopping and killing agent. By the nature of engagement, the infantry contest between opposing groups of riflemen is pretty much confined to strong patrol actions, fire exchanges between small groups within a larger skirmish, or last-ditch stands by companies which have emptied the ammunition from heavier weapons in the earlier stages of the fight. In the latter situation, the contending sides almost invariably close to within less than 150 yards (135 meters) before the climax is reached in which the position is held or lost according to rifle effectiveness.[36]

The ranges of effective rifle fire in Korea are analogous to the World War II experience. When rifle fire was used at ranges greater than 180 meters there was little or no effect. Even the proven accuracy of the M-1 rifle found targets beyond this 180 meter zone more elusive than expected. When automatic fire, either from the BAR or the Light Machine Gun (LMG), was added to the fire of the rifle, firepower was dramatically increased. According to Marshall:

> . . . the one point which seems deserving of particular emphasis is that the BAR greatly compounds the stopping effect of rifle fire at ranges considerably in excess of those at which unaided rifle fire is potent.[37]

In spite of the advantages of increased firepower by automatic weapons, S.L.A. Marshall did not believe that there was a need to change the mix of weapons used in Korea. He felt that a weapon that was not reasonably accurate at ranges in excess of 180 meters would shift too much of a burden on the heavier weapons of the infantry during the enemy approach and withdrawal. On the subject of automatic weapons, Marshall says:

> . . . any trend toward eliminating the semi-automatic, hand-carried weapons in favor of full-automatic

> weapons in the hands of all infantrymen should be vigorously combated.[38]

The primary rationale for not advocating automatic weapons for all infantrymen was based on ammunition usage. He considered semi-automatic weapons conservers of ammunition. The average rifleman in Korea carried "just above 100 rounds" for the M-1 rifle. The BAR men averaged about 120 rounds and the LMG about 400 rounds basic load.[39] However, Marshall goes on to say that, "when the BAR's and machineguns fire excessively and exhaust ammunition supply in the early stages of the fight, the position becomes bankrupt."[40] Riflemen placed so much confidence in the BAR man that they were willing to carry extra ammunition for the BAR.[41]

In the context of supporting fires, especially artillery, ranges of engagement for infantry small arms were close. In the defense, supporting artillery fires at ranges of 45 to 70 meters were not uncommon in Korea. As a general rule even in the offense, supporting artillery effectively suppressed the enemy until the infantry had closed to within 45-100 meters of the objective.[42]

In the context of the rifle squad, experience in the Korean War and World War II demonstrated that rifle firing always seems to build up around the fires of automatic rifles. Where ever the BAR man was located, there always seemed to be larger volume of fire from the riflemen.[43] In the words of Marshall:

> Whatever the main motivation, it would seem obvious that aggressive use of all weapons is closely identified with strong belief in, and effective use of the rifle. . . BAR action is most frequently the moving force because of the high mobility of the weapon and its solid fire effects.[44]

The BAR in Korea provided the central base around which the

infantryman and his rifle engaged in close combat. The infantrymen stated quite frankly that the BAR was the mainspring of the rifle squad's action. The effectiveness of the BAR in Korea further reaffirms the World War II experience. In his assessment of the BAR, Marshall states:

> In the view of the great majority of infantry troops and commanders in Korea, the fighting strength of the infantry company would be increased by doubling the number of BAR's, while reducing the number of M-1 carriers proportionately.[45]

The M-1 rifle, all factors considered, performed adequately in Korea and was liked by most of the men who used it. Although it was heavy and cumbersome and lacked the firepower needed for engagements of massed enemy troops armed with varied assortments of assault rifles (burp gun), machineguns and rifles, the M-1 was reliable and accurate.

When the M-14 rifle was adopted in 1957, the US Army was not engaged in any conflicts anywhere in the world. There were US Army troops stationed in Korea and Europe. From 1953 to 1961, US infantry forces were armed with the M-1 rifle, the BAR and the LMG. Even though the M-14 had been adopted by the Army in 1957, European forces did not receive the new rifle until the Berlin crisis in late 1961. By 1963, all US forces were equipped with the M-14 rifle and the M-60 machinegun.* The M-60 machinegun replaced the old .30 caliber LMG and the M-14, with bipod, assumed the role of the BAR.

In 1965, the first regular US Army forces were deployed to the Republic of Vietnam. They were then armed with the M-14 rifle and the

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*M-60 Machinegun. Weighs 27.7 pounds when loaded with 100 rd/belt and is 43 inches long, fired the NATO 7.62mm cartridge and has a quick change barrel.

M-60 machinegun. Because of the heavy use of the Russian AK-47 assault rifle by the enemy forces in 1965, and in response to urgent requests for M-16 rifles to counter the more effective AK-47 assault rifles, US forces began receiving M-16 rifles in late 1966. By March 1967, all US forces were armed with the M-16 rifle and the arming of South Vietnamese and Korean maneuver units with the M-16 began.[47]

The M-16 rifle was capable of both semiautomatic and fully automatic fire. It was 4 pounds lighter than the M-14 when loaded with a 20 round magazine. The M-16 was a perfect example of the light weight, high velocity rifle recommended by General Wyman in 1958. It had a muzzle velocity of 3150 feet per second and a cyclic rate of fire of 750 rounds per minute when fired full automatic. The effective range was 460 meters, the same as the M-14 rifle. The M-16 rifle was standardized for general Army distribution in 1967.[48]

Unclassified documents containing important information on the usage and experiences of the M-16 rifle by combat infantrymen in Vietnam have been difficult to find during the detailed literature search. Some information has been gleened from recently declassified sources, albiet this data is not as complete or thorough as desired.

In August 1966, the US Army Human Engineering Laboratories, in an attempt to gain a better understanding of how and under what conditions small arms were used in Vietnam, developed a questionnaire which was administered to US Army personnel serving in Vietnam.[49] The report was based mostly on troops who carried the M-16 rifle. The respondents to the questionnaire were combat infantrymen who had been in Vietnam at least six months, were below the rank of captain and had been squad leaders or members of a rifle company or similar organization.

The results of the questionnaire followed closely the experiences of World War II and Korea. For example, ninety-three percent of those questioned, in response to the question, "Do you usually see an enemy soldier to shoot at?", responded "some of the time" or "never". Eighty percent commented that the enemy was engaged at ranges of less than 180 meters. Thirty-one percent of those said that the enemy was engaged at ranges less than 90 meters. Several soldiers questioned in the survey expressed the desire for a 30 round magazine rather than the 20 round magazine which was then issued.[51]

A US Army battalion commander, after his return from Vietnam and while a student at the US Army War College, prepared a paper entitled, "The M-16 Rifle - Tested by Combat." The paper discussed in great detail the evolution of the small caliber, high velocity rifle now known as the M-16. In the summary of his paper he quoted from the February 1968 Department of Defense report:

> The effectiveness of the M-16 rifle has been validated in combat operations in Vietnam under the most varied conditions of terrain, weather, and tactical situation . . . The M-16 has achieved wide acceptance throughout Vietnam. Only thirty-eight individuals of all those surveyed (2100) would like to exchange their M-16 for another weapon. Of this group thirty-five wanted the shorter, lighter version of the M-16 - the CAR-15. The greatest factor of its acceptability is its capability to deliver a high volume of lethal firepower at the critical juncture of a combat engagement.[51]

TEST AND EVALUATION DATA

In February 1966, the US Army Combat Developments Command Experimentation Command completed a field experimentation of Small Arms Weapon Systems (SAWS). The experiment was conducted to determine the

relative effectiveness of rifle and machinegun squads armed with the US Army 7.62mm (M-14), Soviet 7.62mm (AK-47), Colt 5.56mm (M-16) and Stoner 5.56mm (Stoner) weapons. The results were concerned with training, material reliability and fire effectiveness of rifle squads armed with different weapons. The measures of effectiveness were the level of target effects and the sustainability of the effects on the target area. The conclusions of the experiment indicated that squads armed with the small caliber, high velocity (5.56mm) weapons were superior to squads armed with the 7.62mm weapons. The conclusion was not only true for the measures of effectiveness mentioned above, but for overall effectiveness. Although the specific data which related to lethality was classified, the general considerations of lethality further indicated the superiority of 5.56mm weapons.[53]

In the context of the combined firepower of the rifle squad, the SAWS experiment concluded that rifle squads armed with low muzzle* impulse weapons were markedly superior in overall effectiveness to rifle squads armed with high muzzle impulse weapons.* It was also concluded that rifle squads equipped only with Colt (M-16) automatic rifles were superior to all other squads evaluated in overall effectiveness. The study also determined that the long held hypothesis that high muzzle impulse weapons, such as the M-14, were superior to low muzzle weapons at long ranges (300 to 550 meters) was not supported. Several other significant conclusions were brought to light:[54]

*Low muzzle impulse weapons are those weapons with minimal recoil and are characterized by lightweight high velocity ammunition. The M-16, 5.56mm weapon is an example of the low muzzle impulse weapon. High muzzle impulse weapons are characterized use heavier and a relatively lower velocity cartridge with more recoil. The M-14, 7.62mm is an example of a high muzzle impulse weapon.

> Low muzzle impulse weapons are superior to high muzzle impulse weapons in both automatic and semi-automatic fire in night firing in the defense.
>
> Neither the 7.62mm nor the 5.56mm tracer rounds are considered satisfactory for use by the firer in adjusting fire during daylight hours.
>
> For aimed fire on visible point targets during daylight, semiautomatic fire is superior to automatic fire. This is true for all rifles, both low and high muzzle impulse. This does not imply however, that automatic fire may not be superior in suppression effects and hits on adjacent concealed targets.
>
> It is concluded that there are no tactically significant differences between 5.56mm and 7.62mm ammunition per round of ammunition; however, 5.56mm ammunition is significantly superior to 7.62mm ammunition per pound of ammunition or per basic load carried by the soldier.[55]

In August 1967, a follow-on study, which was designed to complement the results of the Army Small Arms Weapons Systems program (SAWS), was completed. The study was entitled, "Infantry Rifle Unit Study, 1967-1975" (IRUS-75). The purpose of the study was to determine the doctrine of employment and detailed organization of US Army small infantry units during the 1970 to 1975 timeframe. Two significant objectives of IRUS-75 were to investigate the best size for the basic infantry element* and the comparative effectiveness of selected weapons with potential value to small infantry units. The weapons used during the experiment were the M-16 rifle, M-16 rifle with XM-148 grenade launcher attached, M-79 grenade launcher and a Stoner 5.56mm machinegun. The M-14 rifle was used in a blank firing (no live fire) exercises only.[57]

The experiment examined small infantry units engaged in

*Basic Infantry Element (BIE). That infantry rifle element which has one leader and no formally designated subordinate elements.[56]

simulated combat situations using the M-16 rifle and grenade launcher combinations. The results demonstrated that a basic infantry element should be six men. Rifle fire (M-16) was found to be most effective in all situations except in support of the attack where grenade fire was superior. The report also recommended further study be given to increasing the firepower capability by introducing a light machinegun.[58]

The US Army has studied and evaluated the optimal weapon assignment for rifle squad organizations for several years. Specifically, in 1956, a study was conducted by Psychological Research Associates entitled, "A Study of the Infantry Rifle Squad TOE."[59] The report centered on four major organizational criteria: fire capability, control, attrition and fire and maneuver. For the purposes of this thesis only the data on the fire capability portion will be discussed.

The analysis of data led the researchers to conclude that a weapons ratio of one-third automatic rifles provided the best overall fire capability. The conclusion was partially based on a concern for small arms ammunition resupply requirements. However, the dilemma of desiring a rifle squad which has a high firepower capability and a minimum ammunition requirement should not be compromised by restrictions on organization and equipment. The compromise of automatic rifles in the squad was also based on a perceived requirement for a rifle which could have a bayonet attached and be used to launch grenades. Further, that a sniper capable weapon was required. The researchers believed that the automatic rifle (BAR) was not good for fighting in cities and at close quarters. The results of the study were based on field tests of the current weapons of the rifle squad in 1956, the BAR and M-1 rifle.[60]

Data from supplementary studies, used in the infantry rifle squad study, showed that riflemen in the defense had a hit probability of 60% to 80% at 90 meters range, while the riflemen in the assault had a hit probability of less than 10% at ranges of 30 meters. Using the BAR, infantrymen had even a lower probability of hit. In the words of the researchers:

> Thus, unless the attacking force can neutralize the enemy (by supporting fires and/or by a heavy volume of small arms fire) until riflemen are within 35 yards of the enemy positions, the defender should be able to repel the assault.[61]

The study concluded that increased effort should be given to developing new types of hand-carried weapons to improve the fire capability of the rifle squad in the assault.*[62]

PSYCHOLOGICAL EFFECTS OF FIRE

The psychological effects of small arms fire has been a point of debate by military men for many years. One side feels that the psychological effects are only incidental to the physical effects of small arms fire, that is, lethality. The other school of thought maintains that the psychological effects are as great a factor and are perhaps overriding in importance to lethality.

In an attempt to measure or investigate the psychological effects of small arms and other weapons assigned to a rifle platoon**,

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*Assault. The climax of an attack; closing with the enemy in hand-to-hand fighting. Also to make a short, violent, but well ordered attack against a local objective, such as a gun emplacement, a fort, or a machinegun nest.[24]

**Rifle platoon normally consists of three rifle squads and one weapons squad. The preponderance of small arms (rifles) are assigned to the rifle squad. The weapons squad is designed to support by fire and usually has two or more machineguns and heavy anti-tank weapons such as recoilless rifles.

a questionnaire study was conducted by Psychological Research Associates in 1957, at Fort Benning, Georgia. The psychological effects were assessed in terms of the dangerousness of different weapons in combinations as judged by combat experienced troops. The questionnaire technique permitted an assessment of weapons difficult to compare in live fire field studies. The weapons assessed in the study were the M-1 rifle, BAR, LMG, 60mm mortar, hand grenade, and the 57mm recoilless rifle. Each weapon was compared in terms of its relative dangerousness in both the offense and defense. The questionnaire was administered to fifty combat veterans, mostly non-commissioned officers.[63]

The results indicated that weapons differ in their relative psychological effects and that experienced troops consider some types of weapons more dangerous than others. The study further concluded that the degree of danger is relative to the context of the mission. For example, a weapon considered dangerous to a rifleman in the assault may not be considered dangerous to the rifleman in a prepared defensive position.[64]

In summary, the study concluded the following:

> From a psychological effect standpoint, the order of dangerousness of the weapons included in this study are as follows:
>
> | Defending Against the Weapon | Assaulting Against the Weapon |
> |---|---|
> | Mortar | LMG |
> | LMG | BAR |
> | RR | Mortar |
> | BAR | RR |
> | Grenade | Grenade |
> | M-1 | M-1 |
>
> The optimum weapon for producing psychological effects in both missions is the LMG.[65]

In another study also done by Psychological Research Associates in 1957, combat experienced infantrymen were compared with infantrymen without combat experience in terms of the perceived dangerousness of semi-automatic and automatic rifle fire.[66] The weapons used were the M-1 rifle and BAR. The study was done using live fire with thirty men as respondents. Fifteen men of the thirty man group had had no combat experience. The results of the live firing were as follows:

> Degree of Combat Experience. Combat experienced personnel were neutralized less than non-experienced personnel.
>
> Weapons. The automatic rifle was judged more psychologically effective than the semi-automatic rifle.
>
> Volume. Increase of volume of fire per six-second interval produced increases in judged neutralization effects.
>
> Distance. Decreases in distance of fire from observer increased the judged neutralization effects of the fire.
>
> Weapon and Volume. Increases in volume of fire of the automatic rifle produced greater increases in judged neutralization than equal increases in volume of fire of the semi-automatic rifle.
>
> Combat Experience and Distance. Decreases in distance produced greater increases in judged neutralization for the combat experienced group than for the non-experienced group.[67]

The results of the study led the researchers to conclude that automatic rifle fire had significantly greater psychological effect than semi-automatic rifle fire. Further, they concluded that the degree of psychological effectiveness of both semi-automatic and automatic fire is a function of the volume of fire, the proximity or nearness of the fire, and the combat experience of the infantrymen.[68]

In an attempt to extend the investigation of the several variables examined in the aforementioned studies, Psychological Research Associates conducted a study in July 1957 entitled, "Psychological Effect of Patterns of Small Arms Fire." This study was designed to obtain a more operational definition and quantification of the willingness of men to expose themselves to different types of small arms fire.[69]

The research study defined psychological effects of fire as neutralization of the enemy. The neutralization would thus reduce the amount of battle time during which the enemy would be willing or capable of returning fire. The resultant reduction in effective enemy fire would be considered firing time lost to the enemy. The quantification of potential and actual hit probabilities was used to develop a tactically meaningful measure of the psychological effect of small arms fire. The difference between potential and actual hit probability values was then used to represent the psychological effect of friendly fire on the enemy firers. All of the troops used during the test were combat veterans with an average of fourteen months of battlefield experience in World War II and/or Korea. The weapons used were the M-1 rifle, BAR and LMG.[70]

The results of the study did not entirely support the results of the previous study which concluded that the automatic rifle was significantly more effective psychologically. However, one of the major reasons for the statistical improvement of the semi-automatic rifle was that the M-1 rifle was permitted to fire equal volumes of fire per burst and equal numbers of bursts per time. The researchers reported that the discrepancy may have been caused by the differences

in response used in the two studies. The previous study had used verbal judgements while this study used target exposure durations as measures of psychological effect.[71]

The conclusions reached by the researchers during this study indicated that there were no differential effects between semi-automatic fire and automatic fire when firing equal numbers of bursts and rounds per burst. They also concluded that the differences in number of rounds per burst of fire resulted in no differential effect on average duration of target exposure. However, they found that increasing the number of bursts over time had a greater effect on decreasing target exposure. As to whether random or systematic distribution of fire on the target area was better, it was concluded that random fire produced more target hits. The implication of this conclusion is that a random pattern of fire produces as much psychological effect as a systematic pattern and kills more targets.[72]

Although the true values of the psychological effect of small arms fire are difficult to assess, the consistency of results in the studies done by Psychological Research Associates and combat experience by the author of this thesis lends inferential validity to the study results. Certainly, the absolute amount and type of fire required to neutralize the enemy will vary depending on the terrain, visibility, level of combat experience and training, and leadership. However, the relationship between relative amounts and types of fire and the enemy's reaction to fire should remain generally in line with the conclusions in these studies.[73]

SMALL ARMS LETHALITY AND BALLISTIC EFFECTS.

Physical lethality is but one aspect of the effectiveness of

a weapon. The psychological effects which accompany the expenditure of firepower have as much to do with demoralizing the enemy as anything else. Although morale and training are neccessary ingredients to an effective army, they alone cannot overcome the human emotion of fear. Under certain circumstances a low casualty rate may be accompanied by a considerable amount of demoralization, while a high casualty rate may induce strong resistance.[74]

Is it really necessary that the infantry rifle be capable of providing an optimal kill probability when a hit is as good as a kill? Weapon lethality has been defined as follows:

> The inherent capability of a given weapon to kill personnel or to make material ineffective in a given period of time, where capability includes the factors of weapon range, rate of fire, accuracy, radius of effects, and battlefield mobility.[75]

Accordingly, small arm lethality is a moral as well as a physical weapon. A person who is hit by small arms fire in close combat will consider fire to be a physical phenomenon. However, the process of killing is generally intended to demoralize those who survive.[76]

The ballistic* characteristics of ammunition have a great deal to do with the effectiveness of the weapon that fires the projectile. The ability of a projectile to penetrate and be effective against various targets is a function of velocity and design. The infantryman is often confronted with several different types of targets in close combat. The different types of targets vary from

*Ballistics is the science that deals with the impact, path and velocity of projectiles fired from weapons.[78]

unprotected individuals to hasty field fortifications, light vehicles, and cities, towns and villages.[77]

Since the invention of the rifle, armies have sought to develop weapons which were ballistically superior to predecessors. The trend in recent years, which has evolved from historical combat experience and improved technology, has been to emphasize firepower rather than ballistic superiority of ammunition. Intermediate cartridges, with an accompanying reduction in weight and size, have made feasible the design of assault rifles with a full automatic capability. As a result, the infantryman is able to carry a proportionately larger quantity of ammunition with the added advantage of lessened recoil. The lower recoil permits better control of the weapon during automatic fire and improved marksmanship training.[79]

The M-1 rifle fired a .30 caliber projectile which weighed 152 grains* and had a velocity of 2800 feet per second. The M-14 rifle fired the standard 7.62mm NATO ammunition which weighed 147 grains with a muzzle velocity of 2800 feet per second.[80] The M-16 rifle fires a 5.56mm bullet which weighs 55 grains and has a muzzle velocity of 3150 feet per second.[81]

In a comparative test firing of penetration capabilities conducted by the US Army Infantry Agency in 1962, between the 5.56mm and 7.62mm cartridges it was concluded that the 7.62mm cartridge (NATO) had significantly greater penetration effects against the selected target array at all ranges tested. The types of targets used in the test included a pine board, sandbag, steel helmet, engine block,

*Grains is the unit of measurement used for bullet weight. (1 grain = 64.9 milligrams or .0649 gram).

14 gauge steel, armored vest, concrete block and a live oak tree four inches in diameter. Except for the tree, one hundred meters was the closest range of engagement. The 5.56mm bullet did penetrate the pine board, steel helmet, one layer of 14 gauge steel and the armor vest out to ranges of 300 meters. In all cases the 7.62mm was equal to the 5.56mm cartridge or better. At ranges in excess of 300 meters the 7.62mm cartridge was significantly better in penetrating power. Although no comparative ballistic data is available for the M-1 rifle .30 caliber projectile, the similar weight, velocity and design would produce the same ballistic effects as the M-14 rifle.[82]

CURRENT AND EMERGING DOCTRINE FOR THE RIFLE SQUAD

The US Army infantrymen of a mechanized infantry squad are specialized in the sense that they usually advance on the modern battlefield mounted in armored carriers, and upon dismounting, fight as infantry. Mounted combat from the present armored personnel carriers (M-113 APC)* is difficult if not impossible for the squad members within the vehicle. The intent for the employment of the carrier is to carry the squad forward to exploit the heavy firepower of the tank. The fires of the carrier mounted .50 caliber machinegun are designed to give the squad close support, but the APC is vulnerable to enemy antitank fire.[83]

The current organization of the mechanized rifle squad consists of eleven infantrymen. There is one squad leader and

*M-113 APC is a tracked vehicle providing all around armor protection from small arms fire and artillery fragments. It has a .50 caliber machinegun mounted in the commanders hatch which is usually fired by the squad leader when squad is mounted, or by the driver when in defensive positions.

two fire team leaders. One man is designated as the driver for the carrier. The squad is armed and equipped as follows:

Position	Equipment
One squad leader	M-16 rifle
Two fire team leaders	M-16 rifle
Two automatic riflemen	M-16 rifle with bipod
Two grenadiers	M-203*
Three riflemen	M-16 rifle**
One driver	M-16
	M-60 machinegun**
	Dragon**

Figure 2-1.

Current Rifle Squad (Mech)[84]

Since 1946 there have been several changes made to the rifle squad Table of Organization and Equipment (TOE). After World War II the twelve man squad was changed to a nine man squad which had eight M-1 rifles and one BAR. During the Korean conflict the rifle squad of armored infantry was authorized ten men. There were five M-1 rifles, one of which was a sniper rifle. The driver carried a .45 caliber submachine gun and the one automatic rifleman carried the BAR. The personnel carrier had a .50 caliber and .30 caliber machinegun which could both be ground mounted. The squad leader, assistant squad leader and the assistant automatic rifleman carried an M-1 rifle also. The TOE changed again in 1956 (12 men, 2 BAR); 1957 (9 men, 2 BAR); 1960 (12 men, 2 fire team leaders, 2 M-14 w/bipod);

*The M-203 weapon is an M-16 rifle with a 40mm grenade launcher attached to the underside. Either weapon may be fired in close combat.

**The Dragon anti-tank weapon and the M-60 machinegun is assigned to one of the three riflemen.

1962 (10 men, 2 fire team leaders, 2 M-14 w/bipod); 1963 (11 men, 2 fire team leaders, 2 M-14 w/bipod). The current TOE of eleven men is the same organization of 1963 except for the change of equipment as shown in Figure 2-1. A sniper rifle was authorized in all cases until the TOE change in 1960.[85]

In an analysis of squad proficiency there are several factors worthy of comparison. However, for the purposes of this research, fire capability is considered the significant factor. Differences in the abilities of leaders and men, amount and quality of training and difficulty of mission and terrain, are all factors which affect squad proficiency. However, the squad's fire capability, that is, available firepower, involves the application of fire on enemy targets.

There are wide ranges of possible combinations of weapons which can be assigned to the rifle squad. There are in fact several combinations of automatic and semiautomatic rifles. A study which examined the fire capability of the rifle squad concluded that no more than one half of a squad should contain automatic riflemen. The figure of one half was judgementally arrived at based on the perceived ammunition resupply problem. There are conflicting priorities for a rifle squad which has a high volume of fire capability and a minimum ammunition resupply requirement. Any choice of a squad TOE will be a compromise among conflicting desires.[86]

The US Army is currently considering another major reorganization of the infantry rifle squad (mech). The Division Restructuring Study (DRS) which is being conducted by the Training and Doctrine Command (TRADOC) recommends that the rifle squad of the future be composed of the following:

Position	Equipment
One squad leader	M-16
One assistant squad leader	M-16
One automatic rifleman	Squad automatic rifle (SAW)*
Two grenadiers	M-203
Two riflemen	M-16
One driver	M-16
One gunner	Bushmaster**
	Dragon***

Figure 2-2.

Proposed Rifle Squad (Mech)

The future mechanized rifle squad will be mounted in the newly designed mechanized infantry combat vehicle (MICV). The MICV is undergoing developmental testing and will permit the mounted rifle squad to fight from within the vehicle. It is expected that the squad will not be required to use its individual weapon when fighting from within the vehicle, but will fire specially designed machineguns from firing ports. Only when the squad dismounts will the individual weapon be carried for close combat. The MICV has improved armor and it is conceptualized that the squad will be allowed to remain mounted longer than is now current doctrine.

Current doctrine emphasizes the use of the machinegun for defense against assaulting infantry. Field Manual 71-1 states that, "Machineguns are the team's**** primary direct fire weapon against an

*The squad automatic rifle has not been determined at this date. Preliminary testing results indicate that if adopted, it will replace the M-60 machinegun and will be caliber 5.56mm.

**The bushmaster is also under development and if adopted will be mounted on the new mechanized infantry combat vehicle (MICV) and will be a 25mm automatic cannon.

***Dragon gunner will be a designated rifleman.

****Refers to company teams made up of tank and mechanized infantry platoons.

infantry assault."[87] The doctrine for employment of the machinegun directs that they be positioned laterally across the front of the company team position so that they are mutually supporting. The Field Manual further states that "Riflemen are positioned to protect machineguns."[88] The implications of this doctrine for the defense indicate that the infantry rifle is not intended to be the principle weapon for defense against an infantry assault.

In consonance with the current Army tactical doctrine are implications of the need for rapid deployment and redeployment of troops from United States bases. Contingency force operations in all climatic and geographical circumstances are possible. Short war scenarios are generally envisioned which typically are supported by air Lines of Communication (LOC). The requirement for forces relying on the air LOC argue for lighter more compact weapons, lighter ammunition and perhaps more importantly substantial firepower after insertion into the battle area. Current field manual for the combined arms teams emphasizes ambush style defensive maneuver for an active defense in depth. It is expected that any future conflicts, particularly in Europe, will find US forces substantially outnumbered. All of these points are best addressed by equipping the infantry with lighter more mobile weapons which can provide the maximum amount of firepower for relatively short and violent close combat engagements. With respect to the infantry, US Army doctrine states: ". . . infantry which is especially designed to operate at times and in places of limited visibility or relatively short fields of fire."[89]

SUMMARY OF LITERATURE SEARCH

Many conclusions may be drawn from the data presented in the

literature describing the evolutionary development of the infantryman's small arm from the 1930's to the present. These conclusions emanate from the qualitative combat experience of three wars and from the quantitative data derived from the numerous studies and developmental tests conducted by several different agencies.

The historical review of the development and procurement of the infantry's rifle portrays the political attitudes and parochial views of the decision makers who have had influence on the rifle development process. It is important to realize that the developmental process of any weapon system, in this case the rifle, cannot ignore the existence and impact of the traditional unquantifiables of service loyalties and the political implications of both the national and international communities. The historical perspective demonstrates that the process of military innovation evolves from two discontinuities; the process of technological and scientific change; and the alternating periods of war and peace.

The uses and effects of the rifle in combat are important to the analysis for several reasons. Although the adoption of a new weapon by the US Army is usually a reflection of its capabilities, organization and doctrine, how well the Army assimilates the new weapon is best measured by its effectiveness in combat. If the perceived doctrinal employment of the weapon does not prove to be as effective as expected, the weapon can be said to be less than optimal. If the weapon does not fill the role for which it was designed the result is usually a request for new or different weapons, a modification to the weapon, a change in organization or an attempt to adjust the tactical employment. In general, the weapon will govern tactics

while the organization is designed to facilitate the tactics to be employed. The selection of the specific tests and studies for review in Chapter II was designed to assist in the proof of the hypothesis. Therefore those tests which specifically deal with the comparative effects of the semiautomatic rifle and the automatic fire of small arms were selected for study. Studies that dealt with firepower capabilities and overall effectiveness in the context of the rifle squad were also examined. The SAWS test in 1965-1966 was particularly unique in that several different weapons were used in the comparative tests which included the Soviet AK-47, all within the context of the rifle squad.

A significant part of Chapter II was devoted to a review of the psychological effects of small arms fire. The psychological factor is important to the analysis because it has contributed much to the development of the hypothesis. In addition to the quantifiable data extracted from the studies, the psychological effects of small arms fire have been presented in the qualitative historical portion of the literature review as well.

Lethalities of different rifles and the concomitant ballistic effects are also important ingredients to the hypothesis. When analyzing the overall effectiveness of small arms fire, it is vital that the issue of target effects be discussed. It was pointed out in the introduction and later in Chapter II that, the strong belief in killing power may represent a flaw in the US Army's approach to rifle development. In part, a central point in the development of the hypothesis is that more emphasis should be placed on a small arm that effectively neutralizes the enemy rather than kills the enemy.

Neutralization of the enemy decreases his fire effectiveness and permits more maneuver for friendly units. Maneuver is used to enhance friendly fire effectiveness, survivability and mission accomplishment.

The review of literature related to ballistics was necessary to demonstrate the limitations of small arms for anything other than close combat. Too often, it seems that developers have expected the penetration capabilities of large caliber rifles to make up for the lack of firepower inherent in heavy, hard-hitting, semiautomatic rifles. The misconceptions surrounding the perceived ballistic penetrating power of small arms have had much to do with the aversion to lightweight automatic weapons in the hands of the infantryman in the rifle squad.

The theoretical review of current and emerging doctrine for the organization and employment of the rifle squad is an integral part in the formulation of the hypothesis. Because the rifle's effectiveness is to be viewed in the context of the rifle squad, the organization, equipment and employment of the squad is significant.

Today's mechanized rifle squad has a plethora of organic weapons in addition to the rifle. The supporting fires available from other sources are overwhelming. The technological sophistication of weaponry and the specialization of members of the rifle squad have almost made training for close combat with small arms nonexistent. The amount of firepower available to the rifle squad for long range fires other than small arms, has evolved to the point where maneuver on foot and close combat is hard to imagine. These conclusions will be used in Chapter III to test the hypothesis using the methodology presented there.

CHAPTER II

FOOTNOTES

[1]"Report of the M-16 Rifle Review Panel", prepared by Office Director of Weapon Systems Analysis (Washington: Department of the Army, 1 June 1968), pp. B-1 to B-4.

[2]Ibid., pp. (B-4)(B-5).

[3]Phillip B. Sharpe, The Rifle in America, (New York: Funk and Wagnalls Company, 1947), p. 519.

[4]W.H.B. Smith and Joseph E. Smith, Small Arms of the World, (Harrisburg: The Stockpole Company, 1962), p. 83.

[5]Sharpe, The Rifle in America, p. 520.

[6]Julian S. Hatcher, The Book of the Garand, (Washington: Infantry Journal Press, 1948), p. 169.

[7]Frank F. Rathbun, "The Rifle in Transition," Army, August 1963, p. 19.

[8]W.H.B. Smith, The Book of Rifles, 2d ed. (Harrisburg: The Stockpole Company, 1960), pp. 353-355.

[9]Ibid.

[10]Report by Preparedness Investigating Subcommittee on the M-14 Rifle Program, Committee on Armed Services, US Senate, 2 October 1961, p. 3.

[11]Smith, Small Arms of the World, p. 643.

[12]Ibid., p. 638.

[13]Ibid., p. 669.

[14]"Report of the M-16 Rifle Review Board," p. B-7.

[15]Letter, Headquarters USCONARC, 21 March 1957, Subject: Study of Military Characteristics for a Rifle of High Velocity and Small Caliber.

[16]"Report of the M-16 Rifle Review Board," p. C-1.

[17]Ibid., p. C-2.

[18]A copy of the Powell Board Report was not available. These statements were taken from the "Report of the M-16 Rifle Review Board" Report, dated 1 June 1968, which was prepared by Office Director of Weapon Systems Analysis, p. C-3.

[19]"Report of the M-16 Rifle Review Board," pp. C-5 to C-17.

[20]"Comparative Evaluation of the M-14, AR-15, and Soviet AK-47 Rifles," Chief of Staff Memorandum for Secretary of the Army, 14 January 1963.

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[22]Roy E. Moore, "Shoot Soldier," Infantry Journal, April 1945, p. 21.

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[24]Ibid.

[25]Ibid., p. 57.

[26]Ibid., p. 60.

[27]Ibid., pp. 66-67.

[28]Ibid., p. 68.

[29]Ibid., p. 77.

[30]Ibid.

[31]Ibid., p. 83.

[32]"The US Infantry Organizational Evolution," Infantry, July - August 1976, p. 20.

[33]S.L.A. Marshall, "Infantry Operations and Weapon Usage in Korea, Winter 1950-51," ORO-R-13, (Chevy Chase: Johns Hopkins University, 1951), pp. 3-6.

[34]Ibid., p. 7.

[35]Ibid., pp. 7-8.

[36]Ibid., p. 8.

[37]Ibid.

[38]Ibid., p. 9.

[39]Ibid.

[40]Ibid., p. 12.

[41]Ibid., p. 43.

[42]Ibid., p. 40.

[43]Ibid., pp. 53-54.

[44]Ibid., pp. 54-55.

[45]Ibid., p. 74.

[46]James L. Collins, Jr., The Development and Training of the South Vietnamese Army, 1950-1972, (Washington: Department of the Army, 1975), p. 48.

[47]Ibid., p. 101.

[48]"The US Infantry Organizational Evolution," Infantry, July - August 1976, p. 25.

[49]"Small Arms Use in Vietnam: Preliminary Results," Technical Note 5-66, Human Engineering Laboratories, August 1966., pp. 1-14.

[50]Ibid., p. 3.

[51]Ibid., pp. 3-9.

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[53]"Small Arms Weapon Systems (SAWS)," US Army Combat Developments Command Experimentation Command, May 1966, pp. 9-1 to 9-3.

[54]Ibid.

[55]Ibid.

[56]"Infantry Rifle Unit Study" (IRUS-75), US Army Combat Developments Command Experimentation Command, 15 August 1967, pp. 1-1.

[57]Ibid., pp. 1-1 to 1-3.

[58]Ibid., p. 4-1.

[59]"A Study of the Infantry Rifle Squad TOE," Psychological Research Associates, March 1956.

[60]Ibid., pp. 64-66.

[61]Ibid., p. 67.

[62]Ibid.

[63]Willard S. Vaughan and Peyton G. Walker, "Psychological Effects of Platoon Weapons - A Questionnaire Study," PRA 57-10, Psychological Research Associates, June 1957, p. 1.

[64]Ibid., p. 14.

[65]Ibid., p. 23.

[66]John A. Whittenburg and James M. Whitehouse, "Psychological Effects of Small Arms Fire on Combat Experience and Non-Experienced Infantryman," PRA 57-9, Psychological Research Associates, June 1957, p. 1.

[67]Ibid., p. 5.

[68]Ibid.

[69]Willard S. Vaughan and Peyton G. Walker, "Psychological Effect of Patterns of Small Arms Fire," PRA 57-16, Psychological Research Associates, July 1957, p. 1.

[70]Ibid., pp. 2-4.

[71]Ibid., p. 9.

[72]Ibid., pp. 13-14.

[73]Ibid., p. 15.

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[81]"Rifle Evaluation Study," p. I-E-1.

[82]Ibid., pp. II-E-4, II-E-5.

[83]Virgil Ney, "The Evolution of the Armored Infantry Squad," CORG-M-198, US Army Combat Developments Command, 19 March 1965, pp. 55-56.

[84]Extracted from modified TOE 7-45, US Army Europe dated 14 February 1974. TOE 7-45 is applicable to the 24 infantry battalions stationed in Europe.

[85]Virgil Ney, pp. 82-86.

[86]John A. Whittenburg and others, "A Study of the Infantry Squad TOE," PRA 56-3, Psychological Research Associates, March 1956, pp. 64-65.

[87]Field Manual 71-1, The Tank and Mechanized Infantry Company Team, final draft, March 1976, p. 5-39.

[88]Ibid., p. 5-40.

[89]Field Manual 71-2, The Tank and Mechanized Battalion Task Force, 6 July 1976, p. 3-7.

CHAPTER III

METHODOLOGY

The results of historical studies and current doctrinal development literature will be used to determine the proper role of the individual small arm in combat related to supporting weapons. Once a role or roles have been established, the requirements for small arms will be argued with attention to performance characteristics and relative importance in terms of combat effectiveness. The results of empirical research conducted by the US Army Combat Developments Command Experimentation Command, Psychological Research Associates and the US Army Infantry Combat Developments Agency as well as historical commentaries will be used to support this argument. The following essential elements of analysis (EEA) will serve as the basis of this argument:

EEA 1. What types of effective fire are required by infantry small arms weapons in the context of current and emerging doctrine for employment of the mechanized rifle squad?

EEA 2. What are the expected ranges of engagement requiring effective fire by the small arms of the infantry squad?

Component factors of the first element are target effects, sustainability, and tactical employment of the rifle squad. These factors will be considered at the following levels:

Level 1: Historical and qualitative assessment

Level 2: Quantitative test data

Level 3: Performance needs derived from doctrinal employment of infantry

Component factors of the second element are small arms effectiveness by range, small arms characteristics, and the doctrinal role of the small arm. These factors will be considered at the following levels:

Level 1: Historical evidence

Level 2: Comparative test data

Level 3: Performance needs derived from current and evolving Army doctrine

During the review of related literature several answers were sought to research questions which were specifically concerned with the effectiveness of small arms fire and the role which they are intended to play as part of the total force. Each of these questions is considered essential to the analysis of the primary EEA and are directly related to the hypothesis. These research questions were:

1. What ranges of engagement are necessary for effective small arms fire?

2. What are the desired target effects of small arms fire in close combat?

3. What type of small arms fire (automatic or semiautomatic) provides the desired target effects?

4. What are the correlational impacts of the psychological effects of small arms fire?

5. What are the comparative effects (lethalities and ballistic characteristics) of different rifle types and calibers?

6. What is the planned doctrinal employment of the mechanized infantry rifle squad?

Information discovered during the review of related literature will be discussed throughout this chapter. The effectiveness measures selected for use in the analysis are necessarily derived from a qualitative concept. The qualitative concept also assists to present parameters for their use. The concept is judgemental, but any effectiveness criteria used as the foundation for measurement must be just that. The concept is also derivative of informed military judgement and military experience to establish the significant qualities in the context and environment of use.

The effectiveness measures used are not unique. In particular, the same basic concept was used in the Small Arms Weapon Systems (SAWS) Test conducted by the US Army Combat Developments Command Experimentation Command.[1]

EFFECTIVE FIRE

One of the primary aims of the infantry small arms battle is to gain fire superiority. Achievement of fire superiority requires the necessary firepower to attain a greater amount of target effects than the enemy and to sustain this level of effects longer than the enemy can sustain his level of effects, and long enough to insure mission accomplishment. Neither of these factors, target effects and sustainability, is meaningful unless related to time.[2]

TARGET EFFECTS

In close combat, the rifle squad's small arms target is usually a group target, that is, an array of individual targets dispersed in

width, depth, and usually height. Most of the targets, as was discussed in Chapter II, are concealed or partially concealed. Firing on these targets is usually begun with a series of cues such as terrain form (crest of hill), weapon signatures, and movement. Fully visible individual targets are usually close or only intermittently exposed at a distance.

The friendly rifle squad behaves as a group also. The individual rifleman interacts with others in the squad by acquiring enemy targets after observing another's tracer round, or ground strike of his bullets.

The fire effects produced by the combined small arms fire of the rifle squad are significantly different from those of individual weapons fired at individual visible targets. In the context of the rifle squad firing against group targets, there are two principle target effects possible -- target hits or near misses. Together they combine in their effects on a given target array.[3]

If near enough to the target array and in sufficient volume, near misses (suppressive fires) of automatic weapons have a greater effect on the battle results than the lethalities of target hits. However, suppressive fires will not effectively produce neutralization of the enemy if the weapons and doctrine do not produce some casualties.[4]

SUSTAINABILITY

The sustainability of fire superiority is a measure of how long effective fire can be maintained. For a single small arm weapon it is dependent upon three factors. These three factors were defined

by the SAWS experiment as follows:

1. The weight rate of ammunition consumption in achieving a level of target effects.

2. The system weight of the weapon.

3. The weight limitation on the weapon system portion of the soldier's combat load carrying capacity.[5]

The infantry rifleman is severely weight limited and the sustainability in a small arms weapon system is highly affected by system weight. The weapon sustainability determinant is the amount of time that available ammunition can sustain a level of effects. In the SAWS experiment this was determined by taking the percentage of ammunition remaining for a rifle squad when the starting weight and test run time are held constant for each squad mix of different weapon systems. An example of comparative sustainability is shown in Figure 3-1

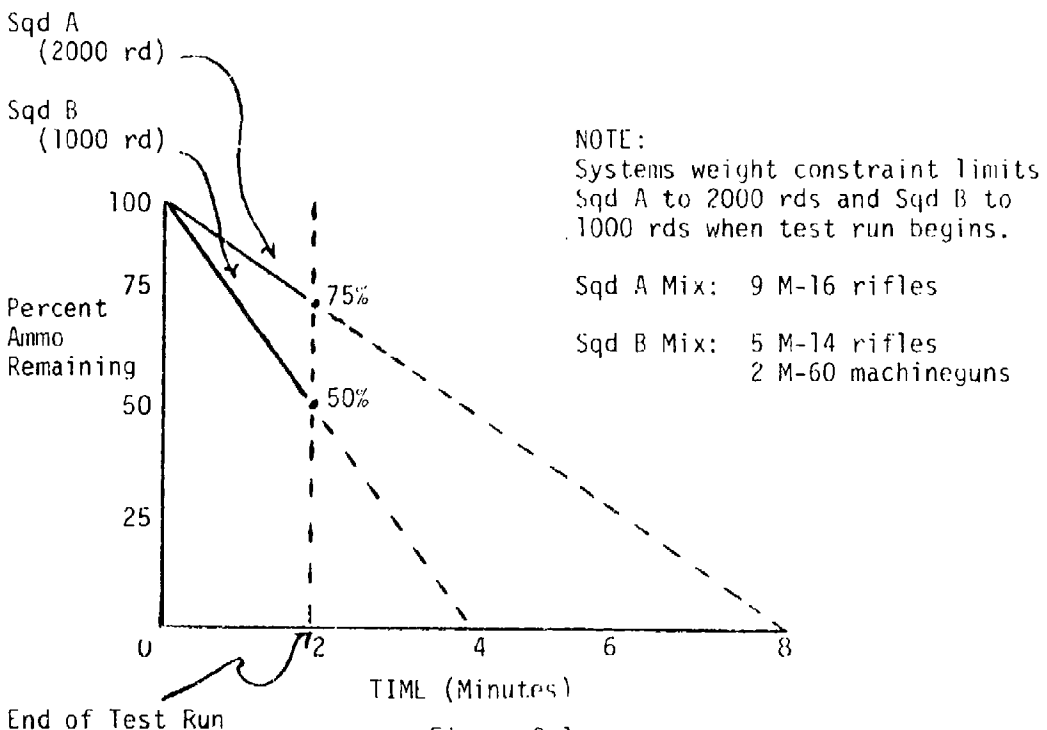

Figure 3-1.

Example of Sustainability

If squad B used 50 percent of its ammunition to attain the given level of effects it would only have half the sustainability of squad A that attained the same level of effects with an expenditure of only 25 percent of its ammunition.

The fire effectiveness measures outlined above are excellent examples of the infantry's use of and effects of various small arms weapon systems. In particular, the results of the SAWS experiment vividly demonstrate the advantages of the shorter, lighter, automatic weapons in all areas of comparison.

DOCTRINAL ROLE OF SMALL ARMS FIRE

In spite of the world-wide committment possibilities which exist for the US Army, most of the training, doctrine, and equipment is designed to fight the next war in Europe. All infantry battalions* in Europe are mechanized. Mounted warfare is characterized by rapid transitions between offensive and defensive combat. In the mechanized or mounted role the infantry is used to insure the effective employment of the combined arms effort of armor (tanks) and infantry (anti-tank weapons and small arms). The armored vehicles (APC's) provide the infantryman protection from small arms and artillery shell fragments while mounted and moving. In mounted combat the rifle squad's role will be to move to and occupy positions either to deny the enemy the freedom to conduct operations, or to drive the enemy into areas where he can be destroyed by supporting fires. The infantry is also expected to clear away obstacles which block or impede the advance of the armor units.[6]

*The infantry battalion consists of twenty-seven rifle squads of eleven men each.

The increased population and spreading urbanization of Europe restricts an open terrain battlefield. It is expected that a great many of the battles in the European environment will be fought in towns and villages and along the routes that connect them. Arthur S. Collins, a retired Lieutenant General has this to say about the potential European battlefield:

> In Western Europe the towns and villages are on the natural routes of travel. They are at the crossings of rivers and along the roads and railroads; they just get bigger where these travel routes intersect. ... That is where much of the fighting is going to take place and where the major battles would develop.[7]

The infantry when dismounted will often have to organize the towns and villages as strong points. LTC John W. Burbery in an article in Military Review points out in his discussion on military operations on urbanized terrain that the demands on organization, training and equipment may require additional emphasis on more suitably armed infantry to fight in built-up areas and cities. Burbery sees a requirement for more short range automatic weapons for the task.[8]

PSYCHOLOGICAL EFFECTS

The psychological or neutralizing effects of suppressive fires can influence close combat engagements in several ways. As was discussed in Chapter II, the relationship between the physical effects of a weapon and the psychological impact of their use are not correspondent. Although the semiautomatic .30 caliber rifle is generally considered to be more accurate than a lightweight fully automatic rifle or submachine gun, evidence indicates that the psychological effect of automatic fire is generally more effective in its neutralization capability.

It was also discussed in Chapter II that combat targets (enemy infantry) are usually ambiguous and poorly defined. Because of the ambiguity of the enemy the target area is larger than the individual soldier himself. Consequently, the entire area in which the enemy is suspected to be located must be covered by fire in order to be effective. Although enemy fire may provide the opportunity to narrow the degree of ambiguity, such cues rarely pinpoint the specific location of the firer. This is especially true at ranges in excess of 200 meters.

COMBAT EFFECTIVENESS COMPONENTS

There are, in addition to the measures of effectiveness already mentioned, other effectiveness qualities which impact on the evaluation of small arms weapon systems. These additional components include weight reduction or mobility, tactical versatility, reliability, and training. Lightweight, shorter and more compact weapons in the hands of the infantryman permit him a greater mobility in the performance of his mission. Lighter ammunition also allows an increase in the amount of potential firepower without an increase in the combat load carrying limit.

Tactical versatility includes the relative capability to perform several different functions normally associated with infantry weapons. These would include automatic and semiautomatic fire, and the use of a grenade launcher. The feasibility for use by airborne, airmobile, mechanized and amphibious forces are also important aspects of tactical versatility.

The reliability component includes factors of durability, ruggedness and overall performance under various climatic conditions.

The propensity for malfunctions or stoppages are significant measures of a weapons reliability under the extremes of close combat. Weapons that frequently misfire or have stoppages can seriously affect the confidence of the firer. A malfunction while engaged in close combat can easily mean the difference between winning or losing a fire fight. The requirement for sustainability of target effects is also jeopardized.

The traditional measures of training performance are primarily firing scores on firing ranges. However, there are other factors to be considered. For example, the weapon should be easily disassembled and assembled for easy cleaning and maintenance. Weapons which have relatively low recoil permit the new soldier to more readily acquire and learn the different techniques of fire for desired target effects.

CHAPTER III

FOOTNOTES

[1]"Small Arms Weapon Systems (SAWS)," US Army Combat Developments Command Experimentation Command, May 1966, pp. 2-41 to 2-49.

[2]Ibid., p. 2-41.

[3]Ibid., p. 2-42.

[4]Ibid., p. 2-43.

[5]Ibid.

[6]"Special Tactics Section: An Overview," Infantry, Vol. 66, No. 5, September - October 1976, pp. 15-16.

[7]Arthur S. Collins, Lt. General (Ret.) "Tactical Nuclear Warfare and NATO: Viable Strategy or Dead End," NATO's Fifteen Nations, Vol. 21, No. 31, June - July 1976, p. 84.

[8]John W. Burbery Jr., "Tactical Lessons Learned --- But Where To Apply Them?" Military Review, July 1976, p. 28.

CHAPTER IV

FINDINGS

The findings which have evolved from the review of related literature and the application of the methodology outlined in Chapter III are presented here. The findings will first be presented as answers to the six basic research questions which were established and used as the basis for the research in Chapter II. The research questions all relate directly to the two Essential Elements of Analysis. The research questions were used to develop the answers to the Essential Elements of Analysis within the parameters of the measurement criteria presented in Chapter III.

RESEARCH QUESTIONS

Question 1 - What ranges of engagement are necessary for effective small arms fire?

The historical evidence of three wars and the collective military judgement and experience of hundreds of combat experienced infantrymen leads to the conclusion that engagement ranges for the rifleman of the rifle squad will rarely exceed 200 meters. The qualitative data gathered in Chapter II portrays the small arms battle at ranges of 30 to 100 meters. The Firma III study conducted in 1969 concluded that 100 meters distance from the objective was the decision point of whether to assault or not assault. Firma III also emphasized

that supporting fires (artiliery and heavy machinegun fire) and maneuver should be the primary means of moving close enough to begin the assault.[1] The Firma III study concluded that:

> More attention should be paid to the infantry's combined fire and maneuver capability after dismounting from carriers . . .[2]

The Firma III study results conclude that one of the best ways to enhance maneuver is by neutralizing the enemy. Fire superiority in close combat has proven to be the most effective method for enhancing maneuver in the rifle squad.

S.L.A. Marshall's research and the SAW's study results support the finding that small arms fire will not be effectively employed beyond ranges of 200 meters. The US Army's stated rationale that infantry small arms fire must have the same effective range capability as the enemy's small arms* seems to be a fallacious argument. The organic supporting weapons of the infantry companies and battalion are designed to provide the supporting long range fires needed by the rifle squad. It is a waste of ammunition for a rifle squad to engage enemy soldiers at ranges in excess of 200 meters with small arms fire. Propelled grenades, light machinegun fire and, in most situations if the APC is in proximity, the .50 caliber heavy machinegun can be employed in support. Mortar fire from company and battalion and artillery fire from the division artillery units are also available for support. The role of the infantry small arm is for close combat at ranges of from 10 meters to 200 meters. Therefore, the rifle squads small arm need only have an effective range of 200 meters.

Further proof of the limited ranges doctrinally envisioned for

*The Soviet AK-47 has an effective range of 400 meters.

the infantry squad small arm is the development of the Squad Automatic Weapon (SAW). The proposed material need document requires that the SAW have an effective neutralization capability out to 1000 meters. The SAW is to be lightweight, and capable of being fired from the hip, underarm or shoulder in the assault. It is expected that basis of issue for the SAW will be two weapons for each rifle squad. The caliber being considered is the 5.56mm ammunition.[3] The SAW development recognizes the close combat role of the infantry small arm.

Question 2 - What are the desired target effects of small arms fire in close combat?

The review of the historical data collected by S.L.A. Marshall indicates that neutralization of the enemy by small arms fire best provides the necessary target effects to enhance mission accomplishment for the infantry rifle squad when engaged in close combat. The research by S.L.A. Marshall led him to conclude that most of the targets engaged by riflemen are "positions" rather than "men" and that "free firing in combat" can provide more effective fire than those who wait to "see" the enemy.[4] The quantitative data presented in the SAWs study and by Psychological Research Associates suggests that neutralization fires of small arms provides a higher proportion of target hits than aimed fire at point targets at all ranges,[5] and that higher volumes of small arms fire significantly increases neutralization effects.[6] All of this data is not to suggest that killing of the enemy is not desired, but rather that neutralization of the enemy with the small arm enhances mission accomplishment more than the killing effect. More specifically, the psychological effects of small arms fire (the fear of being killed) provides validity to the neutralization concept.

The studies done by Psychological Research Associates and by the Institute of Advanced Studies, Combat Developments Command, indicate that neutralization fires effectively reduce the enemy's capability to maneuver and fire. Concomitantly, neutralization increases the friendly forces ability to maneuver and fire. Maneuver can also provide improved fire effectiveness.

Question 3 - What type of small arms fire (automatic or semi-automatic) provides the desired target effects?

The findings for ranges of engagement and target effects are significant for the analysis of research question 3. The choice between automatic or semi-automatic fire does not necessarily require that a clear distinction be made.

The quantitative data reviewed in the SAW study indicates that there are advantages to both methods of fire. Semi-automatic fire is inherently more accurate against pin-point targets and small narrowly defined target areas. It is less fatiguing to the firer over extended periods of time and conserves ammunition. Automatic fire is not as accurate against pin-point targets, especially at ranges greater than 100 meters. Over long periods of firing, automatic fire is fatiguing, and large amounts of ammunition are required to sustain levels of fire. However, the neutralizing effects of automatic fire are much more effective than semi-automatic fire. It should be noted, however, that the study data does indicate that there is little differential effect when semi-automatic fire is given the capability to fire equal numbers of bursts and rounds per burst as automatic fire.[7]

SAW's study results also show that automatic fire has a greater neutralization effect when the number of bursts are increased over

time. As to whether random or systematic distribution of fire on the target is more advantageous, the quantitative data indicates that random fire produces more target hits.[8]

Question 4 - What are the psychological effects of small arms fire?

As indicated in S.L.A. Marshall's historical analysis and in Psychological Research Associates studies, both in the qualitative and quantitative sense, the psychological effect of small arms are seen as significant. Sustainability of effective fire to achieve the desired target effects is indirectly affected by the psychological impact. In close combat with small arms both the friendly and enemy personnel are affected psychologically. Effective friendly fire breeds confidence, boldness and esprit on the battlefield, while it has the opposite effect on the enemy.

The historical qualitative data from three wars and the quantitative data from studies conducted by Psychological Research Associates (PRA) indicates the psychological effects of small arms fire override the physical effects in significance.

The qualitative historical data and the quantitative PRA data support a finding that the advantages of automatic fire over semi-automatic fire are both physical and psychological. In particular, the psychological effect of small arms fire lends credence to the findings in research question 2 and the advantages of neutralization.

Question 5 - What are the comparative effects (lethality and ballistic characteristics) of different rifle types and calibers?

The analysis of lethalities and ballistic effects was limited

to 7.62mm and 5.56mm ammunition.* Comparative test data from the US Army Infantry Agency indicates that the 7.62mm cartridge has significantly greater penetration effects than 5.56mm ammunition at all ranges out to 600 meters. At ranges out to 300 meters the 5.56mm cartridge did penetrate most of the targets as effectively as the 7.62mm cartridge.[9]

Although no quantitative data is available concerning the comparative effects of 7.62mm and 5.56mm ammunition on human beings, the qualitative judgement of US Army medical personnel and combat veterans from Vietnam indicate the 5.56mm ammunition has a greater casualty producing effect at ranges out to 300 meters.

The studies of Combat Developments Experimentation Command and field experience indicate that the lightweight high velocity ammunition (5.56mm) has a tendency to be more easily deflected by undergrowth and trees than the heavier low velocity ammunition (7.62mm). Data results from the SAWS study also indicate that the accuracy of both the 7.62mm and 5.56mm ammunition is equal out to ranges of 500 meters. Beyond 500 meters the 5.56mm ammunition has a tendency to lose velocity and stability thereby giving the 7.62mm a better capability for pin-point accuracy.

Question 6 - What is the planned doctrinal employment of the small arm of the mechanized infantry rifle squad?

The proliferation of specialized weapon systems within the rifle squad which has taken place in recent years has manifestly changed the nature of the infantry rifle squad. No longer does the rifle squad

*In effect, 7.62mm (M 14 rifle) and .30 caliber (M-1 rifle) ammunition are essentially the same when making comparisons with 5.56mm ammunition.

consist of men armed only with rifles and bayonets. With the advent of anti-tank guided missiles, grenade launchers, and armored personnel carriers the infantry squad has increased its capability to defeat enemy armor and massed troops at longer ranges without the use of small arms fire. Moreover, the supporting fires from medium and heavy machineguns which are also part of the squad's TOE substantially increase organic firepower. At the same time, however, the infantryman has strained his capability to effectively destroy the enemy in close combat with small arms.

It was stated in FM 71-1 that the primary mission of the rifleman is to provide close-in protective fire to the M-60 machinegun.[10] Although not explicit in current field manuals, the implication is that the Dragon anti-tank guided missile gunner will require the protection of the rifleman. A qualitative assessment concludes that the M-60 machinegun gunner and the Dragon gunner will have difficulty in carrying a cumbersome rifle while using these weapons. Further, that in the assault these weapons would frequently be employed as supporting weapons. If one assumes a full strength rifle squad of eleven men (rare exception) and the employment of the M-60 machineguns, Dragons, .50 caliber machinegun and the two M-203 grenade launchers the number of riflemen and small arms fire capability for close combat is significantly reduced.

IIA 1. What types of effective fire are required by infantry small arms weapons in the context of current and emerging doctrine for employment of the mechanized rifle squad?

Current and emerging doctrine require the dismounted infantryman to protect the supporting weapons of the squad. As pointed out

earlier, FM 71-1 specifically assigns this role to the riflemen.[11] The implication is that riflemen would engage enemy infantry if they closed to distances which would threaten the gunners of supporting weapons. In this sense, the riflemen would be expected to fire their weapons at close ranges. Automatic fire would provide the desired target effects (neutralization) in the shortest amount of time with the minimum amount of riflemen. One or two riflemen could easily sustain neutralization fires longer with lightweight automatic weapons than with a semiautomatic rifle.

The SAWS experiment found that the lightweight, low muzzle impulse weapon is superior for target effects (neutralization) and sustainability of the target effects.[10]

In addition to the defensive employment of the rifle squad mentioned above, target effects and sustainability must be considered in the context of offensive operations and combat in built-up areas. The Firma III study, which concluded that 100 meters distance from the objective was the decision point for the assault in the offense, provides a qualitative assessment of the role of the small arm in the dismounted attack. Emerging doctrine for the employment of the newly developed armored personnel carrier is expected to permit the rifle squad to remain mounted more often during the assault. This possibility alone could support the use of shorter, lighter small arms for clearing the objective after the assault and for easier storage of weapons within the carrier.

Close combat in cities, towns and large suburban areas is expected to be a necessity in any future conflicts. As the literature search has shown, the dismounted infantryman will be the one to perform

this task. Again, both the quantitative and qualitative data validate the advantages of lighter, shorter, automatic small arms for this type of close combat. The mobility and tactical versatility of automatic, lightweight small arms are superior to heavy, semi-automatic rifles in house to house fighting.

EEA 2. What are the expected ranges of engagement requiring effective fire by the small arms of the infantry squad?

It was pointed out in the discussion of research question one, that ranges of engagement for the small arms of the infantry squad should not exceed 200 meters. The historical evidence gathered by S.L.A. Marshall and the US Army Human Engineering Laboratories supported this finding. The discussion of current and evolving Army doctrine in Chapter II and the analysis of research question six also support the finding.

The analysis of research question two found that neutralization (suppression) was the most effective target effect for close combat. The measurement of effective fire, in terms of achieving the desired target effects within the parameters of the expected engagement ranges, was defined as fire superiority. The quantitative test data gleaned from the SAWS experiment demonstrated that effective fire can be achieved by lightweight, automatic small arms weapons at ranges in excess of 200 meters.

CHAPTER IV

FOOTNOTES

[1]"Dynamics of Fire and Maneuver (FIRMA III)," Briefing by US Army Combat Developments Command Institute of Advanced Studies, 15 January 1970, p. 23.

[2]Ibid.

[3]Proposed amended Material Need (MN) for the Squad Automatic Weapon (SAW) System, USA Infantry Center, 14 May 1976, pp. 6-7 (Unclassified). Document has an overall classification of Confidential.

[4]S.L.A. Marshall, Men Against Fire (New York: William Morrow and Company, 1947), pp. 77-83.

[5]"Small Arms Weapon Systems (SAWS)," US Army Combat Developments Command Experimentation Command, May 1966, pp. 9-1 to 9-3.

[6]"A Study of the Infantry Rifle Squad TOE," Psychological Research Associates, March 1966, pp. 64-67.

[7]"Small Arms Weapon Systems (SAWS)," pp. 2-41 to 2-49.

[8]Ibid., p. 2-42.

[9]"Rifle Evaluation Study," US Army Infantry Combat Developments Agency, (Fort Benning, Georgia, 1962), pp. II-E-4, II-E-5.

[10]Field Manual 71-1, The Tank and Mechanized Infantry Company Team, final draft, March 1976, p. 5-39.

[11]Ibid.

[12]"Small Arms Weapon Systems (SAWS)," US Army Combat Developments Command Experimentation Command, May 1966, pp 9-1 to 9-3.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

This study was generated by the hypothesis that a compact, light-weight, assault submachine gun for the infantryman will improve the combat effectiveness, firepower, and the ability to achieve fire superiority in close combat. Through the process of a detailed qualitative and quantitative research methodology, it is concluded that the assault submachine gun would indeed provide the infantryman the necessary firepower to improve his combat effectiveness.

Throughout the thesis development and subsequent research there were three categorical areas of significance which directly impacted upon the two essential elements of analysis and the six inter-related research questions.

The theoretical review determined the role that the individual small arm plays within the context of current and emerging doctrine and its relationship to the employment of supporting weapons was directly related to the basic hypothesis. It was concluded that the changing mission of the mechanized squad and the increased emphasis on anti-tank warfare have dramatically changed the traditional role of the individual small arm. In the arena of changing tactics, such as the active defense, the rifleman has become responsible for the close-in security of crew served weapons in the rifle squad. Future

weapons and equipment, such as anti-tank guided munitions and the mechanized infantry combat vehicle, visualize the rifleman using one weapon to fight from within the vehicle and another when dismounted. The infantryman when ordered to dismount and engage in close combat with small arms will be fighting at close ranges. With the advent of the squad automatic weapon (SAW) and the heavier and more effective machinegun mounted on the mechanized infantry combat vehicles, organic support fires will provide improved maneuver capability for the infantry rifleman to close with the enemy. All of these factors lead to the conclusion that a requirement for long-range pinpoint accuracy of small arms for the rifleman is unwarranted and unnecessary in the majority of the cases. Both in a qualitative and quantitative sense, the nature of targets for the dismounted infantryman will be small area type targets. Except for close ranges, man-sized targets will be fleeting at best. All of the data clearly indicates that ranges of engagement in excess of 200 meters will be rare for the individual small arms, and should be engaged by larger support weapons.

The extensive historical qualitative assessment showed that in terms of target effects firepower, and fire superiority capabilities, the semi-automatic rifle has left much to be desired. The advantages of automatic weapons in close combat have been proven historically in both the offense and defense. The traditional fears of excessive ammunition expenditure have been mostly overcome with the newer, powerful high velocity projectile in small calibers. It has been shown that getting infantry riflemen to engage the enemy is as much of, if not more of, a problem than getting them to aim at the enemy and hitting him. Automatic weapons on the battlefield create confidence, esprit

and boldness in the hands of the user. In terms of tactical mobility, versatility, desired target effects, sustainability of target effects and psychological advantages, history has demonstrated the advantages of lightweight, automatic small arms in close combat. That is not o say that there are not occasions when semi-automatic fire is necessary or desired. In fact, the data demonstrated that semi-automatic fire does provide better accuracy for pin-point targets at any range. However, for most of the type targets envisioned, automatic fire best provides the desired target effects.

The quantitative examination of test and evaluation data which dealt with the analytical aspects of infantry small arms capabilities and their potential effects also demonstrated the advantages of small, lightweight, automatic weapons. The perceived ballistic advantages of high-muzzle impulse weapons were proven to be false. Empirical data clearly showed that the low-muzzle impulse weapon in the automatic mode of fire was superior in terms of target effects and sustainability of target effects out to ranges of 500 meters.[1] Neutralization fires provide superior fire effects to enhance mission accomplishment. Attempts to use semi-automatic fire to engage fleeting pinpoint targets within the spectrum of the rifle squad is significantly less effective and does not provide adequate firepower for close combat engagements. Bursts of automatic fire at close ranges provide better target effects (neutralization) for longer periods thus facilitating rifle squad maneuver. Neutralization fires when in the defense slow and disrupt the maneuver and fires of the enemy assault forces.

IDENTIFIED SHORTCOMINGS

The two essential elements of analysis which permitted an

analysis of the three major areas of research has supported the hypothesis. However, there are two major shortcomings which should be addressed. The adoption of the compact, lightweight assault submachine gun will not permit the pin-point accuracy in excess of 200 meters which is occasionally required at the small unit level. Traditionally, this requirement has been solved by the use of a large caliber, semi-automatic rifle or sniper rifle. A second major shortcoming is the deficiency which exists in the area of fire discipline and distribution of fires for the rifle squad. The use of automatic weapons requires extensive training at individual and small unit level. The adoption of an automatic submachine gun should overcome the hesitancy to engage the enemy in close combat, but can create the problem of wasted ammunition and indiscriminate firing. The use of this type weapon will require more and better training than currently exists in the US Army at the small unit level. Such things as how many rounds to fire in a burst, when to fire, how to properly engage different targets in different environments (woods, open areas, built-up areas) are subjects requiring thorough training.

RECOMMENDATIONS

The adoption of a lightweight assault submachine gun with a selective fire capability for the rifleman of the mechanized infantry squad should be initiated as soon as possible. Quantitative test data already accumulated by several US Army agencies will negate any requirement for extensive development testing of such candidate weapons. It is recommended that the caliber of the weapon should be 5.56mm. A shortened version of the M-16A1, referred to as the CAR-15, is already available for full scale production and should be considered as a

primary candidate for field testing and procurement.

It is recommended that the assault submachine gun be issued to each member of the mechanized infantry rifle squad. The compactness of the weapon should permit crew-served weapon personnel to carry the submachine gun slung on their back with no significant hinderance in the performance of their primary mission as Dragon gunner, driver (when dismounted) or M-60 machine gunner. The submachine gun could replace the relatively ineffective .45 caliber pistol currently issued to rifle squad members assigned to crew-served weapons.

The adoption of the submachine gun will require increased emphasis on close combat training for users of such a weapon. The increased training, although obstensibly necessitated by a conceptual change in small arms engagements, will permit a much needed improvement in fire control and fire discipline at the small unit level. Maneuver, which has been sadly lacking at small unit level in the US Army,[2] will require added emphasis. Improved techniques for integration of organic supporting fires at the squad, platoon and company level will also require strong emphasis.

It is recommended that the US Army field test the proposed adoption of the assault submachine gun to evaluate its capabilities to improve the target effects, firepower and fire superiority of the mechanized infantry squad. The assault submachine gun may not be optimal in all respects, but then, what small arm is? The important aspect is that both quantitatively and qualitatively, the assault submachine gun, as recommended here, and in the context of new and emerging doctrine, is an improvement over the current small arm issued to the rifleman in the US Army.

FOOTNOTES

CHAPTER V

[1]"Small Arms Weapon Systems (SAWS)," US Army Combat Developments Command Experimentation Command, May 1966, pp. 9-1 to 9-3.

[2]"Dynamics of Fire and Maneuver (FIRMA III)," Briefing by US Army Combat Developments Command Institute of Advanced Studies, 15 January 1970, p. 23.

FOOTNOTES

CHAPTER V

[1]"Small Arms Weapon Systems (SAWS)," US Army Combat Developments Command Experimentation Command, May 1966, pp. 9-1 to 9-3.

[2]"Dynamics of Fire and Maneuver (FIRMA III)," Briefing by US Army Combat Developments Command Institute of Advanced Studies, 15 January 1970, p. 23.

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