Making the Most of What We Have – Combat Power and the Bradley Dismounted Infantryman

A Monograph
by
Major Hugh F. T. Hoffman
Infantry

School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

First Term AY 89/90

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION / AVAILABILITY OF REPORT Approved for public release; distribution unlimited
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION School of Advanced Military Studies, USAC&GSC 6b. OFFICE SYMBOL (If applicable) ATZL-SWV	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) Fort Leavenworth, Kansas 66027-6900	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING / SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)

Making the Most of What We Have-- Combat Power and the Bradley Dismounted Infantryman (U)

12. PERSONAL AUTHOR(S)

Maj Hugh F.T. Hoffman III, USA

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Monograph	FROM _____ TO _____	90 Jan 22	55

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Bradley Mechanized Infantry J-Series MTOE, Combat Power NTC Observations

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

See Attached Sheet.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
☐ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL MAJ Hugh F T Hoffman III	22b. TELEPHONE (Include Area Code) (913) 684-2138
	22c. OFFICE SYMBOL ATZL-SWV

DD Form 1473, JUN 86 — Previous editions are obsolete. — SECURITY CLASSIFICATION OF THIS PAGE

ABSTRACT

MAKING THE MOST OF WHAT WE HAVE--COMBAT POWER AND THE BRADLEY DISMOUNTED INFANTRYMAN by MAJ Hugh F.T. Hoffman III, USA, 55 pages.

Many authors in recent years have lamented the decrease of dismounted infantrymen in J-series Bradley mechanized infantry units. This decrease is often described as a shortage and portrayed as a critical weakness of Bradley units. This monograph takes a fundamentally different approach to the issue and examines not whether there are enough infantrymen in Bradley units but whether Bradley units can generate sufficient combat power to win on the battlefield with the vehicles, men, weapons systems, and organization they currently have. In pursuing the answer to this question, the author employs Brigadier General Huba Wass de Czege's Relative Combat Power Model to analyze how well Bradley units perform doctrinal missions against the typical Soviet force arrays they could expect to see on the modern battlefield. Data and reports on field performance, particularly lessons learned from NTC rotations, provide valuable insights into Bradley unit strengths and weaknesses as they apply to firepower, maneuver, protection, and leadership.

Analysis of field performance under the Relative Combat Power Model indicates that the fewer number of dismounted infantrymen in Bradley units is not so much a problem as how those units are organized and employed. The author argues that current Bradley squad and platoon organization works against optimal training and tactical performance. Careful consideration should be given to separating the mounted and dismounted elements of a Bradley platoon. Such a separation would allow the platoon leader and company commander to employ both the dismounted and mounted elements more effectively and efficiently. The author's analysis also suggests several critical issues the commander ought to take into consideration when planning tactical operations around Bradley units attrited by combat. Among these issues are the tradeoff between survivability of positions and security, the attendent risks of employing dismounted infantrymen away from their M2s, the impact of fatigue upon performing multiple missions in continuous operations, and the relative impact of dispersion in Bradley units on firepower, maneuver, and leadership/C^2.

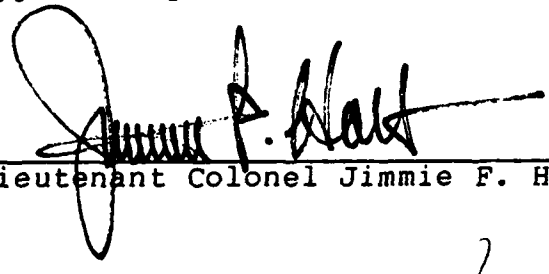
SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

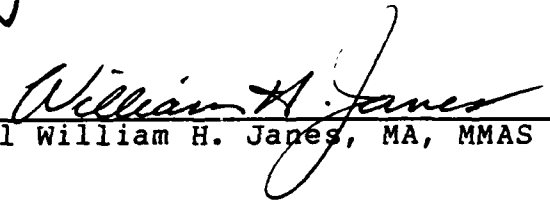
Major Hugh F. T. Hoffman

Title of Monograph: Making the Most of What We Have - Combat Power and Bradley Dismounted Infantryman

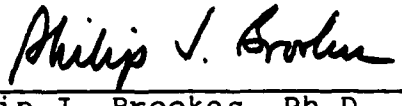
Approved by:



Lieutenant Colonel Jimmie F. Holt, MA, MMAS — Monograph Director



Colonel William H. James, MA, MMAS — Director, School of Advanced Military Studies



Philip J. Brookes, Ph.D. — Director, Graduate Degree Program

Accepted this 26th day of March 1990

Table of Contents

I. INTRODUCTION

A strong and commonly voiced concern in the armor and mechanized communities is that there are too few dismounted infantrymen for the size and number of missions that Bradley infantry units are typically expected to perform. Major General Scholtes (Retired), former commander of the Second Armored Division, states this worry in the strongest of terms:

> The modern armored division has concealed within it a critical weakness so important it could impact on the division's ability to accomplish the many and diverse missions it must be prepared to take on. This major weakness is the total inadequacy of the dismounted infantry within the division. At a time when the Army is forming two new light divisions, the modernized heavy armored division with six armor [sic] battalions and four infantry battalions does not have a sufficient quantity of dismounted infantrymen to make an effective combined arms force.[1]

His concern seems even graver when one begins to consider the strengths at which units in combat will operate. If World War II is any precedent, infantry units can expect routinely to fight at 60 to 80 percent strength.[2] These figures indicate that a Bradley squad, authorized nine men, probably will consist of five to seven men in battle. If we then subtract the three man crew required to fight the vehicle itself, we are left with only two to four dismounted infantrymen.[3]

Further complicating the issue is the fact that Bradley infantry battalions habitually cross-attach one or more companies to a sister armored battalion, further reducing the aggregate dismount strength by one quarter to one half. In concrete terms, this analysis portends that in future conventional wars, infantry heavy task forces (three infantry companies and one tank company) can expect to field on average only about 120 dismounted infantrymen in a battalion sector of four to ten kilometers in width. From this perspective, the density of infantrymen indeed seems to be dangerously low.

While the discussion above should give us cause for concern, it seems to make questionable assumptions about the battlefield of the future. It appears not only to ignore intangible factors that will play a critically important role in the combat effectiveness of tank and mechanized task forces, but it also disregards tangible symbiotic relationships between the battlefield operating systems that may

complement and enhance the combat strength of those infantrymen that we do have. One flaw in this kind of thinking is the imbedded assumption that dismounted infantrymen will or should be equally distributed throughout a task force's sector in some form of a linear disposition. Our doctrine clearly recognizes the rarity of linear operations in high- or mid-intensity conflicts and predicts that nonlinear operations will be the norm on future battlefields, even in conventional combat.[4]

Second, and equally important, is the impact that synchronization of combat capabilities has in increasing the effect of the individual infantryman's contributions to overall combat power. Infantrymen, in other words, complement the other combat systems on the battlefield and, in turn, are complemented by them. Their effectiveness is at least partially a function of how well their unique capabilities contribute to the whole. Merely looking at dismounted infantry strength alone can be quite misleading if other combat systems significantly enhance the infantryman's relative combat power against the enemy.

Finally, the intangibles of leadership, morale, and command and control can have a tremendous positive or negative impact on a unit's ability to win on the battlefield.[5] Expertise, experience, will, cohesion, and esprit ultimately count for much as does an effective command and control system. Unfortunately, because these considerations are unquantifiable, we often omit them when we calculate the relative strength of our forces against the enemy's. We should not neglect these considerations merely because they are physically immeasurable and must be evaluated subjectively.

Before beginning, however, it is perhaps best to come to grips with what we mean by "too few" infantrymen. It is not enough to point to historical precedent and say that we have always fielded between nine and twelve dismounted infantrymen in a squad.[6] Nor is it sufficient to refer to the apparent "emptiness of the battlefield."[7] The claim "too few" is a relative evaluation and is a function of comparing our strength against the enemy's. Brigadier General Huba Wass de Czege calls this comparative strength "combat power."[8] According to him, combat power has four components: firepower,

maneuver, protection and leadership. Imbedded in each of these four components are the intangibles of the moral and cybernetic domains. Thus, we ought not draw any conclusions about whether there are enough infantrymen in Bradley units before exploring the four components of combat power as they apply to the Bradley infantry.

The central question of this paper, then, will be whether Bradley infantry units as currently organized can generate sufficient combat power to accomplish their assigned doctrinal missions. If not, is the problem merely one of numbers or is it one of organization and how the dismounted infantry are employed? General Wass de Czege's Combat Power Model will be the analytic tool used to assess the current Bradley infantry organizational structure and determine that structure's impact on the employment of Bradley infantry battalions.

II. AN ANALYSIS OF BRADLEY INFANTRY RELATIVE COMBAT POWER

To understand our own relative combat strength, we need first to examine the tactics and forces of our principal adversary, the Soviet Army. The Soviet Union is the most powerful of the nations we could expect to fight in a mid- to high-intensity war, and it has any number of client states who fight using its equipment and doctrine. Therefore, an analysis of its forces and tactics should give us an idea of the type and number of forces that we would need to employ in a conventional war to ensure success.

In all likelihood, U.S. battalion task forces in a typical scenario would initially face elements from first echelon motorized rifle divisions since they comprise the majority of Soviet ground maneuver forces.[9] For the purposes of comparing dismounted infantry strength, examining motorized rifle units highlights the most potent infantry force the Soviets can generate in a zone of attack or defense against U.S. forces. With that in mind, let's look at what U.S. doctrine requires of infantry battalion task forces in the offense and defense and then compare these requirements against typical Soviet force arrays they might face.

U.S. doctrine states that an infantry battalion task force in the defense should be able to defeat an attacking Soviet regiment. At the very minimum, a battalion task force should sit astride a regimental

avenue of approach. A Soviet motorized rifle regiment (MRR) normally attacks across a three to eight kilometer front with two motorized rifle battalions (MRBs) in the first echelon and one motorized rifle battalion in the second echelon. The second echelon battalion will normally follow the main axis. Generally, the tank battalion of the regiment is divided and each of its tank companies is attached to a motorized rifle regiment.[10]

First echelon MRBs ordinarily are BTR-60PB units consisting of 48 BTR-60PBs and approximately 280 dismounted infantrymen when at full strength.[11] Attached tank companies comprise 13 T-64/72s each. Hence, a battalion in the defense should encounter 96 BTR-60PBs, 27 T-64/72s, and about 560 dismounted infantrymen in the first echelon. Supporting these two echelons will be two to four artillery battalions consisting of 18 howitzers each (36-72 howitzers).[12]

The Soviets desire force ratios greater than three to one along an axis of attack. They will weight the main attack area to obtain up to a 5:1 ratio in tanks, a 6-8:1 ratio in artillery, and a 4-5:1 ratio in dismounted infantry by reducing unit frontages, limiting distances and intervals between units and men, and augmenting organic artillery with front and army assets.[13] Additional fire support will come from an increased allocation of ground attack sorties from front tactical aviation assets.[14] In simple terms, the Soviets generate higher force ratios primarily by adding fire support assets, condensing forces in space and time, and by positioning subsequent echelons to follow success.

Still, looking only at one echelon at a time, we can see that a Soviet regiment will have difficulty obtaining the desired force ratios without narrowing its sector significantly. A typical U.S. battalion task force organized with three infantry companies, it organic antitank company, and one tank company generates 41 M2 Bradley Fighting Vehicles, 14 M1 Abrams Tanks, 12 M901 Improved TOW Vehicles, and 180 dismounted infantrymen at full strength. In terms of forces available, Soviet first echelon forces can only generate slightly over a two to one ratio in infantry fighting vehicles, slightly under a two to one ratio in tanks, slightly over a three to one ratio in dismounted

infantry, and anywhere from a two to one to a three to one ratio in artillery. In numbers alone, a U.S. battalion task force should have sufficient forces to defeat attacking Soviet first echelon battalions before turning its attention to defeating second echelon forces. The key is to isolate each echelon as a discrete package of forces and firepower. Interestingly, our offensive doctrine emphasizes the same point.

American offensive doctrine stresses that an attacking U.S. battalion has sufficient forces to defeat a Soviet company in the defense. When the Soviets are forced to defend, they probably will have sustained substantial losses. Normally, they will have been attacking for several days and will have halted to consolidate gains, to await additional resources before continuing the attack, to repulse an enemy counterthrust, to regroup after serious losses (from conventional, nuclear, or chemical weapons), to free resources for other elements of the force that are on the offensive, or to await logistical support.[15] Whether Soviet companies are in a deliberate or a hasty defense, their positions will be characterized by a single echelon of positions and forces, barriers and minefields, and "fire sacks" and ambush sites. Generally, company strongpoints will be 500 to 1000 meters wide and 500 meters deep.[16]

A motorized rifle platoon, the battalion reserve, will be positioned where it can quickly and effectively respond to and stabilize an enemy penetration.[17] That platoon comes, of course, from one of the forward companies of the battalion. For the purposes of this analysis, however, we will assume that it does not come from the company we examine.

A Soviet motorized rifle company (MRC) in the defense will have twelve BTR-60PBs, four T-64/72s, and approximately 95 dismounted infantrymen when it is at full strength.[18] Additionally, elements from the battalion's antitank and grenade launcher platoons could be collocated with MRC. Up to three artillery battalions could support the parent regiment. In all probablility, that company's parent battalion will position its organic mortar battery so that it can provide immediate close in fire support for all three company

strongpoints.[19]

From these figures we can see that our battalion task force of three infantry companies and one tank company would be able to gain a three to one ratio of infantry fighting vehicles (41:12), tanks (14:4), and artillery (if we were part of a main attack and additional division or corps artillery battalions were allocated to support us). We could attain a three to one ratio or greater of infantrymen, though, only if we concentrated the attack against a limited portion of the enemy company's defense. As we would only have 180 dismounted infantrymen at full strength, the best ratio we could achieve against the MRC at full strength would be roughly two to one. The Soviet motorized rifle company would need to be reduced to 60 percent strength before we could generate a three to one ratio with a full complement of infantry. If we were operating at 80 percent strength (144 dismounted infantrymen), which might be a bit optimistic, then the Soviet company's dismounted infantry strength would need to be at roughly 50 percent (48 men) before we attacked.[20] The alternative would be to isolate one or two platoons of the company and mass our forces against them.

The preceding analysis is designed to show that under most conditions Bradley mechanized infantry task forces have the numerical strength to meet the doctrinal requirements for force ratios in both the offense and defense. An important caveat for this claim is that our dismounted forces must be at or near full strength. Whether these forces can in fact successfully perform doctrinal missions is a function of much more than just numbers of men, fighting vehicles, and tanks. How they are employed is critical to their achieving tactical success with doctrinally acceptable force ratios. Nonetheless, these calculations do give us a basic idea of whether we have enough assets, including dismounted infantry, to defeat threat forces of the size and type we intend to fight.

The next logical step, then, is to examine what doctrine requires of the dismounted infantry in the execution of offensive and defensive missions. That is, what tasks must they be able to perform for the force as a whole to succeed, and against what kind of resistance should they be expected to perform these tasks?

For an attack or defense to succeed, the dismounted infantry elements of a battalion task force could be called upon to execute any number of individual tasks that contribute to the success of the overall battalion mission. While initial correlation of forces estimates might well suggest that a Bradley unit has enough soldiers to accomplish the assigned overall mission, the number of tasks it must perform in accomplishing the mission and the degree of enemy resistance it might face in performing them could well give us another picture. With this in mind, an analysis of what doctrinal tactical manuals require of the infantry in the defense will prove useful.

Defensive operations make several demands on the talents of infantrymen. First and foremost, they are expected to occupy and defend positions against enemy infantry attack. Inherent in this mission is the requirement to identify any likely enemy dismounted avenue of approach and array sufficient forces astride this avenue to prevent enemy infiltration or penetration into the unit's positions. In addition, unit commanders must identify where to place short and medium range dismounted antitank weapons to best complement the M1's main gun and the TOW system on the M2 Bradley. Furthermore, the unit will require some dismounted infantry to provide close-in security for the Bradley Fighting Vehicles (BFVs) and the attached M1 tanks.

Of course, all this means the dismounted infantry will need to clear fields of fire and construct fighting positions. In terms of digging requirements for the dismounted infantry alone, the time and effort necessary will be considerable. The construction of fighting positions with overhead cover will take the efforts of everyone not already engaged in security at least eleven to twelve hours.[21]

Also impacting on the number and types of requirements placed upon the dismounted infantry is where they will be positioned in relation to the BFVs themselves. According to FM 7-7J: The Mechanized Infantry Platoon and Squad (Bradley), the BFVs and infantry can be configured in three diffeerent ways. First, they can occupy the same position and orient their fires on the same avenue of approach. Second, they can occupy the same position and orient their fires on separate avenues of approach. Third, they can occupy separate positions but orient on the

same avenue of approach.[22] If they do occupy separate positions, then the leader will have to determine whether he wants to dilute his infantry strength and stretch his command and control by splitting them between the vehicle and dismount positions or take risk and not provide dismounted infantry security for the BFVs. While the decision of which option to choose is METT-T dependent, the leader should understand that by splitting his mounted and dismounted elements between two positions, he compounds his command and control requirements, makes it much more difficult to distribute the workload and manage the requirements placed on his infantrymen, and and dilutes his dismounted firepower. When we consider the many other requirements and missions placed on the infantryman, we can begin to appreciate the difficulty a Bradley infantry leader has in accomplishing those tasks he needs to complete without overtaxing his infantrymen or taking unnecessary risks.

The requirements mentioned so far are only the beginning. Besides the tasks noted above, infantrymen will need to emplace, close, and defend obstacles against enemy breeching attempts. Given that there are only a limited number of engineers and engineer assets attached to any battalion task force, the dismounted infantry will need to do much of the basic engineering work themselves to free engineer assets for larger and more critical engineer tasks. Emplacing mines and triple strand concertina are both labor and time intensive tasks. For example, emplacing by hand a three strip standard pattern minefield that is 200 meters by 100 meters will take a squad approximately ten hours depending on the density of the mines in the minefield.[23] Emplacing a 300 meter section of triple strand concertina takes an entire platoon one hour.[24] A squad will take three or four times that long.

Over and above these tasks, infantrymen will also be required to garner intelligence about enemy activities through active patrolling and the establishment of observation posts. Each patrol and observation post will require the commitment of two to three men. Besides the establishment of antiarmor or antipersonnel ambushes and roadblocks on secondary roads or approaches to the defensive position.

In all probablility most of these tasks will be executed at

platoon level, though some of them could conceivably be consolidated at company level. What becomes increasingly clear as we go through this analysis is the virtual impossibility of performing all these dismounted tasks simultaneously. Accordingly they must be sequenced so the dismount element can accomplish them without first exhausting itself and becoming combat ineffective. In addition, they must be set in priority order so that the infantry can accomplish those tasks that are most mission critical. It appears fairly clear that the commander must be willing to make tradeoffs to ensure that he gets the capability out of the infantry that he needs. For example, preparing positions and emplacing obstacles require the effort of most of the unit for a considerable period, possibly in excess of twelve hours. Nevertheless, since security is always first priority, the unit will be forced to degrade its construction effort in the interest of protecting itself. The commander must weigh the degree of security he needs against the degree of survivablility he requires. The number of soldiers and the time he has available may not allow him the luxury of performing both tasks optimally.

Clearly the commander and platoon leaders of a Bradley company will be required to plan closely how they will use their dismounted infantry, how long they will use them, and how they will integrate all the missions that those infantrymen will have to perform. A full strength Bradley mechanized infantry platoon consists of only twenty dismounted infantrymen, including the platoon leader and his radio telephone operator. The efforts of those twenty men will have to be planned for in minute detail so that their strength can be sustained over the course of continuous operations. Accordingly, the commander must design a sleep plan that allows each man at least four to five hours of sleep a day to sustain his physical strength and mental acuity.

In the offense, Bradley infantrymen will have significant dismounted requirements placed upon them even when they are committed to mounted operations. First, they will probably be required to conduct dismounted reconnaissance patrols to determine the size and nature of the enemy objective. These reconnaissance elements may

precede the main body by several hours, depending on how far the line of departure is from the objective. Following the reconnaissance elements may be dismounted infantry with the mission of infiltrating to clear obstacles or seize key enemy positions.[25] The reconnaissance elements probably will be squad-sized while the infiltration units could be composed of the remainder of a company's dismount strength. In all probability the infiltration will take place in platoon-sized or smaller units.[26]

Other uses of the dismounted infantry in the attack would include their maneuvering over terrain unsuitable for vehicles and attacking the enemy from an unexpected direction.[27] They could also assault with tanks against enemy strong points or fortified positions to protect the tanks from short range, ground-employed antitank weapons. Finally, Bradley battalion task forces will almost always be required to conduct night attacks dismounted.

The key considerations in resourcing offensive operations with dismounted infantrymen are that we must provide enough infantrymen to perform reconnaissance and breeching missions yet have enough soldiers remaining for the actual actions on the objective. If there are not enough dismounted infantrymen to perform all three missions separately, then some elements will have to perform double duty. Once we begin doubling up missions on units, we begin encountering greatly increased problems with coordination, command and control, and physical exhaustion.[28]

The preceding discussion indicates that infantrymen do most of their work dismounted and away from their vehicles. Historical evidence supports this claim. For example, most armored infantry units in World War II spent the majority of their time on the ground.[29]

An important issue concerning the performance of dismounted infantry offensive and defensive tasks is the nature of enemy resistance we expect to encounter in executing a particular mission. The amount of resistance we expect to be up against is one of the preeminant considerations when we design our force to execute the plan. Because Bradley infantry units are designed primarily for the accompaniment of tanks, they are essentially mobile offensive units.[30]

As such, they are not equipped or manned particularly well for assaulting highly fortified positions in the offense, nor are they equipped and manned to construct and hold highly fortified areas where they might be forced to slug it out with large numbers of enemy infantry.[31] To put Bradley units in these kinds of roles requires significant augmentation by additional infantry units and the scope of their missions being significantly reduced.

With these considerations in mind, we should distinguish between the types of enemy resistance it is reasonable to commit a Bradley unit against. FM 7-7J: The Mechanized Infantry Platoon and Squad (Bradley) makes a useful distinction in this regard which is applicable at the battalion level. In its discussion of the attack, the manual distinguishes between light, medium, and heavy enemy defensive resistance. Light resistance is characterized by an enemy squad or platoon defending on the best terrain available but without appreciable combat support assets such as engineers and artillery to enhance their defensive positions. They will have two or three armored vehicles and limited antitank assets. Their positions will not be dug in. We can expect these elements to hold their position to maintain contact with us.[32]

Medium resistance consists of enemy platoons or companies defending from hastily prepared fighting positions on the best ground available. These forces will have had the time to integrate their combat assets (engineers and artillery), and we should expect to encounter hasty minefields in front of their positions. In all likelihood, they will not have dug tank ditches or constructed extensive wire obstacles. These units will probably have been in position six to twenty-four hours.[33]

An enemy capable of providing heavy resistance is one that will have had time to establish platoon and company strongpoints which are echeloned and capable of mutual support. These positions will be characterized by extensive minefields, tank ditches, and wire obstacles. In addition, these units will have integrated all the direct and indirect fires available to them. We can expect well-planned and lethal fires. Platoons will be positioned forward of

the main defensive belt to provide security. Platoons or companies in these strongpoints probably will not withdraw once they are attacked.[34]

Though the U.S. has no official offensive analog to the distinctions between enemy levels of defensive resistance, it seems that we could demarcate similar levels of offensive "pressure." Light offensive pressure might consist of irresolute, hasty attacks from the march by forces that are exhausted, understrength, ill-trained, poorly led, or dispirited. Such an attack might be conducted by an enemy unit that has already been heavily attrited and exhausted by extensive exposure to major combat actions. The enemy's intelligence about our defensive posture would be inaccurate or poorly developed, and he would be attempting to regain contact with us through reconnaissance or a meeting engagement. Moreover, he would be unable to concentrate his firepower through maneuver or integrate his combat support assets adequately because he would either be surprised by the location of our defense or his forces would be fragmented as a result of the design of our defense. We could defeat these sorts of attack from hastily prepared positions on advantageous terrain.

Medium offensive pressure would consist of hasty battalion to regimental-sized attacks from the march against our position. Enemy intelligence about us would be thorough enough to know our basic unit dispositions and strength but not thorough enough to know all our individual positions in the defense. The enemy's attack would be characterized by well-integrated direct and indirect fires, and he would be able to employ skillfully unit engineer mobility teams. These kinds of attack could be defeated from prepared battle positions on good, defensible terrain.

Heavy offensive pressure would be characterized by deliberate regimental or divisional attacks against our positions. Enemy intelligence about our positions would be thorough, and his attack would focus on perceived weaknesses identified by that intelligence. Not only would his artillery be well-integrated with his direct fire weapons, but those artillery fires would be significantly augmented by divisional or army artillery units. The employment of enemy sappers would be thoroughly planned and rehearsed as an integral part of the

attack. These attacks would be marked by the large number of dismounted infantrymen employed both to assault and infiltrate our positions. We could only hope to defeat this type of attack from a strongpoint or highly fortified battle position.

I bring up these distinctions only to suggest that coping successfully with heavy defensive resistance or offensive pressure will require considerable, detailed planning and significant augmentation, not only with additional infantry but also with other maneuver, artillery, and engineer units as well. Committing a Bradley unit hastily to "heavy" combat with only its organic soldiers and equipment may extend it beyond its capabilities. General Wass de Czege and others allude to this issue when they write of the different types of infantry and their capabilities.[35] While Bradley units are readily capable of coping with light to medium pressure or resistance, it may well be better to assign "heavy" combat missions to them only after considerable preparation and augmentation, if at all.[36]

The foregoing discussion of the employment of Bradley mechanized infantry suggests that the dismounted infantry element has multiple requirements in both the offense and the defense. It also suggests that there are upper limits to a Bradley unit's capabilities and that there are missions it cannot perform without considerable planning and reinforcement. The commander must recognize where his deficiencies lie and plan for complementary battlefield operating systems to make up for his recognized shortfalls. If he cannot correct the shortfalls with other assigned assets, then he must look for outside assistance, either in terms of additional and equipment or in terms of limiting the scope of the mission in some fashion.

So far, we have compared the doctrinal strength of a U.S. battalion task force against that of the appropriate Soviet force, both in the offense and defense. We have done so to see whether there are enough dismounted infantrymen in a battalion to accomplish the mission. We have also looked at the doctrinal requirements placed on dismounted infantrymen to determine how these soldiers would have to be used and to get a sense of how far their numbers and capabilities would be stretched in the performance of doctrinally achievable missions. In

considering Bradley infantry capabilities, I have suggested what might well be unachievable.

The next task, then, is to find out whether a Bradley infantry battalion can generate enough relative combat power to perform adequately its assigned missions. Determining whether we have enough infantry in Bradley units involves more than merely counting assets and then comparing totals. Leadership, synchronization of battlefield operating systems, quality of training, experience, expertise, command and control, and morale all play a critical role in the tactical success of a unit. We must consider all of these intangibles and assess their impact on the fighting strength of a Bradley unit. Unlike other models commonly employed in determining the relative combat power of a unit, General Wass de Czege's model takes into account the influence of qualitative and intangible considerations as well as the more commonly evaluated quantitative and tangible aspects of combat power. Perhaps equally as important, his model is consistent with the dynamics of combat power articulated in FM 100-5.[37]

As General Wass de Czege states, two of the major uses for the model are developing force structure and analyzing force design.[38] The model, when employed for these purposes, should be a useful tool in determining the strengths and weaknesses of Bradley infantry organizational structure against the kind of threat it should face on the battlefield. In identifying the strengths and, in particular, the weaknesses of the Bradley organizational structure, the model should give us a clear picture of how the organizational structure of Bradley units needs to be improved, if it needs to be improved at all. If the Combat Power Model (CPM) suggests that the organizational structure is sound for the doctrinal requirements placed on it, and Bradley units as a whole still cannot successfully perform doctrinal missions, then we are left with the uncomfortable conclusion that either our doctrine is not sound or we as leaders do not execute our doctrine very well. Either of these options would bode ill for our Army.

General Wass de Czege makes it very clear that combat power is a relative measure. That is, combat power is only meaningful in terms of what strengths we have and our power to degrade the enemy's strengths

versus the enemy's ability to degrade our strengths.[39] Moreover, he uses the CPM more as an analytic tool than as a predictor of actual combat outcomes. We study a unit's capabilities, preparations, and combat actions to determine how that unit might perform given the enemy's capabilities, preparations, and combat actions. Used in this way, the CPM helps us identify and understand problems with our organizational structure in the performance of doctrinal missions.

There are four elements of the CPM: firepower, maneuver, protection, and leadership. Of these four elements, leadership is the linchpin. It enhances each of the other three elements. We predict the outcome of battle in the CPM by first measuring the effects our maneuver, firepower, protection, and leadership have on degrading the enemy's combat power and then by balancing that effect with the effect the enemy's elements of combat power have on degrading our combat power. The equation below represents the model schematically.

THE RELATIVE COMBAT POWER MODEL[40]

$L_f(F_f+M_f+P_f-D_e) - L_e(F_e+M_e+P_e-D_f)$ = The Outcome of the Battle

L_f= friendly leadership effect	L_e= enemy leadership effect
F_f= friendly firepower effect	F_e= enemy firepower effect
M_f= friendly maneuver effect	M_e= enemy maneuver effect
P_f= friendly protection effect	P_e= enemy protection effect
D_e= enemy degrading of friendly firepower, maneuver, and protection effects	D_f= friendly degrading of enemy firepower, maneuver, and protections effects

In short, the outcome of the battle is the difference between our combat power and that of our enemy.

As General Wass de Czege points out, this model is not a mathematical tool designed to give precise and certain solutions. Instead, it is an analytical tool that forces us to consider a wide range of variables and their impact on battle. Many of these variables are not measurable with any degree of certainty because they are qualitative in nature. We just will not know until the moment of battle whether our assessment is correct or not. Still, the analytic process itself is useful, and can give us important insights. As General Wass de Czege says, "[the model] is designed to assist the

leader (or his staff officers) in asking the right questions about what to do to win."[41] It does not tell him whether he will win or not.

The elements of the model need to be addressed for an understanding of this analysis. As stated earlier, there are four components of the Combat Power Model. They are firepower, maneuver, protection, and leadership.

A. FIREPOWER. For General Wass de Czege, firepower is a function of five variables: (1) volume of fire, (2) lethality of fire, (3) accuracy of fire, (4) ability to acquire targets, and (5) flexibility of employment.[42] A squad or crew must be able to identify, acquire, and hit targets quickly with a high volume of accurate and lethal fire. Additionally, it must be mobile enough to displace rapidly and concentrate firepower at another location in a timely manner.

The effectiveness of squads and crews being able to acquire, mass their fires against, and suppress or kill targets is dependent on several factors. Individuals and crews must be proficient in terms of accuracy, employment, and positioning. There must also be enough systems to engage the enemy weapons that present the most immediate danger. This is not just a matter of numbers; it is also a matter of positioning so that different weapons systems support and complement each other. Inherent in this requirement are adequate fields of fire for the weapon's capabilities. Squads and crews must know when and where to look for targets, and the visibility should be such that they can see the targets in the places where they want to destroy them. Additionally, the supply system has to provide them with enough ammunition of the right type and mix to kill the kinds of targets they will face. Finally, the weapons they use must be reliable and accurate.[43]

Since no Bradley units to date have been exposed to combat, we must rely upon observations from the National Training Center and other sources to determine how Bradley units fare with respect to firepower effects against Soviet force arrays. In this regard, published observations tend not to have much attendant analysis that addresses the specific causes of the events that have been observed. Hence, in several cases I have had to make inferences about those observations.

In those instances, I have rendered what I believe to be a plausible explanation for the observed phenomena using General Wass de Czege's CPM. Let's examine now what observers have to say about firepower and Bradley units.

Recently the National Training Center (NTC) Operations Group has been presenting their "Direct Fire Briefing" that identifies a general player unit decline in direct fire performance, both in live fire exercises and in ESXs (MILES force-on-force maneuver exercises). Their claim is that there is "a direct fire problem" and it is getting worse.[44] Interestingly enough, the decline has paralleled the fielding of the Bradley Fighting Vehicle to more and more CONUS units. The NTC says unit "direct fire systems cannot destroy over 41% of the ESX opposing forces and a substantial decline in direct fire performance is evident in both ESX and the live fire exercise!!"[45] The problem is far more serious at night, particularly in the night live fire exercise.

While the NTC claims that the problem is one of training and not one of systems, their own analysis suggests that training and weapons employment problems can be directly linked to the organizational structure of Bradley units. I do not deny that many of the deficiencies units exhibit are training-related; I merely claim that these training failures can be linked to how Bradley platoons and companies are organized and how that organization limits or hinders high quality, multi-echelon training. To better understand this point, we should first examine how units are organzed when they arrive at the NTC, particularly with respect to dismounted infantrymen, and then review the NTC's particular observations. Also useful will be a discussion of how units train crews and dismount squads in preparation for a rotation at the NTC.

One recurring observation is that many infantry and armor battalion task forces bring far fewer dismounted infantrymen to the NTC than they are authorized under the MTOE. One observer remarked that his experience showed that the average balanced Bradley infantry task force (two infantry companies and two tank companies) brought between 30 and 60 men to the NTC.[46] A former OPFOR regimental commander stated that his dismounted infantry consistently outnumbered Bradley units by

a considerable margin even though he was chronically short of dismounted infantrymen himself and was dependent upon augmentees to approximate OPFOR dismount strengths.[47] Still another observer stated that he witnessed two balanced Bradley infantry task forces that arrived at the NTC with less than 30 dismounted infantrymen each.[48]

All these observations demonstrate that Bradley units often arrive at the NTC with not just less than their full authorization of dismounted infantrymen but with significant shortfalls. Some units arrive with *half* their authorized dismount complement. One useful way to look at this situation is to liken these battalions to units that have been in combat for awhile and are operating at their wartime attrited strengths. World War II figures seem to support this comparison. Let's suppose, though, that the observations I have referred to are examples of the worst situations and that most units arrive with more infantrymen than I have suggested. For the purposes of this analysis, then, assume that the average unit arrives with 70% of its authorized infantrymen.

A Bradley company at 70% strength of its dismount element will number approximately 42 men, including the platoon leaders and radio telephone operators. At this strength, each squad will field approximately four dismounted infantrymen. One of these four will be the squad leader. The remaining three will probably carry one of the SAWs (Squad Automatic Weapon), the Dragon antitank missile, and either an M203 grenade launcher or the other SAW, depending on the mission. Since the squad leader probably will be fully involved in directing the battle, we can assume that only the remaining three men will be consistent firers throughout the battle. Including the BFV, we can count on only four weapons systems in a squad to be firing at any given time. A comparable M113 unit under the same strength constraints will have seven such weapons systems or almost twice as many weapons firing. Given these considerations, the NTC Direct Fire Briefing comments that follow take on an interesting light.

The major observations of the Direct Fire Briefing address three areas: poor leader planning for direct fires, poor or no unit rehearsals of fire plans, and finally poor positioning of unit direct

fire assets.[49] It is the third kind of observation that points to the organization of Bradley units being at least a part of the problem. NTC observers claim that weapons systems are oftentimes not positioned where they can easily see designated terrain features that serve as control measures or where they can optimally engage enemy systems. Units need to site and prepare positions better, including alternate and supplementary positions, so they can mass the proper volume of fire at the right time.

Yet, while NTC observers make these claims, they also point out how long it takes to prepare adequate defensive positions.[50] Most units just do not have time to build more than adequate primary positions. In addition, the NTC also recognizes the need for dispersing positions to obtain flank and rear shots.[51] Furthermore, NTC observers recognize the difficulty that infantry and antitank weapons systems have in disengaging and displacing to alternate and supplementary positions.[52] Finally, observers claim that it is often better to draw the OPFOR in close to friendly positions so that as many killing systems as possible can be brought to bear at once against them and ensure their destruction.[53]

These observations considered together seem to necessitate the separation of the dismounted elements from the mounted elements to obtain the maximum effect from each their different weapons systems. Dismounted infantrymen are most effective 200 to 800 meters from the engagement area. Their systems are primarily directed at destroying the enemy's dismounted force along dismounted avenues of approach and killing some enemy armored vehicles at close ranges. Bradleys are most effective at distances of 1500 meters or greater against enemy tanks on vehicular avenues of approach. Against armored personnel carriers and fighting vehicles such as the BTR-60PB and BMP-2, the Bradley is most effective from 600 to 1600 meters away. This means that in order to take advantage of the distinct capabilities of the three systems on the BFV (25mm chain gun, TOW missile system and dismounted squad), we should position them in separate but complementary positions on the battlefield. In fact, BFVs can be situated up to 1500 to 2000 meters from their dismounted squads.

We have already seen that the average Bradley unit at 70% strength puts only four dismounted infantrymen on the ground. These four men translate to only two positions at best. So, a platoon has at best six dismounted fighting positions if it does not patrol or perform other security missions for the company or battalion outside of the platoon battle position. If we assume that a typical platoon battle position is roughly 500 meters wide, then the platoon has roughly ten positions (including those of the BFVs) separated from each other by an average of 50 meters.

The upshot of the discussion above is that as the Army has transitioned from the M113 to the M2, mechanized units have begun to put far fewer firing systems on the ground (almost half as many). This has translated to fewer firing positions, and the increasing criticality of each position. Now if a unit positions a firing system poorly, or if a firing position is destroyed, its adverse impact on the platoon's overall integrated fire plan is signficantly greater than before.

This consideration puts the platoon leader in a dilemma. He either disperses his forces throughout the position to provide for the best all around defense, or he masses his infantry's firepower to achieve the greatest lethality in an engagement area and takes the risk in other areas of the battle position. It seems that NTC observers would promote the concentration of fires. To achieve any meaningful massing of the dismount's fires, all or most of the dismounted infantry in the platoon need to be grouped fairly close together to achieve the desired weapons effect and to attain the requisite command and control. Dismounted squads of four men just cannot fill the bill.

A related issue is the matter of ammunition supply. The BFV is the primary carrier of ammunition for the squad. However, if the dismounted infantrymen are separated from the vehicle a great deal of the time, as experience seems to indicate, they must carry their own ammunition. A four man squad with two SAWs, two M203s, a Dragon, and an M16 probably will not be able to carry enough ammunition to sustain itself in a prolonged firefight.[54] This concern alone suggests the need for more men in a squad.

Thus, NTC observations lead one to conclude that a squad of six dismounted infantrymen is not robust enough to sustain 30% casualties and still generate enough effective fires as an integral unit. Limited visibility and NBC conditions only worsen the problem. NTC observations indicate that when units keep their dismounted infantryment dispersed, those riflemen are not in position to bring enough effective fire on the enemy. To achieve this effect in a platoon at 70% strength, the infantry of two or more of the squads in a platoon must invariably be grouped together to achieve a sufficient volume of firepower.

NTC observations about offensive operations tend to support the conclusions I have drawn above. Almost invariably the observations speak of the need to mass adequately fires from the proper positions. In particular, they requlary speak of a need for a high volume of fire from the dismounted element.[55] To achieve this kind of volume of firepower, a platoon must mass the greater part of its dismounted infantrymen to achieve success. An added benefit of this massing of attacking dismounted infantrymen is that their greater strength increases the number of targets enemy defenders must engage and thereby enhances the attacking infantry's chances for survival.

Chronically inadequate or incorrect positioning of a Bradley unit's firepower also stems from the way Bradley units train. The way Bradley units train is a function of how they are currently organized. Squad leaders are both the primary leader in the vehicle and the primary leader of the dismounted squad. When they train with one of the two elements, they necessarily are not in a position to train the other element directly. Hence, when a unit is conducting crew gunnery training, little effective training of the dismounted element is going on because their primary leader, who is critical in controlling their actions, is training with the vehicle crew, and the dismounted element is usually pulling range support for the BFV crews. The organization of Bradley units often works at cross purposes to multi-echelon training, a staple of our training doctrine. A similar problem arises with vehicle crew training when the squad leader devotes his energies to training the dismount element of the squad.

At issue is the squad leader's split training focus between the crew's and the dismounted infantry's training. A squad leader's training one element in many cases excludes him from training the other. Since he is the central cog in making either of these elements perform satisfactorily as a team, he must train with them both. But each element suffers because all the members of the element train together only about half as often as they should.

A second training problem is that units are generally resourced with only enough 25mm ammunition to qualify the squad leader with the BFV crew. The assistant squad leader, who must command the BFV when the squad leader dismounts, gets virtually no live fire training.[56] Hence, while he will be responsible for commanding the BFV when the squad dismounts, and he probably will be situated a good distance from the dismounted element (as I discussed above), he probably will not be trained well enough to be effective either in positioning the vehicle or in fighting it.

A final training consideration with regard to the firepower of Bradley units is how the dismount element gets its live fire training. Usually, dismounted live fire exercises follow a day or two behind crew gunnery qualification. Since an entire Bradley company is consumed in supporting its own crew qualification ranges, the dismounted infantrymen receive little or no dismounted training before they begin live fire exercises. As a result, much of the training effect of the live fire exercises is lost because units must perform extra "dry runs" and precious time is spent reviewing the essentials instead of executing training.

To become competent at positioning and fighting a squad, the squad leader must focus his training efforts on one or the other of these two elements. The current MTOE does not allow for that kind of training focus. In fact, the squad leader must split his time equally between the mounted element and the dismounted element. In this respect, platoon leaders and company commanders share an analogous problem with the squad leader at their respective levels of command. They must train as members of a vehicle crew, train their dismounted elements, and train their mounted elements. While they have subordinates who

can control and train either the mounted or dismounted element in their absence, their time with each of these elements is still much less than it could be if they were able to devote their efforts to one or the other. Hence, it should not be surprising that units are far less than fully adept at positioning, planning, and rehearsing to achieve maximally effective direct fires.

In summary, the ability of Bradley units to acquire targets and project a high volume of accurate, lethal fires is hindered by their organization. First, squads cannot sustain 30% casualties and still produce the volume of fires necessary to kill targets. To produce a high volume of fire, Bradley platoons are forced to combine their dismounted elements. As currently structured, Bradley squads are virtually incapable of performing missions we would assign to traditional squads. Either the squad should be strengthened with additional men or we ought to redefine what constitutes a squad under the current Bradley infantry MTOE.

Second, the organization of Bradley units, at least in part, has an adverse impact on how much and how well Bradley units train, especially at the squad level. The quality of training, in turn, has a harmful effect on the unit's ability to produce accurate and lethal fires on the battlefield. The question is now whether the organization of Bradley units somehow hinders their ability to maneuver and bring their fires effectively to bear.

B. MANEUVER. Maneuver effect under the CPM has four major subcomponents: (1) unit mobility, (2) tactical analysis, (3) management of resources, and (4) command, control, communications, and intelligence. Each of these variables in its own way impacts on a unit's ability to position its firepower where it will do the most damage to the enemy while at the same time minimizing the damaging effects of the enemy's fires on friendly soldiers and weapons systems. The object of tactical maneuver is to stack the balance of firepower in one's own favor at the point of decision. Effective maneuver is characterized by a certain amount of risk taking and economizing of

forces at points other than that of the critical battle.[57]

Units must have the capability and skill to move quickly and effectively around the battlefield. Physical fitness, equipment maintenance, maneuver skill, and the capabilities of the equipment all impact on moving to the critical juncture of the battlefield at the right time. A proper tactical analysis is essential for effective maneuver and includes the proper use of the IPB, knowledge of enemy doctrine and capabilities, knowledge of friendly unit capabilities and organization, an understanding of enemy and friendly courses of action, the wargaming process, and the ability to synchronize combat assets based on the plan.[58]

The management of resources is built upon our tactical analysis and an understanding of our unit's mobility. We must have a clear idea where we envision the main battle will be, and we must have a clear understanding where we can take risk and economize our forces. Understanding these two points helps set the correct priorities for our combat resoures: soldiers, time, supplies, and equipment.[59]

Finally, command, control, communications, and intelligence (C^3I) effectiveness is necessary to control maneuver properly. The number of elements that a leader must control and the number of functions he must perform should be within his ability to execute. General Wass de Czege refers to this capability as span of control. Well-thought-out SOPs and a good doctrine also ease the burden of control by streamlining communications and simplifying coordination. They help ensure that subordinates do what is expected of them in moments of crisis. Finally, adequate communications systems that ease the quick and timely passing of information and orders are essential to command and control.[60]

Again, NTC observations are applicable to this element of combat power with respect to Bradley units. While many of these observations specifically reference M113 units, the problems that they present are as applicable, if not more so, for Bradley units. The major theme that emerges from a multitude of sources is that mechanized units, both M113 and Bradley, demonstrate inadequate performance and knowledge of dismounted maneuver skills. These inadequacies impact on all four

subcomponents of maneuver.

Observers note that dismount elements of mechanized forces are less mobile than their light infantry counterparts for two major reasons. First, mechanized dismounted soldiers appear to tire earlier in the exercise, and their fatigue degrades their performance to the point where they become exercise casualties because they have lost their mental acuity and physical ability to react quickly.[61] Second, mechanized units lack dismounted maneuver skills. The problem here is twofold. Units lack the collective skills, and small unit leaders lack the knowledge and experience to impart these skills to their soldiers.[62]

Observers attribute the early fatigue to two major causes. First, units apparently do not train enough in dismounted activities to condition their soldiers physically for the rigorous demands placed upon them at the NTC. There is apparently much less emphasis on walking and moving with load bearing equipment for long distances than in light infantry units.[63] Part of the problem, at least, seems to be a focus on mounted maneuver in mechanized units at the expense of the equally important dismounted skills and physical requirements.

A second reason observers believe that Bradley dismounted infantrymen reach earlier physical exhaustion is that there are fewer of them to fulfill the requisite infantry component tasks that I discussed earlier. Extensive dismount operations take a very heavy physical toll on the dismounted force, yet leaders do not seem to take this into consideration when they plan missions for the dismounted elements. As a result, they tend to overextend those dismounted infantrymen they do have.[64]

Comments about unit dismounted maneuver and mobility skills are equally disheartening. The NTC had this to say about the battalion task forces in one division:

> Dismount fire and maneuver whether with or without tracks is executed very poorly. Platoon/squad leader and team leaders fail to establish an overwatch or support by fire position. Under live fire conditions this is especially true. In ESX, the 'John Wayne' approach is closer to the standard dismounted maneuver. The aggressiveness needed to execute this drill is also normally missing. NBC conditions just make the situation worse.[65]

While this statement describes an M113 unit, its author claims that the

comment is equally applicable to many a Bradley unit. He goes on to say in the same study that Bradley infantry has "a serious problem in training and utilizing its dismounted elements....The degradation in dismounted operations skills needs to be analyzed and compared with M113 studies."[66] Interviews with former observer-controllers at the NTC bear out these observations and identify other dismounted maneuver deficiencies of Bradley units as well.

Also of major concern to NTC observers is the apparent lack of dismounted experience and training of junior leaders in the platoon. Not only are squad leaders inexperienced and relatively untrained in dismounted operations, but their platoon sergeants appear to be equally as unskilled. Moreover, a far lower percentage of mechanized infantry platoon leaders appear to have attended Ranger school than their light infantry counterparts.[67] In short, there appear to be very few junior leaders with the necessary expertise and experience in dismounted operations to train their units well. If Bradley units have less time to train their leaders and soldiers in dismounted operations, which appears to be the case, then they need to have junior leaders who come to the unit competent in the skills requisite for successful dismounted operations.

Despite these deficiencies, observers claim that the BFV, in terms of its mobility and firepower can go a long way in compensating for many of the dismounted infantry's maneuver deficiencies. Its chain gun is extremely effective, and it has the mobility to move quickly to where its firepower can do the most good. Members of the OPFOR claim that they fear the Bradley more than the M1.[68] On the other hand, poor dismount infantry habits are too often the cause of the loss of BFVs. Crews sometimes rely too extensively on their thermal sights and fail to dismount and emplace observation posts. When Bradley crews fail to post external security, they are as vulnerable as tankers to dismounted infiltraters with anti-tank weapons.

As for conducting a tactical analysis of the battlefield, Bradley units seem to do no better or worse than other units. An almost universal claim by NTC observers is that all units need to do much better at executing the IPB process and the commander's estimate.

However, time constraints and unit SOPs seem to mitigate against units using the IPB and the commander's estimate process, in general, to its full benefit. Optimally, a complete analysis of METT-T considerations and thorough wargaming of viable courses of action should give the commander a precise idea of how he ought to configure his forces and where he ought to put them. Yet NTC observers note that on many occasions it is not prudent for battalion task forces to change their task organization between missions.[69] Given the paucity of infantrymen that a task force will have and the number of requirements it places on those infantrymen in support of offensive and defensive operations, company team internal reorganization may not be sufficient to address dismount needs identified in the IPB and commander's estimate. In fact, the shortfall this comment addresses may well be a contributing cause to the rapid decline of a squad's strength and stamina. Since the current organization and training wisdom do not encourage the movement of independently operating dismounted squad packets of infantrymen from one company team to another, dismounted squads may well start the battle with a significant physical disadvantage.

NTC observers and other commentators have had much to say about the span of control of Bradley infantry junior leaders in terms of the requirements placed upon them during combat operations. LTC Theodore Severn addresses this issue in his monograph, "Airland Battle Preparation: Have We Forgotten to Train the Infantryman?" He states that the average Bradley infantryman must learn over 100 more skill tasks than are required of other infantrymen.[70] The 11M must be proficient with the 25mm chain gun, the TOW missile system, vehicle automotive and turret maintenance, and dismounted tactical skills.

In Severn's view the Bradley infantryman is a jack of all trades and master of none. He suggests that there are too many skills for the Bradley infantryman to learn for him to stay highly proficient in them all. Additionally, many of these skills are quickly perishable when not constantly reinforced through training. Most of all, he believes that this problem is greatest for the squad leader, who is responsible for both the dismounted and mounted training of the squad. Because the squad leader is responsible for the training and employment of both

elements, the organization of Bradley squads is dysfunctional.[71] The cards are stacked against the squad leader, and he is not likely to do both tasks well.

The squad leader's split focus also has a detrimental effect on mobility and maneuver skills. Because the squad leader must be a participant in both vehicle and dismounted mobility skill training, he very often is not in a position to execute multi-echelon training in his squad. Either dismounted training suffers, crew training suffers, or they both suffer. NTC firepower and maneuver observations would suggest that the third alternative is true.

The observations of Bradley unit dismounted maneuver problems that I have highlighted above seem to substantiate Severn's views. Moreover, the following consideration also seems to support Severn's position. The squad leader's role in the transition from mounted to dismounted operations typifies the problems a squad leader has in carrying out his dual responsibilities.

FM 7-7J: the Mechanized Infantry Platoon and Squad (Bradley) identifies two types of dismounts, the hasty and deliberate.[72] I am primarily concerned with the former. When the squad leader decides to execute a hasty dismount with his squad, he is in all probability under fire. His first action is to select an appropriate dismount point, hopefully one that is covered. He then must maneuver to that point while directing the fires of his gun. Meanwhile, he is also supposed to be warning his soldiers in the back of the vehicle to get ready to dismount, and he is supposed to be formulating some sort of tactical response to the threat. As he pulls into the dismount point, still taking fire, he exits the turret and leaves the gunner alone to scan for targets to engage and react against. He quickly briefs the assistant squad leader on the situation, tells him what he wants him to do, and hands him the CVC (combat vehicle crew helmet). The assistant squad leader then climbs into the commander's position in the turret and tries to orient himself quickly on the terrain and situation. The squad leader next gropes for his helmet and web gear because it is inadvisable to wear them in the turret, struggles to put them on amid four to six other soldiers who are also getting ready to dismount,

barks some quick instructions, and then orders the squad to dismount. When they have dismounted, he quickly forms the squad, issues a hasty FRAGO, and checks to see whether the squad has grabbed all the weapons, equipment, and ammunition they need.

I illustrate this action for several key reasons. First, it shows the vulnerability of the vehicle during this transition because a key member of the crew, the vehicle commander, exits the turret in the heat of battle. Moreover, the vehicle remains vulnerable until the assistant squad leader is sufficiently oriented to control the vehicle's fires. This is the same fellow, incidentally, who did not get to shoot live fire gunnery because the unit was not resourced with enough ammunition.

Second, the squad leader is supposed to be formulating a response to the tactical situation as he is fighting the vehicle. Yet if he is taking accurate fire from an identifiable source, his mind is more likely to be on returning fire than on formulating a cogent plan. Additionally, he is warning the dismount squad and probably trying to communicate with his platoon leader and give him a situation report.

Third, at the exact time when the vehicle is most vulnerable, and the squad with it, the squad leader is groping around in the dark trying to find his personal gear and weapon. Instead of quickly leading his squad off the BFV, he is scrambling to catch up with them. Moreover, his actions do more to delay than expedite the dismount process. In contrast, the Soviet squad must be able to dismount its vehicle in 10 seconds. I doubt that its American counterpart could perform this task in triple that time under the conditions I have described.

NTC observers identify the transition from mounted to dismounted operations as a recurring problem.[73] Is it any wonder? Once again, the squad leader's acting in a dual capacity gets in the way of squad proficiency at accomplishing assigned tasks. Consistent problems with the squad leader's dual focus suggest strongly that one individual be responsible for training and leading the vehicle crew and one individual be responsible for training and leading the dismounted element.

Other mechanized units, both foreign and U.S., recognize the need to split the vehicle commander and dismounted squad leader functions between two individuals. For example, American and Israeli M113 units recognize that it is not a good idea for the squad leader to be the individual responsible for firing the vehicle's main weapon during the battle. They place the squad leader in the cargo hatch where he can control the battle.[74] Admittedly, the squad leader cannot see much of anything in the back of a BFV, but I think that the benefits of his sole focus on conducting the dismounted battle would outweigh the advantages of his seeing the battlefield beforehand. It is arguable that a buttoned up Bradley commander operating in extreme battlefield clutter conditions does not hold much of a visual advantage over his compatriot in the rear, particularly if he cannot identify the point from which he is receiving the fire.

Another point of discussion concerning maneuver under General Wass de Czege's Combat Power Model relates to how squads operate with the radios available to them. This point is addressed in at least one NTC observation that I have come across, and it seems to follow naturally from the analysis that has preceded. If the dismounted infantry in a platoon are most likely to be employed away from their vehicles when in a dismount role, they are going to need some means of communication. However, a squad's BFV has only one radio.[75] This means that if at least two of the platoon's radios come off the vehicles for the dismount squads' use, two squads will need to operate together if they are going to maintain any communications with the rest of the platoon. Moreover, BFVs will be forced to position closer to their wingmen than the doctrinal 150 meters so that they can maintain visual contact and pass visual signals. While this system is marginally executable, it has many drawbacks, particularly if the dismounted elements have assigned tasks that by their nature cause them to disperse. For example, a platoon that has two dismounted squad battle positions, a roving patrol, a.d vehicles in pairs fighting separately from the infantry will not have enough radios. Interestingly, the new British Warrior, in many respects very similar to the Bradley, comes equipped with two radios, one of which can be

dismounted and sent off with the dismounted element.[76] The British apparently believe that the dismounted squad needs its own communications capability.

One final issue concerning maneuver effect needs to be addressed. NTC observations repeatedly call for the concentration of combat power against an isolated portion of the enemy. MG Leland addresses the massing of combat power in defensive operations as follows:

> Since it is not possible to be strong everywhere across a wide front, a key to defeating an attacking regiment with a much smaller force is timely movement in response to enemy action....To be successful, the defender must bring the vast majority of his combat power to bear irrespective of the routes the enemy chooses.[77]

The important point in this quotation is that defensive forces- when they are the significantly smaller force- must be oriented on the defeat of the enemy rather than on the retention of terrain. The suggestion here is that Bradley units must be able to maneuver the majority of both their mounted and dismounted elements to achieve decisive firepower. If this is true, and the dismounted and mounted elements are likely to be engaging the enemy from different positions to take maximum advantage of the different weapons systems they each possess, then we need a separate leadership structure that can move and fight each of these elements independently. If their fighting apart is more likely to be the normal condition, then that separate leadership structure ought to be the permanent one for the element. In the case of the dismounted infantry, that leadership structure should control more than the current six men so that it can absorb up to 30% attrition and still pack some punch. Additionally, that structure has to mesh with the configuration of the BFV itself so that the squad can be efficiently and effectively transported around the battlefield. Since BFVs operate in pairs doctrinally, and individual BFVs cannot carry enough men to accommodate a larger squad than they currently do, the natural move is to distribute the platoon's dismounts evenly among all four of its BFVs. This means that a platoon would field two nine man squads instead of three six man squads. Each squad would be split between two vehicles.[78]

NTC observations about offensive operations suggest a similar adjustment of the Bradley organization. The most striking observations

concern the effectiveness of dismounted infiltration of enemy positions. One commentator claims that the biggest fear of the OPFOR in the defense is the infiltration of a dismounted force. In his words, "[a] dismounted force can completely disrupt a defense and make the defender worry about the dismount and not the main battle."[79] This comment, along with others that identify the need for dismounted infantry to perform autonomous missions such as breaching, patrolling, and dismounted assaults, also suggests the need for a separate dismounted structure, either within the platoon or within the company.

In summary, an analysis of the the subcomponents of maneuver leads to several conclusions. First, the dismounted infantrymen in a squad will spend most of their time on the ground devoting their energies to dismounted operations. Second, the current dismounted squad organization is not robust enough to operate alone. To be effective in combat, the dismounted infantrymen in a platoon will need to operate in larger packets to achieve sufficient concentration of mass and firepower. Third, the leadership structure at platoon level is dysfunctional because it hinders effective training and control of the platoon. Finally, the three preceding conclusions suggest that there are not enough radios in the current platoon structure.

C. PROTECTION. Under General Wass de Czege's Combat Power Model, protection is a function of three major variables: (1) concealment, (2) exposure limitation, and (3) damage limitation. Concealment efforts are primarily directed at denying the enemy information about friendly activities. At the tactical level concealment measures are primarily passive in nature and include stealth, camouflage, and light and noise discipline.[80]

Exposure limitation focuses on denying the enemy lucrative targets on the battlefield. To prevent or degrade his acquisition of targets, we must be concerned with our ability to use cover, to minimize our exposure to his fires when we move out from behind cover, and to complicate his ability to track our soldiers and vehicles as we maneuver in exposed places.[81] The size of the target, its acceleration and speed, its agility in changing direction, its ability to obfuscate the enemy gunner's view, its unpredictability, and its ability to

return fire on the move are all factors in limiting a target's exposure and, hence, its vulnerability. At the unit level exposure limitation is concerned with formations and dispositions during movement, local security measures, information gathering means, and the mutual support of weapons systems.[82]

Damage limitation involves the actions individuals and units take to restrict the destructiveness of enemy fires against them once they become targets. Individual protective clothing such as the helmet, protective kevlar vest, and NBC clothing and equipment must not only give the soldier protection, but they must also be designed so that the soldier will wear them. Soldiers must be able to use cover, and they must be able to construct survivable positions reasonably quickly. In this regard, engineer digging equipment is a great combat multiplier. Finally, units must be able to minimize attrition and the effects of attrition during the battle. At the tactical level, the commander is concerned with managing the wear of NBC gear, the prompt medical treatment and evacuation of his wounded men, the quick repair or evacuation of his vehicles, the minimization of the stresses that lead to battle fatigue and combat shock, the building of adequate positions, and the coordination for fires and actions that will facilitate his unit's disengagement from the enemy.[83]

Only two major protection issues concern the Bradley infantry's dismount strength and organization. The first revolves around the building of survivability positions. The second addresses the need for local security.

Experience at the NTC time and again has demonstrated that "survivability is more of a combat multiplier than mobility or countermobility in the defense."[84] Accordingly, NTC observers recommend that first priority in the defense should go to the construction of the dismounted infantry's fighting positions. But, as they recognize, the building of these positions is extremely labor and resource intensive. As I pointed out earlier, the building of proper fighting positions can take 12 hours or more. If dismounted soldiers have to build one of these positions for their alternate and supplementary positions as well, then they are tied up for a minimum of

36 hours in digging. While they are building these fighting positions, they must make a tradeoff. If they choose to conduct patrolling, then they slow down the construction process and potentially leave themselves vulnerable to enemy direct and indirect fire if the enemy chooses to attack them inside the 36 hour window. On the other hand, if they concentrate on building survivable positions, then they leave themselves vulnerable to enemy reconnaissance efforts. Thus, even though they may have well-prepared positions, those positions may be compromised and subject to more intense and accurate fires. Given how few dismounted soldiers there are in a platoon, this is an issue of critical importance. It is no wonder why most units never build alternate or supplementary fighting positions, even though the locations for those positions are identified.[85]

These observations suggest that the Bradley infantry requires some kind of augmentation to aid it in preparing fighting positions. The mission requirements placed on the dismounted infantry, the limited amount of time available, and the need for well-built and survivable fighting positions all argue for Bradley units being augmented by additional assets from engineer units or for their receiving additional engineer tools and demolitions to speed up the process of building fighting positions. One NTC observation has made a plea for a trenching machine for mechanized infantry units.[86] If one of the infantry commander's primary concerns is to husband the dismounted infantry's fighting strength and allow it to perform more of its doctrinal dismounted missions, then one way to accomplish this end is to reduce its time in building positions.

A second activity critical to the protection and preservation of a unit's combat power is patrolling. The counterreconnaissance battle is not merely waged by forces forward of the FLOT (forward line of own troops). Company and platoon positions also need the security provided by reconnaissance and combat patrols. Effective and thorough patrolling, however, is both manpower intensive and extremely physically demanding. To maintain continuous patrols in front of and around unit positions may well overtax the already heavily committed dismounted infantry. In one of his NTC observations General Saint, a

former III Corps Commander, stated:

> To conduct continuous and intensive patrols as a means of gathering and denying information, TO&Es must be revised to provide for these two factors. The fix must be now, [sic] in order to train in this facet of combat operations.[87]

General Saint clearly believes that Bradley infantry unit organizations do not have enough dismounted infantrymen to perform all the other defensive tasks they must perform and provide adequate patrolling protection.

This observation surely underlines the need for close and central management of dismounted missions at the company level to eliminate needless duplication of patrolling tasks and to manage the pool of assets available to conduct the patrolling at any one time. In addition, this quotation implies the need for highly efficient and proficient patrolling elements composed of the minimum number of soldiers necessary to perform the mission. Squads and platoons need to be configured so that they can resource patrols without the remaining element becoming combat ineffective as a result. In this respect, the squad structure that I suggested in the last section may take a step toward remedying this problem.

My analysis above leads to similar conclusions about Bradley dismount strength as in the preceding two sections. While the low dismount strength of Bradley units makes it much more difficult to accomplish the required infantry dismount tasks, the minimums can probably be attained by better organizing and husbanding the dismount forces that Bradley units do have. Key to the efficient and effective management, training, and employment of the these dismounted infantry will be the quality of their leaders.

D. LEADERSHIP. Leadership is the last and most important of the elements of combat power. As we have seen above, its effects permeate the other three elements. It is virtually impossible to discuss them without in some fashion addressing one of the variables of leadership. Yet the leadership effect is the least quantifiable and most tied to the traits of the individual leaders of units. We can see what I mean by quickly looking at the traits and abilities that General Wass de Czege identifies as essential. He enumerates these essential traits of the leader in the following manner:

1. He must be technically proficient in certain job specific skills.

2. He must also have a thorough understanding of the full range of his own unit's capabilities and those of units that support him.

3. He must possess judgment and certain appropriate analytical skills.

4. He must be dedicated to his profession and committed to accomplishing his assigned tasks.

5. He must be able to exert moral force in the execution of his mission. In other words, he must be able to transmit commitment, dedication, and a sense of mission to his subordinates.

6. He must possess certain communication skills which allow him to issue understandable instructions and receive the information he needs to make effective decisions.

7. Finally, he must have a feeling for the effects of combat on himself, his soldiers, and the impact these may have on the execution of his assigned mission.[88]

While all of these variables can and will play an important, even crucial, role in enhancing the combat power of a Bradley unit, the one that keeps cropping up in the discussion of the other three elements of combat power is the first.

Technical proficiency seems to be the central linchpin in this analysis. As we have seen, the Bradley organizational structure seems to demand an acceptable level of leader technical proficiency and knowledge in a greater number of skill tasks than the other infantry structures. Additionally, it requires a broader span of control, both in terms of controlling elements in the organization and in terms of the technical requirements of the position. The organization of Bradley units, on the other hand, works against the leader's sustaining his personal technical proficiency and imparting this technical proficiency to his charges. We have seen that the leader's dual responsibilities of vehicle commander and dismount squad leader work against each other. The leader cannot execute both functions at the same time, and so he becomes a "part-timer" at both. His inability to focus his efforts on either responsibility fully leads to his probably not getting the full combat power potential out of either his crew element, his dismount element, or both. His having to accomplish his dismounted tasks with fewer soldiers than in the past just exacerbates the problem.

III. CONCLUSIONS AND DOCTRINAL IMPLICATIONS

We have seen over the course of this paper that BG Wass de Czege's Combat Power Model is a powerful analytic tool for evaluating force design and developing organizational structure. It has helped us identify the significant weaknesses of Bradley units as well as their strengths. In doing so, it has given us a clear road map of where Bradley unit design ought to go, both for the near and long term. The four components of combat power--firepower, maneuver, protection, and leadership--each has served as a signpost in this process. All four components of combat power have suggested the same conclusions about how well Bradley organizational structure serves to enhance unit combat power. They have given us a strong sense that there is much Bradley units can do to generate combat power better and more effectively, not the least of which is to modify Bradley infantry organizational structure. After all, if a combat unit cannot generate optimal combat power, the *sine qua non* of its existence, then it does not adequately serve the purpose for its creation.

As I said in the beginning, I intended to determine whether the Bradley infantry can generate sufficient combat power to accomplish its doctrinal missions. This analysis indicates that it can, with some important reservations. Even with as few infantrymen as Bradley units traditionally train and operate, NTC observations uniformly suggest that with high quality training and leadership Bradley infantry task forces can win against the OPFOR. However, my analysis also indicates that the current organizational structure of Bradley units undermines optimal training and leadership in several insidious ways.

First, the dismount element of the squad becomes disfunctional as an integral unit after it loses two to three men. To mass and sustain effective combat power, it must invariably be combined with the dismounted infantrymen from at least one other squad. Since the dismounted portion of the current squad spends most of its time on the ground and away from the BFV, its command and control structure ought to reflect that dismounted orientation and focus.

Second, the squad leader's responsibilities as vehicle crew

commander and dismount element leader under the current Bradley organization work against each other. To become proficient in one area, the squad leader, by necessity, must neglect the other. Given that the squad leader has more tasks in which to be proficient than his other infantry counterparts and less time to become proficient in those skills, he probably will not achieve as high a level of proficiency as he could if his efforts were focused on only one set of responsibilities. Thus, the responsibilities for commanding the BFV and leading the squad ought to be separated and assigned to two different individuals.

An attendant problem to the one mentioned above is that the vehicle crew and the dismount element only get a percentage of the time they need to train together as an integral unit to become proficient. Hence, vehicle crews and dismount elements are apt to be less than optimally trained. They may train with the assistant squad leader, but the crew or squad trained will be a different one.

Third, the dismounted infantrymen need their own radios to perform their battlefield tasks effectively. Dismounted infantrymen will probably be situated in combat away from their vehicles. Since the squad BFVs only have one radio each and the platoon leader's vehicle has two, the separation of the platoon into more than four separate combat elements will result in at least one of the elements not having a radio. Because radio communications will be essential to command and control the dispersed elements of a Bradley platoon and maneuver them rapidly to mass their fires, a shortage of radios could seriously impinge on their ability to accomplish the mission.

Fourth, the relatively few infantrymen in a platoon and the immediate needs for their services in providing reconnaissance, security, and countermobility obstacles are strong arguments for engineer assistance in the building of fighting positions. It is not merely a matter of the dismounted infantry being incapable of building fighting positions or of their needing to conserve their fighting strength. It is instead a matter of their being relieved of work in one area to perform necessary tasks in another area.

Finally, the mobility and firepower of the BFV can make up a good

deal for the paucity of infantry if it is maneuvered and employed properly. Moreover, well-sited engineer obstacles that are covered by accurate and timely direct and preplanned indirect fires can also go a long way in compensating for numerical weakness. Canalization of the enemy into the area where we want to fight him and have the relative advantage in combat power can more than compensate for our relative numerical weakness.

These conclusions taken collectively do not necessarily argue for a gross increase in the number of infantrymen in the Bradley squad but instead for a more effective organization and C^2 (command and control) architecture for Bradley units. They suggest that leaders be dedicated to performing either mounted or dismounted missions. This will greatly streamline training and operations with the attendant result that vehicle crews and dismounted squads will be better trained to perform the multiple requirements demanded of them. Whether the dismounted infantry should be formed into separate squads, platoons, or even companies is beyond the scope of this paper, but these dismounted units will require their own command and control structure with their own dedicated communications equipment.[89]

These conclusions also suggest that the size and organization of a squad needs redefining. The current platoon structure can accommodate the reorganization of its dismounted soldiers into two nine man squads. Moreover, the nine man squads can be carried by the platoon's vehicles if we mount each squad on two vehicles. This assignment of a squad to a pair of BFVs also dovetails nicely with Army doctrine of moving and employing BFVs in pairs (the wingman concept).

Apart from this type of modification of the Bradley MTOE, any significant increase in the number of dismounted infantry in a Bradley battalion must be accompanied by an attendant increase in the number of BFVs or a major modification of the BFV itself.[90] Because the Army faces a period of increasing budget cuts and force rollbacks, neither of these options seem likely to occur in the near term. Since it appears that we will have to make do with what we have, the reorganization strategy suggested in this paper appears to be the best short term option.

Finally, it is important to touch briefly upon the two major doctrinal implications of my analysis and conclusions. The most important implication is that the organizational design of a unit in of itself can enhance or degrade the combat power of its raw assets. In the case of the current Bradley infantry MTOE, the organizational structure works against optimizing combat power. The source of the problem is the BFV itself. Instead of the BFV being designed around the infantry squad it is supposed to carry, the opposite appears to have occurred. So the organizational designer needs to understand what is the primary weapon system around which he builds the organization. For an infantry unit, that "weapon system" is the squad, not the fighting vehicle that carries the squad.

By making this claim, however, I do not mean to denigrate the important, even preeminent, role the 25mm gun and TOW system can play in certain tactical situations. It is the dismounted infantrymen, though, for whom the Bradley was built. My contention is that the design of the vehicle's weapons and automotive systems should accommodate and enhance optimal squad design, not work against it. As fast and as lethal as the BFV is, it does not carry enough dismounted infantrymen.

The second major doctrinal implication of this study is that an organization that supports a doctrine like Airland Battle needs to undergo a combat power analysis that evaluates the organization under its doctrinal mission parameters. That is, the force designer needs to clearly understand the missions that the unit is supposed to perform, and he needs to understand what kind of enemy force and what kind of enemy resistance this unit is supposed to overcome when he begins his combat power analysis. Had this kind of analysis occurred when the Bradley organization was on the drawing board, we might not be going through our present trials and tribulations with it.

Despite its shortcomings, the Bradley Fighting Vehicle is still a radical improvement over its predecessor, the M113. It gives the U.S Army significant combat potential in terms of its firepower and mobility. NTC observations time and again relate the tremendous technological advantage it gives player units over the OPFOR. The time

has come now to bring Bradley dismounted infantry maneuver skills on line with the capabilities of the vehicle. One sure step in that direction is to align the Bradley infantry organization so that it complements the BFV's unique capabilities and yet takes advantage of the special contributions effective dismounted infantrymen can bring to the Airland battle.

ENDNOTES

[1] Richard A. Scholtes, "Where Have All the Infantrymen Gone?," Armed Forces Journal 124 October 1986: 92.

[2] Department of the Army, FM 101-10-1/2: Staff Officers' Field Manual Organizational, Technical, and Logistical Data Planning Factors (Volume II) (Washington D.C.: GPO, October 1987) 4-9 and 4-11. My computations are based on 5 to 10 days of combat per month and count non-battle losses as well. Given that infantrymen sustained over 80% of of the total battle losses during World War II, I would hazard that my figures may be a bit optimistic. The problem was not merely one of losses. Often replacements were too few and too slow in coming based on the War Department's underestimation of potential battle losses of infantrymen. Moreover, wounded soldiers averaged about 45 days or so of recovery time before they could be returned to full duty. Thus, units were getting replacements at a slower rate than they were incurring casualties. Further complicating the problem was the phenomenal personnel turnover in units, particularly among officers. Units were not only losing men at a fairly high rate, but they also were often units composed of men who had not been bonded into highly trained and cohesive units. Russell Weigley in his book, Eisenhower's Lieutenants, addresses this point in great detail (pp. 370-375) as does John English in his A Perspective on Infantry (p. 176). The Army's account of the Battle of Singling in Small Unit Actions identifies the infantry strength of the platoons involved at 19, 14, and 15 respectively out of an authorized dismounted infantry strength of 36. These figures appear to be fairly typical for the time.

[3] The current MTOE for a Bradley squad is nine men. I assume that Bradley units will always keep the vehicle itself crewed at the expense of the dismounted team. While the gunner can employ the 25mm gun and the TOW missile system without the aid of the vehicle commander, he cannot reload by himself quickly, nor can he acquire targets as well.

[4] Department of the Army, FM 100-5: Operations (Washington D.C.: GPO, May 1986) 2.

[5] FM 100-5: Operations, 13.

[6] Virgil Ney, The Evolution of the Armored Infantry Squad (Ft. Belvoir, Va.: Combat Operations Research Group Memorandum 198, U.S. Army Combat Developments Command, January 1965) 79-86.

[7] James Schneider, "The Theory of the Empty Battlefield," RUSI Journal September 1987: 37-44.

[8] Huba Wass de Czege, "Understanding and Developing Combat Power," ts., School of Advanced Military Studies, USACGSC, February 1984, 12-14.

[9] David Isby, Weapons and Tactics of the Soviet Army (London: Jane's Publishing Co., Ltd.) 109. Recent Soviet initiatives indicate that their tactical doctrine is changing to place significantly more emphasis on the defense. Preliminary indications, however, indicate that changes currently taking place will have little impact on the tactics for units at the regimental level or lower. Accordingly, I have chosen to rely on Soviet tactical information already available in published texts and field manuals.

[10] Department of the Army, FM 100-2-1: The Soviet Army, Operations and Tactics (Washington D.C.: GPO, July 1984) 5-22 and 5-23.

[11] Combined Arms Center, U.S. Army Command and General Staff College, Tactical Commander's Development Course, Soviet Tactical Planning Factors (Ft. Leavenworth, Ks: GPO, May 1989) 2-11. See also Isby, 109-111. The figures I use take into account the addition of a machine gun/ anti-tank platoon to each motorized company. I added the number of personnel in this platoon to the strength figures in Isby's

book. The numbers of vehicles and dismounted infantrymen will be similar in BMP-1 units except that they will only have 44 BMP-1s. BMP-2 units will also have 44 BMPs but 9 fewer dismounted infantrymen.

12 FM 100-2-1, 5-22. See also Soviet Tactical Planning Factors, 4-11.

13 Department of the Army, Soviet Army Operations (Washington D.C.: GPO, April 1978) 3-81.

14 Soviet Army Operations, 3-81.

15 FM 100-2-1, 6-1. See also Soviet Army Operations, 4-3.

16 Soviet Tactical Planning Factors, 4-15. See also FM 100-2-1, 6-7.

17 FM 100-2-1, 6-7.

18 Soviet Tactical Planning Factors, 2-11, 2-15. See also Isby, 110.

19 FM 100-2-1, 6-7.

20 This number could vary significantly based on the enemy's morale, state of training, and the strength of the position he occupies.

21 Department of the Army. FM 5-103: Survivability (Washington D.C.: GPO, June 1985) 4-8.

22 Department of the Army. FM 7-7J: The Mechanized Infantry Platoon and Squad (Bradley) (Washington D.C.: GPO, February 1986) 6-14 to 6-20.

23 Department of the Army. FM 5-102: Countermobility (Washington D.C.: GPO, March 1985) 190.

24 FM 5-102, 194.

25 COL Carl E. Ernst, NTC Observation Number 4516, FORSCOM Report NTC-88-11, 5-2. Infiltration has proved to be very effective at unhinging an enemy flank when synchronized with aviation, tank, and mechanized forces.

26 Department of the Army. FM 7-71: Light Infantry Company (Washington D.C.: GPO, August 1987) 3-22.

27 Department of the Army. FM 71-2: The Tank and Mechanized Infantry Battalion Task Force (Washington D.C.: GPO, September 1978) 3-29.

28 Observation Group, National Training Center, Dismounted Operations at the NTC (Ft. Irwin, Ca.: n.p., 1988) Observation Number 88-11-4 Training. Coordination problems deal primarily with link-up and timing. Units that perform reconnaissance, for example, and also have to link-up with follow-on mechanized elements must be at the right place at the right time to effect the joining of the two elements and the movement to their subsequent objective. If they have a critical follow-on mission and miss their link up, then they could throw the timing and synchronization of the entire operation off significantly. At worst, they could cause the mission to fail.

29 Virgil Ney, 35.

30 Both FM 71-1 and FM 71-2 are manifestly unclear in this regard. Perhaps more helpful in this regard is BG Huba Wass de Czege's distinction between three types of infantry in his article, "Three Kinds of Infantry" Infantry September-October 1986: 11-13. In this article, BG Wass de Czege claims that Bradley infantry (which he terms "armored infantry") bases its actions on furthering "the advance and protection of the main battle tank." Brigadier Richard E. Simpkin shares this view. See "When the Squad Dismounts" Infantry November-December 1983: 15. See also "Developing Army's Bradley: The Wages of Compromise" Army

July 1987: 71. See also Niven J. Baird, "The MICV is an Offensive Weapon System" Armor July-August 1977: 27-28.

[31] Wass de Czege, "Three Kinds of Infantry," 12.

[32] FM 7-7J, 5-4.

[33] FM 7-7J, 5-4.

[34] FM 7-7J, 5-4 to 5-5.

[35] Wass de Czege, "Three Kinds of Infantry," 12. See also Wass de Czege, "More on Infantry" Infantry September-October 1986. Interestingly, the German Army seems to share BG Wass de Czege's view about the need for significant supplementation of dismounted infantrymen in mechanized units for missions in heavily forrested terrain and urban areas. Many senior officers in the Bundeswehr believe that their own armored infantry forces (in many respects very similar to our Bradley units) need this kind of additional infantry force. General Franz Uhle-Wettler is perhaps the most articulate and outspoken proponent for this view which he supports in depth in his Battlefield Central Europe: Danger of Overreliance on Technology by the Armed Forces (Ft. Leavenworth, Ks.: U.S. Army Command and General Staff College, 1980) 46-53. See also Ernst Klaffus, "The Infantry--Thoughts on Weapons and Protection" NATO's Sixteen Nations December 1983- January 1984: 36+. See also Gero Koch, "German Infantry in the 1990s" Infantry July-August 1987: 28.

[36] Wass de Czege, "Three Kinds of Infantry," 12.

[37] FM 100-5, 11-14.

[38] Wass de Czege, "Understanding and Developing Combat Power," 8.

[39] Wass de Czege, "Understanding and Developing Combat Power," 12.

[40] Wass de Czege, "Understanding and Developing Combat Power," 15.

[41] Wass de Czege, "Understanding and Developing Combat Power," 20.

[42] Wass de Czege, "Understanding and Developing Combat Power," 23.

[43] Wass de Czege, "Understanding and Developing Combat Power," 23-25.

[44] Chief of Plans and Operations, Operations Group, National Training Center, "NTC Direct Fire Briefing," FORSCOM Troop Leaders Program, Ft. Irwin, Ca., 26 August 1989.

[45] "NTC Direct Fire Briefing"

[46] Captain William M. Hollowell, former NTC Observer-Controller, personal interview, 24 October 1989.

[47] COL William H. Janes, former OPFOR Regimental Commander, NTC, personal interview, 4 October 1989.

[48] NTC Observer-Controllers, NTC Observation Number 4135, Rotation 87-13, 4.

[49] "NTC Direct Fire Briefing"

[50] Major Michael Foncannon, former NTC Observer-Controller, personal interview, 27 November 1989. Captain William Hollowell, former NTC Observer-Controller, personal interview, 24 October 1989. See also MG E.S. Leland, Memorandum for LTG Riscassi, "NTC Observations," NTC Lessons Learned, 20 November 1985: 15.

[51] PRI/Battle Observation Summary, Observation 88-11-14 Training, Observation Group, National Training Center, Dismounted Operations at

the NTC, Ft. Irwin Ca., 1988. See also MG E.S. Leland, 13-15. See also CPT Dexter, NTC Observation Number 4835, Rotation 87-3, 9.

52 MG E.S. Leland, 13-14. COL William Janes, personal interview, 4 October 1989

53 MG E.S. Leland, 14.

54 COL William A. West, former Chief, Observation Group, NTC, personal interview, 7 November 1989.

55 MG E.S. Leland, 14.

56 Combined Arms and Tactics Department, USAIS, "White Paper: Bradley Fighting Vehicle, Doctrine, Organization, Training," Ft. Benning, Ga., n.d., 11. Authorizations of M2 training ammunition in Europe, for example, are well below STRAC authorizations. In 1987 and 1988 units were allotted only enough 25mm ammunition to qualify the primary crew.

57 Wass de Czege, "Understanding and Developing Combat Power," 26.

58 Wass de Czege, "Understanding and Developing Combat Power," 26-28.

59 Wass de Czege, "Understanding and Developing Combat Power," 28.

60 Wass de Czege, "Understanding and Developing Combat Power," 29.

61 CPT William M. Hollowell, personal interview, 24 October 1989. See also Dismounted Operations at the NTC, 11. See also Jon G. Graber et al, Continuous Operations SOP for BIFV Units (Alexandria, Va.: Army Research Institute for the Behavioral and Social Sciences, 1987) 2. This last document addresses continuous operations in observed ARTEPs that occurred in both CONUS and OCONUS. For a detailed discussion of the impact of continuous operations on soldiers, see Frederick W. Hegge's "The Future Battlefield: Human Dimensions and Implications for Doctrine and Research," Walter Reed Army Institute of Research, 1982 and Gerald P. Krueger's "Strategies for Sustaining Soldier and Unit Performance in Continuous Operations," Walter Reed Army Institute of Research, 1987.

62 Dismounted Operations at the NTC, 8, 10, and 12. See also Robert G. Rollier et al, BIFV Squad and Platoon Leader Span of Control (Alexandria, Va.: Army Research Institute for the Behavioral and Social Sciences, 1985) 7-9. While the latter text reports the results of a separate study not connected with the NTC, its findings are very similar to those found in NTC observations with regard to squad and platoon leader expertise.

63 Almost all of those officers interviewed for this monograph remarked in a like fashion on this point. Moreover, they almost invariably remarked on the fact that light units knew what their physical limits were and tended not to overextend themselves as mechanized units more typically did. That is, light infantry units seem to have a much better feel for the limits of their physical endurance than mechanized units generally do.

64 This was a point of almost universal agreement among the individuals that I interviewed. The most commonly cited error is to move dismounted elements on foot much farther than they need to given the transportation and secure routes available. In many instances, infantry units took too long to move to where they needed to go and were too tired to be fully effective once they got to that point. See also Dismounted Operations at the NTC, Observation Number 87-11-21 Training. Leaders also tend to overextend themselves by not taking the rest they need to be effective when the opportunity presents itself. This problem seems to be exacerbated by a tendency on the part of senior leaders to demand that junior leaders be instantly available and ready for rapid reaction to the tactical situation. The perception of this

attitude by junior leaders leads them to ignore normal sleep needs until they become exhausted and ineffective. See Jon G. Graber et al, Continuous Operations SOP for BIFV Units, (Alexandria, Va.: Army Research Institute for the Behavioral and Social Sciences, March 1986) 2. Research has shown that leaders need no less than 4 to 5 hours of sleep to sustain the minimum necessary mental acuity to perform competently in a high stress, high activity environment. Even so, mental alertness and physical performance will decline until at the 5 to 7 day mark they will have reached the same low level as that seen after two days of no sleep at all. See Gerald P Krueger et al, Strategies for Sustaining Soldier and Unit Performance in Continuous Operations, (Washington D.C.: GPO, October 1987) 1.

[65] Dismounted Operations at the NTC, Observation Number 88-11-9 Training, 40. See also Severn, 30. See also "White Paper: Bradley Fighting Vehicle Doctrine, Organization, Training," 9.

[66] Dismounted Operations at the NTC, 105.

[67] Dismounted Operations at the NTC, 12-13. See also "White Paper: Bradley Fighting Vehicle Doctrine, Organization, Training," 9. See also CPT Sandoy, NTC Observation Number 928, Rotation 85-11, T 17-2.

[68] Dismounted Operations at the NTC, Observation Number 88-11-5 Maneuver, 78.

[69] COL William A. West, personal interview, 7 November 1989.

[70] Severn, 14. See also "White Paper: Bradley Fighting Vehicle Doctrine, Organization, Training," 10. See also Robert G. Rollier et al, BIFV Squad and Platoon Leader Span of Control (Alexandria, Va.: Army Research Institute for the Behavioral and Social Sciences, December 1989). See also Margaret S. Salter and Robert L. Rollier, Task Analysis of Tactical Leadership Skills for Bradley Infantry Fighting Vehicle Leaders (Alexandria, Va.: Army Research Institute for the Behavioral and Social Sciences, October 1986).

[71] Severn, 27-28. See also "White Paper: Bradley Fighting Vehicle Doctrine, Organization, Training," 7-9.

[72] FM 7-7J, 5-17 and 5-18.

[73] Dismounted Operations at the NTC, 9.

[74] CPT Edwin L. Kennedy, Jr., "Israeli M113s," Infantry July-August 1984: 6. MAJ E.G. Barbero, NTC Observation Number 1217, 19 January 1986.

[75] FM 7-7J, D-10. The platoon leader and platoon sergeant each have two radios on their respective vehicles, but one radio of the two in each vehicle will almost always be set on the company frequency. Hence, if the platoon sergeant's second radio is used for dismounted operations, the platoon has no redundancy in monitoring the company net. Given the dispersion of most Bradley units, using the platoon sergeant's second radio for dismounted operations is probably not a good idea.

[76] COL T.L.M. Porter, British Liaison Officer, Combined Arms Center, personal interview, 7 November 1989.

[77] MG E.S. Leland, 13.

[78] "White Paper: Bradley Fighting Vehicle Doctrine, Organization, Training," 14.

[79] Dismounted Operations at the NTC, Observation 88-11-1 Maneuver, 74.

[80] Wass de Czege, "Understanding and Developing Combat Power," 30-31.

[81] Wass de Czege, "Understanding and Developing Combat Power," 31.

[82] Wass de Czege, "Understanding and Developing Combat Power," 32.

[83] Wass de Czege, "Understanding and Developing Combat Power," 32-34.

[84] MAJ E.G. Barbero, NTC Observation Number 1214, 20 January 1984. See also LTC Crowley, NTC Observation Number 1742, 3 April 1986.

[85] Dismounted Operations at the NTC, Observation 88-11-14 Training, 46.

[86] Dismounted Operations at the NTC, Observation 88-11-14 Training, 46.

[87] General Crosbie Saint, NTC Observation Number 1742, 3 April 1986.

[88] Wass de Czege, "Understanding and Developing Combat Power," 34-35.

[89] Dismounted Operations at the NTC, Observation 88-11-3 Material, 67. While this observation refers to M113 units, it is probably even more applicable to Bradley units since the radio must be pulled out of the turret as the squad leader is attempting to exchange positions with the assistant squad leader and prepare the squad to dismount. See also LTC Crowley, NTC Observation Number 2546, 16 January 1987.

[90] A number of recent articles and observations address this issue. See also MG Richard A. Scholtes, 97. See also MAJ Emanuele, NTC Observation Number 1978, 15 July 1986.

BIBLIOGRAPHY

1. BOOKS

Baxter, LTC (Ret) William P. Soviet Airland Battle Tactics. Novato, Ca.: Presidio Press, 1986.

Bellamy, Chris. The Future of Land Warfare. New York: St. Martin's Press, 1987.

Donnelly, Christopher. Red Banner: The Soviet Military System in Peace and War. Coulsdon, Surrey: Jane's Information Group, Ltd., 1988.

Doughty, COL Robert A. The Evolution of U.S. Army Tactical Doctrine, 1946-1975. Ft. Leavenworth, Ks.: Combat Studies Institute, USACGSC, 1979.

_____. The Seeds of Disaster: The Development of French Army Doctrine 1919-1939. Hamden, Cn.: Archon Books, 1985.

English, LTC John A. A Perspective on Infantry. New York: Praeger Publishers, 1981.

English, LTC John A., MAJ J. Addicott, and MAJ P.J. Kramers, eds. The Mechanized Battlefield. Washington: Pergammon-Brassey's International Defense Publishers, 1985.

Fry, MG James C. Assault Battle Drill. Harrisburg, Pa.: The Military Service Publishing Co., 1955.

Fuller, MG J.F.C. Armored Warfare. Harrisburg, Pa.: The Military Service Publishing Co., 1943.

Griffith, Paddy. Forward into Battle: Fighting Tactics from Waterloo to Vietnam. Strettington, Sus.: Anthony Bird, 1981.

Guderian, General Heinz. Panzer Leader. Washington: Zenger Publishing Co., Inc., 1952.

Herzog, Chaim. The Arab-Israeli Wars: War and Peace in the Middle East. New York: Random House, Inc., 1982.

Horne, Alistair. To Lose a Battle. London: Penguin Books, 1979.

Holmes, Richard. Acts of War: The Behavior of Men in Battle. New York: The Free Press, 1985.

House, MAJ Jonathan H. Toward Combined Arms Warfare: A Survey of 20th Century Tactics, Doctrine, and Organization. Ft. Leavenworth, Ks.: Combat Studies Institute, USACGSC, 1985.

Isby, David C. Weapons and Tactics of the Soviet Army. London: Jane's Publishing Co., Ltd. 1981.

Kellett, Anthony. Combat Motivation. Boston: Kluwer-Nijhoff Publishing, 1982.

Liddell-Hart, B.H. The Future of Infantry. Harrisburg, Pa.: The Military Service Publishing Co., 1936.

_____. The Red Army. Gloucester, Ma.: Peter Smith, 1968.

London Sunday Times Insight Team. The Yom Kippur War. Garden City, N.Y.: Doubleday and Doubleday, Inc., 1974.

MacDonald, Charles B. A Time for Trumpets. New York: William Morrow and Co., Inc., 1985.

_____. Company Commander. New York: Bantam Books, 1947.

Marshall, BG S.L.A. Men Against Fire: The Problem of Battlefield Command in Future War. Gloucester, Ma.: Peter Smith, 1978.

_____. The Soldier's Load and the Mobility of a Nation. Quantico, Va.: The Marine Corps Association, 1950.

McDonough, LTC James R. The Defense of Hill 781. Novato, Ca.: Presidio Press, 1988.

Miksche, Ferdinand O. Blitzkrieg. London: Faber and Faber, 1941.

Necker, Wilhelm. The German Army of Today. London: Lindsay Drummond Ltd., 1943.

Rommel, Field Marshal Erwin. Attacks. Vienna, Va.: Athena Press, 1979.

Rothenburg, Gunther E. The Anatomy of the Israeli Army: The Israel Defense Force. New York: Hippocrene Books, 1979.

Sajer, Guy. The Forgotten Soldier. London: Sphere Books, 1967.

Sasso, LTC Claude R. Soviet Night Operations. Ft. Leavenworth, Ks.: Combat Studies Institute, USACGSC, 1982.

Simpkin, Brigadier (Ret) Richard E. Human Factors in Mechanized Warfare. Oxford: Brassey's Publishers Ltd., 1983.

_____. Mechanized Infantry. Oxford: Brassey's Publishers Ltd., 1980.

_____. Race to the Swift. London: Brassey's Defence Publishers, 1985.

_____. Red Armour. London: Brassey's Defence Publishers, 1984.

Stouffer, Samuel A. et al. The American Soldier: Combat and its Aftermath. Volume II. Princeton, N.J.: Princeton University Press, 1949.

van Creveld, Martin L. Command in War. Cambridge, Ma.: Harvard University Press, 1985.

_____. Fighting Power: German and U.S. Army Performance, 1939-1945. Westport, Cn.: Greenwood Press, 1982.

Vigor, P.H. Soviet Blitzkrieg Theory. New York: St. Martin's Press, 1983.

von Mellenthin, Major General F.W. NATO under Attack: Why the Western Alliance Can Fight Outnumbered and Win in Central Europe without Nuclear Weapons. Durham, N.C.: Duke University Press, 1984.

_____. Panzer Battles: A Study of the Employment of Armor in the Second World War. Norman, Ok.: University of Oklahoma Press, 1956.

Weigley, Russell F. Eisenhower's Lieutenants: The Campaign of France and Germany, 1944-1945. Bloomington, In.: Indiana University Press, 1981.

Wray, LTC Timothy A. Standing Fast: German Defensive Doctrine on the Russian Front During World War II. Ft. Leavenworth, Ks.: Combat Studies Institute, USACGSC, 1986.

2. PERIODICAL ARTICLES

Armstrong, LTC Jerry N. "Mindset Must be Attack, Not Defend," Army 34 (Feb 84): 14-26.

Army, "Developing Army's Bradley: The Wages of Compromise," (Jul 87): 71-77.

Baird, LTC Niven J. "The MICV is an Offensive Weapon System," Armor (Jul-Aug 77): 27-28.

Bautz, MAJ Edward. "The Tank Infantry Team in an Armored Division," Armored Cavalry Journal 55 (May-Jun 46): 21-23.

Bernier, LTC Robert G. "Combined Arms Maneuver Battalion--Armor and Infantry Build a New Relationship," Armor 97 (Jan-Feb 88): 14-19.

Besch, CPT (Ret) Edwin W. "Infantry Fighting Vehicles--Their Evolution and Significance," Marine Corps Gazette (Jul 83): 50-60.

Brachan, Paul. "Urban Sprawl and NATO Defense," Survival (Nov-Dec 76): 251-260.

Bradford, COL Zeb B. "Mechanized Infantry on the Modern Battlefield," Infantry (Nov-Dec 75): 20-29.

Bradley, Clifford D. "The Future IFV," Infantry 71 (Jul-Aug 81): 21-27.

Brower, Kenneth S. "Armored Fighting Vehicles and Units for the Future," RUSI Journal (Sep 81): 64-68.

Campbell, LTC Clark and CSM Charles Moore, "Company Defensive Position," Infantry 78 (Nov-Dec 88): 33-36.

Chaudrue, LTC Robert G. "Requiem for the Infantry," Infantry 68 (May-Jun 78): 28-31.

Chermol, LTC Brian H. "Battle Fatigue," Infantry 74 (Jan-Feb 84): 13-15.

Combined Arms Center, TRADOC. "New Clout for Mech Infantry: The M2 and Airland Battle 2000 Tactics," Army 33 (Aug 83): 18-29.

Dauber, LTC Peter F. "The German Armored Combat Troops," Infantry 73 (May-Jun 83): 24-27.

Depuy, General William E. "One Up and Two Back?," Army 30 (Jan 80): 20-25.

Dick, C.J. "Soviet Battle Drills: Vulnerability or Strength?," International Defense Review (No. 5 1985): 663-665.

Dunaway, Roy S. "The IFV," Infantry 67 (Jul-Aug 77): 46-50.

Ernst, COL Carl F. and MAJ David M. White. "Bradley Infantry on the Airland Battlefield," Infantry 76 (May-Jun 86): 20-24.

Everson, MAJ John A. "The Armoured Infantry Battalion--Organized and Trained as It Will Fight," Military Review 61 (Sep 81): 54-64.

Foss, LTG John W. "Bradley Organization and Tactics," Infantry 75 (Jul-Aug 85): 2-3.

Foster, Edward. "Feet on the Ground: Infantry in the Central Region," RUSI Journal 134 (Spring 89): 41-46.

Fuller, MG J.F.C. "The Evolution of the Armored Infantry Rifle Squad," Armor 74 (Nov-Dec 65): 34-45.

Gates, David. "Area Defense Concepts: The West German Debate," Survival 29 (Jul-Aug 87): 301-317.

Ganz, A. Harding. "Return to Singling," Armor 94 (Sep-Oct 85): 32-39.

German Army Armor School. "The German Armored Combat Troops," 73 Infantry (May-Jun 83): 24-27.

Green, Michael. "Better Bradley," International Combat Arms 7 (Jan 89): 55-59.

Hallenback, LTC Ralph A. "Reorganize Platoon," Infantry 73 (Nov-Dec 83): 10-12.

Hastings, MAJ Henry S. "Employment of Armored Infantry," Armored Cavalry Journal 56 (May-Jun 47): 24-26.

Holmes, David J. "The IFV on the Modern Battlefield," Infantry 70 (Sep-Oct 80): 10-14.

Hurley, MAJ Emerson F. "Tank-Infantry Teamwork at its Peak in the Armored Division," Armored Cavalry Journal 56 (May-Jun 47): 27-28.

Infantry School. "Cooperative Training--Infantry and Armor," Armored Cavalry Journal 55 (Sep-Oct 46): 39-41.

Kennedy, CPT Edwin L. Jr. "Israeli M113s," Infantry (Jul-Aug 84): 6-7.

Klaffus, BG Ernst. "The Infantry--Thoughts on Weapons and Protection," NATO's Sixteen Nations 28 (Dec 83/Jan 84): 36+.

Knayer, Manfred. "Germany's Armored Infantry," Armored Cavalry Journal 56 (May-Jun 47): 32-34.

Knyazkov, Viktor. "The BMP 2 Infantry Fighting Vehicle," Soviet Military Review 10 (Oct 85): 30-31.

Koch, COL Gero. "German Infantry in the 1990s," Infantry 77 (Jul-Aug 87): 27-32.

Kojro, MAJ Chester A. "Bradley Platoon Reorganization," Infantry (Mar-Apr 87): 16-18.

Krapke, Paul W. "What is the Ideal Armored Personnel Carrier? How Best to Combine Armour with Mechanized Infantry," Armada International 12 (Jun-Jul 88): 21-22.

Martin, MAJ David W. and MAJ Stanislaus Dashawetz. "Armor, Mech Infantry Team for Combat Power," Army 33 (Dec 83): 34-38.

Merzlyak, L. "IFVs on the Offensive," Soviet Military Review 7 (Jul 83): 30-33.

Ogorkiewicz, R.M. "Armored Vehicles for the Infantry," International Defense Review (Light Armoured Vehicles Supplement) 19 (Aug 88): 31-34.

Riley, CPT J.P. "MCV-80 and Beyond," RUSI Journal 131 (Nov 86): 23-28.

Rosetto, CPT Luigi. "Armoured Infantry," Army Quarterly 109 (Apr 79): 147-152.

Schneider, James J. "The Theory of the Empty Battlefield," RUSI Journal 132 (Sep 87): 37-44.

Scholtes, MG (RET) Richard A. "Where Have All the Infantrymen Gone?," Armed Forces Journal 124 (Oct 86): 92+.

Sedar, Robert P. "Employing the IFV," Infantry 71 (Sep-Oct 81): 33-37.

Siegel, Kenneth A. "What Comes First? (The Vehicle or the Man?)," Infantry 72 (Sep-Oct 82): 36-37.

Simpkin, Brigadier (Ret) Richard E. "A New Proposal for Fighting Vehicles," Armor 89 (Nov-Dec 80): 13-18.

_____. "Tank Hunting," Infantry 74 (Jul-Aug 84): 23-27.

_____. "Task Configuration for Fighting Vehicles," Armor 92 (Nov-Dec 83): 13-18.

_____. "When the Squad Dismounts," Infantry 73 (Nov-Dec 83): 14-18.

Uhle-Wettler, General Franz. "Infantry Versus Tank," NATO's Sixteen Nations (Jun-Jul 84): 29-49.

Walter, BG Enno. "Armoured Infantry," NATO's Sixteen Nations--Special Issue (Jan 81): 18+.

Wass de Czege, BG Huba. "More on Infantry," Infantry 76 (Sep-Oct 86): 13-15.

_____. "Three Kinds of Infantry," Infantry 75 (Jul-Aug 85): 11-13.

3. GOVERNMENT DOCUMENTS AND UNPUBLISHED MONOGRAPHS

Abt, MAJ Frederic E. "Tactical Implications of the M2 Equipped J-Series Mechanized Infantry Battalion Dismount Strength." SAMS Monograph, Command and General Staff College, 1988

Army Research Institute. Observations from Three Years at the National Training Center. Alexandria, Va.: Army Research Institute for the Behavioral and Social Sciences, January 1987.

Belenky, G.L. et al. "Israeli Battle Shock Casualties: 1973 and 1982." Scientific Manuscript, Walter Reed Institute of Research, 1983.

Brisson, MAJ Douglas D. "How Much is Enough? The Requirement for Increased Infantry Dismount Strength." SAMS Monograph, Command and General Staff College, 1987.

Combined Arms and Tactics Department, U.S. Army Infantry School. "White Paper: Bradley Fighting Vehicle Doctrine, Organization, Training," Unpublished paper, Ft. Benning, Ga., n.d.

Freakley, MAJ Benjamin C. "Interrelationship of Weapons and Doctrine: The Case of the Bradley Fighting Vehicle." SAMS Monograph, Command and General Staff College, 1987.

German General Army Office. "GE Infantry Fighting Vehicle for the 'Nineties'." Trans. by TRADOC Liaison Office. Cologne, Federal Republic of Germany, 1982.

German War Office. The German Motorized Infantry Regiment. Trans. Military Intelligence Service of War Department. 1941.

Goldsmith, Martin. Applying the National Training Center Experience: Tactical Reconnaissance. Santa Monica, Ca.: Rand Corporation, 1987.

Graber, J. et al. Continuous Operations SOP for BIFV Units. Alexandria, Va.: Army Research Institute for the Behavioral and Social Sciences. Prepared by Litton Systems, Inc., Sunnyvale, Ca., March 1986.

Hanna, MAJ Mark L. "Application of Airland Battle to Small Unit Tactics." SAMS Monograph, Command and General Staff College, 1985.

Hegge, Frederick W. "The Future Battlefield: Human Dimensions and Implications for Doctrine and Research." Scientific Manuscript, Walter Reed Army Institute of Research, December 1982.

Kriwanek, MAJ Thomas M. "Armored Infantry in the U.S. Force Structure." SAMS Monograph, Command and General Staff College, 1985.

Krueger, Gerald P. et al. "Strategies for Sustaining Soldier and Unit Performance in Continuous Operations." Scientific Manuscript, Walter Reed Institute of Research, October 1987.

Leland, MG E.S. "NTC Observations." Memorandum for LTG Riscassi. NTC Lessons Learned, 20 November 1985.

Ney, Virgil. The Evolution of the Armored Infantry Rifle Squad. Ft. Belvoir, Va.: Combat Operations Research Group Memorandum 198, U.S. Army Combat Developments Command, 4 May 1965.

_____. Organization and Equipment of the Infantry Rifle Squad: From Valley Forge to ROAD. Ft. Belvoir, Va.: Combat Operations Research Group Memorandum 194, U.S. Army Combat Developments Command, January 1965.

Observation Group, National Training Center. "Dismounted Operations at the NTC." Ft. Irwin, Ca., 1988.

Reznichenko, V.G. Tactics. Trans. CIS Multilingual Section, Translation Bureau, Secretary of State Department, Ottawa, Canada. Washington D.C.: GPO, 1984.

Rollier, Robert L. et al. BIFV Squad and Platoon Leader Span of Control. Alexandria, Va.: Army Research Institute for the Behavioral and Social Sciences. Prepared by Mellonics Systems Development Division, Litton Systems, Inc., Sunnyvale, Ca., December 1985.

_____. Bradley Fighting Vehicle System Combat Effectiveness: Evaluations of Developments in Tactics, Training and Equipment. Alexandria, Va.: Army Research Institute for the Behavioral and Social Sciences. Prepared by Mellonics Systems Development Division, Litton Systems, Inc., Sunnydale, Ca., December 1985.

Salter, Margaret S. and Robert L. Rollier. Task Analysis of Tactical Leadership Skills for Bradley Fighting Vehicle Leaders. Alexandria, Va.: Army Research Institute for the Behavioral and Social Sciences. Prepared By Litton Computer Services, Mellonics Systems, Mountain View, Ca., October 1986.

Severn, LTC Theodore I. "Airland Battle Preparation: Have We Forgotten to Train the Dismounted Mechanized Infantryman?" Study Project, U.S. Army War College, 30 March 1988.

St. Onge, LTC Robert J. "The Combined Arms Role of Armored Infantry." MMAS Thesis, Command and General Staff College, 1985.

Uhle-Wettler, General Franz. "Battlefield Central Europe: Danger of Overreliance on Technology by the Armed Forces." Unpublished Paper translated by TRADOC. Reprinted for the Command and General Staff College, 1980.

United Kingdom. British Army. "Army TD Note 16: Tactical Handling of MCV 80 (Warrior) (An Information and Discussion Note)." January 1987.

United Kingdom. British Army. "Conversion to Armoured Infantry." n.p., n.d.

United States. Department of the Army. General Staff. Bradley Fighting Vehicle: White Paper. Washington D.C.: Dept. of the Army, 1986.

United States. Department of the Army. DA Pamphlet No. 20-269: Small Unit Actions During the German Campaign in Russia. Washington D.C.: GPO, July 1953.

United States. Department of the Army. FM 5-102: Countermobility. Washington D.C.: GPO, March 1985.

United States. Department of the Army. FM 5-103: Survivablilty. Washington D.C.: GPO, June 1985.

United States. Department of the Army. FM 7-7J: The Mechanized Infantry Platoon and Squad (Bradley). Washington, D.C.: GPO, February 1986.

United States. Department of the Army. FM 7-71: Light Infantry Company. Washington, D.C.: GPO, August 1987.

United States. Department of the Army. FM 23-1: Bradley Fighting Vehicle Gunnery. Washington D.C.: GPO, September 1987.

United States. Department of the Army. FM 71-1: Tank and Mechanized Infantry Company Team. Washington D.C.: GPO, November 1988.

United States. Department of the Army. FM 71-2: The Tank and Mechanized Infantry Battalion Task Force. Washington D.C.: GPO, September 1988.

United States. Department of the Army. FM 100-2-1: The Soviet Army Operations and Tactics. Washington D.C.: GPO, July 1984.

United States. Department of the Army. FM 100-5: Operations. Washington D.C.: GPO, May 1986.

United States. Department of the Army. FM 101-10-1/2: Staff Officers' Field Manual Organizational, Technical, and Logistical Data Planning Factors (Volume 2). Washington D.C.: GPO, October 1987.

United States. Department of the Army. Combined Arms Center. "Soviet Tactical Planning Factors: Tactical Commander's Development Course." Ft. Leavenworth, Ks.: U.S. Army Command and General Staff College, n.d.

United States. Department of the Army. Combined Arms Training Activity. "NTC Lessons Learned: 7 Operating Systems." Ft. Leavenworth, Ks.: Center for Army Lessons Learned, 31 January 1986.

United States. Department of the Army. Combined Arms Training Activity. "NTC Lessons Learned: Command and Control." Ft. Leavenworth, Ks.: Center for Army Lessons Learned, 27 February 1987.

United States. Department of the Army. Combined Arms Training Activity. "NTC Lessons Learned: Leadership." Ft. Leavenworth, Ks.: Center for Army Lessons Learned, 1 July 1987.

United States. Department of the Army. Combined Arms Training Activity. "NTC Lessons Learned: Minefield Breaching." Ft. Leavenworth, Ks.: Center for Army Lessons Learned, 27 May 1988.

United States. Department of the Army. Combined Arms Training Activity. "NTC Lessons Learned: Heavy Forces, Vol I." Ft. Leavenworth, Ks.: Center for Army Lessons Learned, Fall 1988.

United States. Department of the Army. U.S. Army Intelligence and Security Command/ U.S. Army Intelligence and Threat Analysis. Soviet Army Operations. Washington D.C.: GPO, April 1978.

United States. War Department. Historical Division. Small Unit Actions. Washington D.C.: GPO, 1946.

United States. War Department. Military Intelligence Service. German Military Training. Washington D.C.: GPO, September 1942.

United States. War Department. Military Intelligence Service. The German Squad in Combat. Washington D.C.: GPO, January 1943.

U.S. Army Center for Army Lessons Learned. "CALL Printout, Subject: Bradley Mechanized Infantry." Ft. Leavenworth, Ks., 30 October 1989.

U.S. Army Center for Army Lessons Learned. "CALL Printout, Subject: Infantry Tactical Operations and Maneuver." Ft. Leavenworth, Ks., 30 October 1989.

U.S. Army Center for Army Lessons Learned. "CALL Printout, Subject: Home Station Training." Ft. Leavenworth, Ks, 30 October 1989.

Wass de Czege, BG Huba. "Understanding and Developing Combat Power." Unpublished Paper, School of Advance Military Studies, Command and General Staff College, 1984.

4. INTERVIEWS AND UNPUBLISHED BRIEFING SLIDES

Cerri, MAJ Anthony J. Former NTC Observer-Controller. Personal Interview. 6 December 1989.

Chief of Plans and Operations, Operations Group, National Training Center, Ft. Irwin, Ca. "NTC Direct Fire Briefing." Presented to FORSCOM Troop Leaders' Program attendees, August 1989.

Foncannon, MAJ Michael. Former NTC Observer-Controller and OPFOR Company Commander. Personal Interview. 27 November 1989.

Hollowell, CPT William M. Former NTC Observer-Controller. Personal Interview. 24 October 1989.

Janes, COL William H. Former OPFOR Regiment Commander, NTC. Personal Interview. 4 and 30 October 1989.

Shackleford, COL (Ret) William A. Former Chief of the Operations Group, NTC. Personal Interview. 10 and 14 December 1989.

West, COL William A. Former Chief of the Operations Group, NTC. Personal Interview. 7 November 1989.