

RETENTION AND EMPLOYMENT OF TACTICAL RESERVES

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

MASTER OF MILITARY ART AND SCIENCE
General Studies

by

DAVID C. CALLAHAN, MAJOR, USA
M.A., Embry-Riddle Aeronautical University, Daytona Beach, Florida, 1998

Fort Leavenworth, Kansas
2002

Approved for public release; distribution is unlimited.

MASTER OF MILITARY ART AND SCIENCE

THESIS APPROVAL PAGE

Name of Candidate: MAJ David C. Callahan

Thesis Title: Retention and Employment of Tactical Reserves

Approved by:

_____, Thesis Committee Chairman
COL Stephen M. Sittnick, M.A.

_____, Member
LTC Paul L. Cal, M.A.

_____, Member
Harold S. Orenstein, Ph.D.

Accepted this 31st day of May 2002 by:

_____, Director, Graduate Degree Programs
Philip J. Brookes, Ph.D.

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

ABSTRACT

RETENTION AND EMPLOYMENT OF TACTICAL RESERVES, MAJ David C. Callahan, 105 pages.

This study specifically examines three aspects of doctrine concerning the retention and employment of reserves at the tactical level. Should commanders retain a reserve? If retained, should the reserve be kept to the rear, and should the reserve be comprised of only uncommitted forces? The thesis is that doctrine concerning the retention and employment of reserves at the tactical level is not efficient and effective.

An evaluation of the historical evolution and application of reserves provide a base from which to understand how doctrine concerning the retention and employment of reserves evolved. These deductions are then applied against the doctrinal application of reserves to determine if they are efficient and effective in today's tactical environment. Simulation findings are then presented, which further substantiate the doctrinal findings.

The historical and theoretical findings indicated that doctrine concerning the retention and employment of reserves was efficient and effective. The doctrinal and simulation findings indicated that doctrine concerning the retention and employment of reserves at the tactical level was not efficient and effective. The doctrinal and simulated analysis concluded that a defender can be as, or even more, effective without retaining an uncommitted reserve positioned to the rear of forward troops.

TABLE OF CONTENTS

	Page
THESIS APPROVAL PAGE	ii
ABSTRACT	iii
ABBREVIATIONS	v
ILLUSTRATIONS	vi
TABLE.....	vi
CHAPTER	
1. INTRODUCTION	1
2. LITERATURE REVIEW	16
3. RESEARCH METHODOLOGY	28
4. HISTORICAL ANALYSIS	33
5. DOCTRINAL ANALYSIS	58
6. SIMULATION ANALYSIS	88
7. CONCLUSIONS AND RECOMMENDATIONS	95
REFERENCE LIST	99
INITIAL DISTRIBUTION LIST	103
CERTIFICATION FOR MMAS DISTRIBUTION STATEMENT.....	104

ABBREVIATIONS

AO	Area of Operations
AAR	After Action Review
BCT	Brigade Combat Team
BCTP	Battle Command Training Program
BLUFOR	Blue Forces
CALL	Combined Arms Lessons Learned
CMTC	Combined Arms Maneuver Training Center
COA	Course of Action
CTC	Combat Training Center
FM	Field Manual
JANUS	Combat Simulation System
JRTC	Joint Readiness Training Center
MIBN	Mechanized Infantry Battalion
NTC	National Training Center
OC	Observer-Controller
OPFOR	Opposing Force
SGI	Small Group Instructor

ILLUSTRATIONS

Figure	Page
1. Hannibal's initial disposition prior to the Battle of Cannae which depicts the absence of a reserve positioned to the rear.....	4
2. Hannibal's employment of forward-positioned forces to envelop the Roman Army at the Battle of Cannae.....	4
3. COA depictions.....	59
4. Maneuver comparison of COAs	72
5. Depiction of COA 1 and COA 2 branch plans	79
6. Simulation COAs with branch plans	90

TABLE

Table	Page
1. Simulation results.....	91

CHAPTER 1

INTRODUCTION

Introduction

Combat leaders are indoctrinated early in military training with the precept of retaining a reserve. They are taught that they should always retain a reserve, that the reserve should be withheld from action or not committed to a specific course of action, and that they should position their reserve to the rear of supported troops. These principles are reinforced throughout a leader's professional development until they become accepted as an expected allocation of combat power, even to the point of unquestionable acceptance. Retaining a reserve is believed to be a practical and responsible application of combat power. The designation of a reserve provides insurance against uncertainty, flexibility to deal with unplanned contingencies, and an opportunity to exploit success. Although retaining a reserve is a practical and responsible principle in itself, a military leader should be careful not to apply this principle universally at all levels of command and in all environments. Examples from history and contemporary military operations demonstrate that the traditional employment and integration of reserves in accordance with established doctrine do not guarantee success. Blind compliance with retaining uncommitted forces to the rear, without a proper appreciation of the unique battlefield situation in regards to the principles of war and the tenets of Army operations, will often result in a less than optimum allocation of combat power within the area of operations.

Background and Context of the Problem

History records numerous engagements and battles in which the retention of an uncommitted force, positioned to the rear of the line of contact, contributed to and failed to contribute to the outcome of the battle. The examples below illustrate both the positive and negative aspects of retaining such a force.

The retention of uncommitted forces positioned to the rear of forward troops by Rommel during World War I provides an example of the value of retaining reserves in such a manner. Rommel depended heavily on his reserves during his defense of Mount Cosna in World War I. He comments that the reserves were urgently needed during the heavy fighting and that without them the position could not have been held. He was convinced, had he placed all his forces in the front lines, that his losses would have been greater and that his defense would have easily been defeated (Rommel 1979, 187).

Reserves were also decisively used by US commanders during the Battle of the Bulge (1944). General Brandenberger, Commander of the German Seventh Army, attributed his failure to advance farther, after initial penetrations of the American front, to the effectiveness of the American local reserves (MacDonald 1985, 159).

While Napoleonic victories at Marengo, and Borodino serve as additional examples of the importance of having reserves available to tip the scales (Dupuy 1984, 331), two of Napoleon's greatest defeats--Leipzig and Waterloo--were suffered even though he retained and employed reserves. Waterloo provides a classic example of how the retention and employment of reserves by both Wellington and Napoleon did not provide a decisive advantage to either opponent. In fact, Wellington's repositioning of two cavalry brigades from his left flank to his weakened center actually demonstrated

how forward committed units could effectively be repositioned during the heat of battle (Komroff 1964 74). The engagements at Quatre Bras and Ligny, which preceded Waterloo, provide excellent examples of how the retention of an uncommitted force, rather than their positioning or commitment forward, actually contributed to the defeat of Napoleon at Waterloo. If D'Erlon's 20,000 extra men had been positioned forward with Grouchy at Ligny or Ney at Quatre Bras, rather than idle in reserve with D'Erlon, it is likely that Blucher would have been annihilated at Ligny or Wellington crushed at Quatre Bras (Komroff, 1964, 37). As history would have it, D'Erlon's 20,000 extra men did not fire a shot all day, which allowed Wellington and Blucher both to withdraw and consolidate their efforts at Waterloo. Although many factors influence the outcome of engagements, these battles provide evidence that the retention and employment of a reserve does not guarantee success in itself.

History also records engagements and battles in which the decision not to retain an uncommitted force, positioned to the rear of the line of contact, contributed to and also failed to contribute to the outcome of the battle. The battle of Cannae provides a superb illustration of how the decision not to retain an uncommitted force, positioned to the rear, contributed to both the success and failure of a battle.

Rather than retain a large uncommitted force in reserve to the rear of his forward forces, Hannibal, strong with the confidence with which he inspired his soldiers, chose to extend his line instead, placing the bulk of his combat power on the flanks, rather than in depth. Rather than retain surplus forces in reserve, Varro, the Roman commander, chose instead to mass his forces in greater depth than usual in anticipation of penetrating Hannibal's center (fig. 1). Upon initial contact Hannibal's center gave slightly to allow

the Romans to expose their flanks. Just as the Romans began to celebrate their victory, the bulk of Hannibal's combat power, positioned on the flanks, enveloped the surprised Romans (Griess 1984, 57-59) (fig. 2).

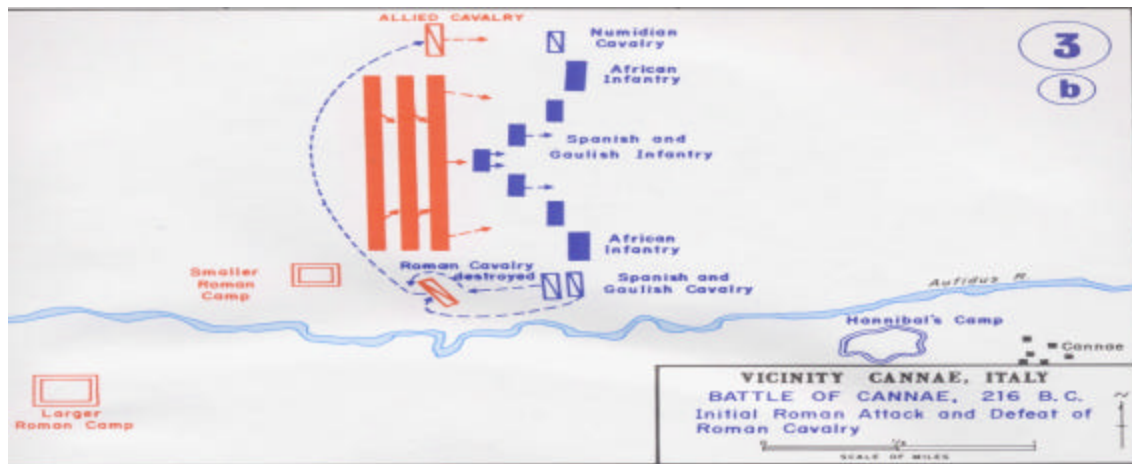


Figure 1. Hannibal's initial disposition prior to the Battle of Cannae which depicts the absence of a reserve positioned to the rear. Source: *Ancient and Medieval Warfare* (Griess 1984, 66).

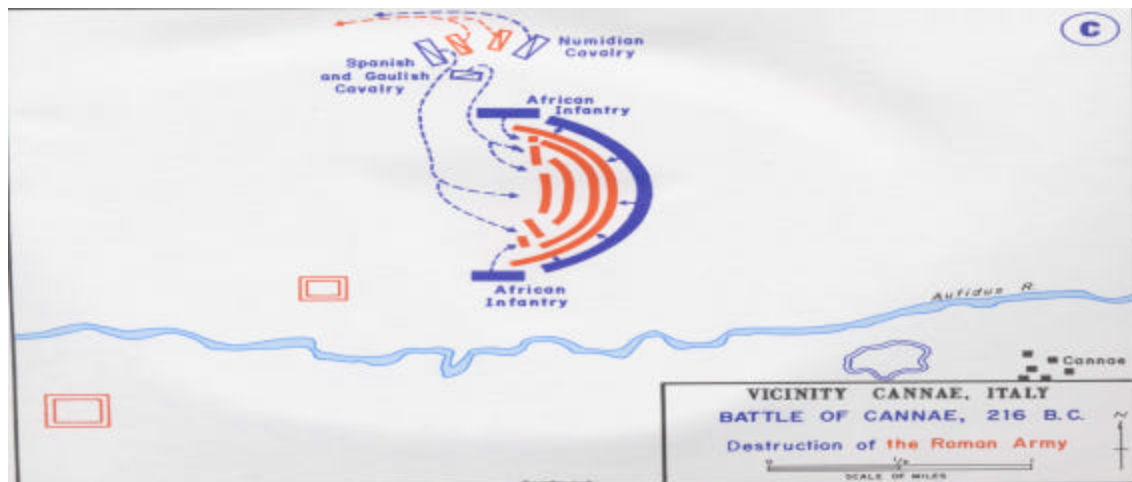


Figure 2. Hannibal's employment of forward positioned forces to envelop the Roman Army at the Battle of Cannae. Source: *Ancient and Medieval Warfare* (Griess 1984, 66).

Not having a subtracted reserve positioned to counter such envelopment severely restricted Varro's options, ultimately resulting in the destruction of his forces.

Hannibal's decision, however, to concentrate his combat power on the flanks in lieu of retaining a reserve positioned to the rear actually facilitated his counterattack that decimated Varro's forces (Du Picq 1987, 81).

Deciding whether or not to retain an uncommitted force, positioned to the rear of the line of contact, remains a question commanders must continue to answer today. For example, during a Joint Readiness Training Center (JRTC) heavy and light rotation, a defending battalion task force retained its armor force as an uncommitted reserve positioned to the rear of the line of contact rather than augmenting its infantry companies defending forward. Shortly after contact one of the defending infantry companies, without the benefit of forward positioned armor forces, was unable to mass sufficient combat power at the decisive point in order to prevent a penetration. Once committed, the armor company team reserve maneuvered directly into the strength of the opposing force's (OPFOR) hastily established defensive position and was quickly destroyed.

The after action review (AAR) revealed three points: (1) Had the tanks been positioned forward with the infantry company, instead of positioned to the rear of the forward positions, friendly forces (BLUFOR) would have had more favorable combat ratios with which to prevent a penetration in the first place; (2) The commitment of the reserve after the OPFOR penetration resulted in a sequential piecemealing of BLUFOR combat power, thus creating more favorable combat ratios for the OPFOR; and (3) The BLUFOR reserve actually attacked into the strength of the OPFOR, which had established a hasty defense upon penetration of the forward BLUFOR positions.

Many tactical level commanders have experienced similar situations in combat and training and have had to ask the following question: How can I best allocate my available combat power? Should uncommitted combat power be retained in the rear to counter unforeseen contingencies or positioned forward to provide more favorable combat ratios at the initial point of contact?

This dilemma is not just confined to a specific combat training center or a tactical unit. In fact, the author has frequently experienced and observed this problem over twenty years of military service. The author first experienced this problem while serving as a tank platoon leader in an armored and mechanized task force during four rotations at the Combined Arms Maneuver Training Center (CMTC). Only once during those four rotations did the reserve contribute to the success of the battle. In the other three rotations, which consisted of three to four missions each, uncommitted reserves positioned to the rear had no impact on the battle. The AARs revealed many actions that contributed to the ineffective employment and integration of reserves. The inability to mass the effects of the reserve at the decisive point and time was the underlying issue for the majority of AARs. Contributing factors to this issue included: unclear objectives for the reserve, inability of the reserve to retain the element of surprise, inability to secure and protect the reserve prior to and after commitment, inability of the reserve to maneuver to the designated location, reactive rather than proactive use of the reserve, complicated contingency plans for commitment of the reserve, and an inability to communicate with the reserve.

While augmenting both BLUFOR and OPFOR units during four JRTC rotations and while serving as the JRTC OPFOR Mechanized Infantry Battalion (MIBN)

commander during twelve rotations, the author personally witnessed similar trends. The author continued to observe these trends while serving as an observer-controller (O-C) during twenty rotations at the National Training Center (NTC) and as a battalion advisor of a mechanized infantry battalion.

These trends are not only restricted to the combat training centers, they are also revealed in simulation training and in the military academic setting. Perceptions from simulations, as observed by battle command training program (BCTP) trainers, indicate that units do not adequately plan for commitment of the reserve to maintain the integrity of the defense or to seize the initiative from the enemy (CALL 1995. II-13).

Observations from Small Group Instructors (SGI) teaching at the Infantry and Armor Captains Career Courses indicate that their students do not tailor the composition and disposition of the reserve to the tactical situation presented. In planning defensive operations they routinely retain uncommitted forces positioned to the rear to serve as a reserve, regardless of the tactical situation. The author also observed similar trends while serving as a small group instructor (SGI) for the Armor Officers Advanced Course and division chief for the Armor Officer Basic Course.

Trends from the Combat Training Centers indicate that brigade and battalions fail to effectively plan, synchronize, and execute the actions of their reserves in support of tactical operations (CALL 1996, N57-58), (CALL 1998, N-179-181).

Brigades and battalions routinely retain and employ reserves merely to comply with a doctrinal precept, without a detailed assessment of the current tactical situation in respect to their mission, enemy capabilities, effects of the terrain, and friendly capabilities. This often results in a less than optimal allocation of available combat power during course of

action development and a lack of synchronization during course of action analysis. As a result, the full potential combat power of a brigade combat team or battalion task force is not committed at the decisive point and time on the battlefield in order to exploit success or prevent defeat.

The Research Question

Given the historical performance of tactical reserves and the current assessment of their employment and integration at the combat training centers, during simulations and in an academic setting, further examination is necessary to clearly identify and analyze the specific challenges regarding their retention and employment at the tactical level. US Army doctrine states that reserves preserve a commander's flexibility and provide a hedge against uncertainty (FM 3-0 2001, 8-10). Doctrine also states that a commander should withhold a portion of his force from action so as to be available for commitment at the decisive moment. Doctrine goes on to describe a reserve as a portion of a body of troops which is kept to the rear, or withheld from action at the beginning of an engagement with the primary purpose of retaining flexibility through offensive action (FM 101-5-1 1997, 1-132).

The purpose of this paper is to examine the doctrinal principles regarding the retention and employment of reserves. The primary question to be answered from this research is: Is doctrine concerning the retention and employment of reserves at the tactical level efficient and effective?

Subordinate questions will examine the efficiency and effectiveness of such doctrine using the principles of war and the tenets of army operations as the benchmark. The three subordinate questions to be answered through this research are: Should

commanders retain a reserve? If retained, should reserves be kept to the rear? Must the reserve be comprised of forces uncommitted to any other action?

Assumptions

There are three assumptions relevant to this research. The first assumption is that tactical commanders in the future will continue to face the dilemma of whether to retain a reserve or not, and, if retained, how best to position and employ a reserve in order to maximize the effectiveness and efficiency of available combat power.

The second assumption is that the principles of war and the tenets of army operations will provide an acceptable standard with which to analyze the effectiveness and efficiency of doctrine concerning the retention and employment of reserves at the tactical level. The final assumption is that JANUS provides as realistic a model of the battlefield at the brigade and below as can be found in the model & simulation world.

Definition of Terms

As with any professional organization, the proliferation of terms and definitions associated with military operations is extensive. The author has chosen to expound upon the most pertinent and often used terms of this study. Field Manual 101-5-1, *Operational Terms and Graphics* (1997), can be referenced for the majority of definitions of key terms and symbols not addressed in this section. Unless otherwise noted, the following operational terms and definitions are from FM 101-5-1.

BLUFOR. A term used to identify friendly units that are participating in a training exercise. The size of the unit may vary from an individual soldier to an entire army and is not specific to any specialty or branch of service (author's definition).

Combat Power. The total means of destructive and/or disruptive force which a military unit/formation can apply against the opponent at a given time. A combination of the effects of maneuver, firepower, protection, and leadership.

Committed Force. A force in contact with an enemy or deployed on a specific mission or course of action which precludes its employment elsewhere.

Course of Action. Any sequence of acts that an individual or a unit may follow. A possible plan open to an individual or a commander that would accomplish or is related to accomplishment of the mission. A feasible way to accomplish a task or mission that follows the guidance given, will not result in undue damage or risk to the command, and is noticeably different from other actions being considered.

Doctrine. Fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application.

Economy of Force. The allocation of minimum-essential combat capability or strength to secondary efforts so that forces may be concentrated in the area where a decision is sought. Economy of force is a principle of war and a condition of tactical operations. It is not used to describe a mission.

Forward Defense. A choice of defensive maneuver where the majority of a unit's combat power is deployed in a generally linear manner along or near the forward edge of the battle area (FEBA). Security, reconnaissance, and counter reconnaissance forces are employed forward of the FEBA. The objective of this choice of maneuver is to destroy the enemy in vicinity of the FEBA. Counterattacks forward of the defending forces are critical to this choice of maneuver. The perimeter defense is a type of forward defense.

In-depth Defense. A choice of defensive maneuver that forces the enemy to attack through a series of mutually supporting friendly positions, causing the enemy's mass to be expended and his supporting forces to be unable to focus. This choice of maneuver reduces the risk of an enemy penetration and allows the enemy to gain terrain to wear down and overextend his ability to sustain his attack. In-depth defensive usually culminates in a friendly counterattack to complete the destruction of the enemy and regain lost terrain.

Line of Contact. A general trace delineating the location where two opposing forces are engaged.

Maneuver. Employment of forces on the battlefield through movement of combat forces in relation to the enemy, supported by fire or fire potential from all sources, to gain potential advantage from which to destroy or threaten destruction of the enemy to accomplish the mission.

Mass. To concentrate or bring together fires, as to mass fires of multiple weapons or units.

Objective. The clearly defined, decisive, and attainable aims toward which every military operation should be directed.

Offensive. A principle of war by which a military force achieves results by acting with initiative, employing fire and movement, and sustaining freedom of maneuver and action while causing an enemy to be reactive.

OPFOR. A term used to identify enemy units that are participating in a training exercise. The size of the unit may vary from an individual soldier to an entire army and is not specific to any specialty or branch of service (author's definition).

Principles of War. Principles that guide war fighting at the strategic, operational, and tactical levels. They are the enduring bedrock of US military doctrine.

Reserve. Portion of a body of troops which is kept to the rear, or withheld from action at the beginning of an engagement, available for a decisive movement. That portion of a force withheld from action or uncommitted to a specific course of action, so as to be available for commitment at the decisive moment. Its primary purpose is to retain flexibility through offensive action.

Security. Measures taken by a military unit, an activity or installation to protect itself against all acts designed to, or that may, impair its effectiveness.

Simplicity. One of the nine principles of war. The preparation and execution of clear, uncomplicated, and concise orders and plans to facilitate mission execution in the stress, fatigue, and fog of war.

Surprise. One of the nine principles of war. The enemy is attacked at a time or place, or in a manner for which he is unprepared and which he did not expect.

Tactical Level of War. The level at which battles and engagements are planned and executed to accomplish military objectives assigned to tactical units or task forces. Activities at this level focus on the ordered arrangement and maneuver of combat elements in relation to each other and to the enemy to achieve combat objectives

Uncommitted Force. A force that is not in contact with an enemy and is not already assigned a specific mission or course of action which would preclude its use elsewhere.

Unity of Command. One of the nine principles of war. All forces operate under one responsible commander who possesses requisite authority to direct forces in pursuit of a common unified purpose.

Limitations

There are two limitations to this study, both involving the collection of data for this research. The first limitation involves the collection of primary source material from the combat training centers. Current military policy prohibits the release of unit specific after action reviews outside of the participating unit. However, secondary source information regarding overall trends, both positive and negative, is captured and released in various combat training Center for Army Lessons Learned (CALL) publications. As a result, this aspect of the research will have to rely on secondary sources, which may not provide the details of the conditions and environment that influenced the actual retention and employment of a reserve.

The second limitation involves the collection of combat simulation results that are not classified for release. As a result, the simulation analysis aspect of this research will be limited to unclassified simulation results. Another limitation of the simulation analysis is that it will not take the human dimension of combat or fog of war into account. Although this research will be limited by such factors, the results of this research could serve as a reference and provide valuable information for the conduct of future classified simulations.

Delimitations

The author has chosen to delimit this research in three areas. The first involves the level of war. The purpose of delimiting this research to the tactical level of war is

twofold: the majority of existing research is focused at the operational and strategic levels; and the majority of combat commanders that could benefit from this research operate at the tactical level.

The second delimitation is the size of tactical unit to be researched. The historical aspect of the research will focus on the retention and employment of reserves at and above the battalion level. The reason for such a delimitation is that FM 3-90, *Tactics*, recognizes the battalion level as the lowest tactical echelon at which reserves are retained. The doctrinal and simulation analysis of the research will further be delimited to a three company battalion. The purpose for this delimitation is to more relevantly portray the army's current organization structure of three rather than four company battalions.

The final delimitation involves the spectrum of operations and environment to be researched. This research will focus on the retention and employment of reserves in the defense. The purpose for this delimitation is the amount of combat power associated with defensive operations. Assuming a defensive posture generally indicates a less than favorable correlation of forces in relation to the enemy. As a result, the allocation of combat power is of greater consequence and concern for the commander in the defense.

Significance of the Study

As evidenced by historical battlefield accounts and current assessments from the combat training centers, the retention and employment of reserves continue to challenge tactical level commanders. This study will confirm or deny the efficiency and effectiveness of doctrine concerning the retention and employment of reserves, and assist in determining whether the problem of employing and integrating reserves is of a doctrinal nature or training nature. Identifying the nature of the problem is essential prior

to developing and implementing actions to improve the efficiency and effectiveness of reserves in support of combat operations.

If doctrine is the nature of the problem this study will identify the shortcomings and provide solutions and recommendations to improve the efficiency and effectiveness of reserves. If doctrine is found to be efficient and effective, this study will serve to support existing doctrine and provide valuable information with which to analyze the efficiency and effectiveness of training leaders to employ and integrate reserves at the tactical level.

Experienced military commanders, as well as military historians, will agree that committing a reserve means one of two things: the fight has gone well and it is time to exploit success; or the fight has not gone as expected and the reserve remains the only force available to influence the fight. In either case the ineffective or inefficient allocation of combat power could very well determine the outcome of the battle.

The bottom line remains that future tactical commanders must be prepared to effectively and efficiently allocate and employ combat power to its fullest potential. The mission and the lives of their soldiers depend on their decisions and action. These findings, along with established literature outlined in the following chapter, will prove valuable in presenting the challenges of retaining and employing reserves in support of defensive operations at the tactical level.

CHAPTER 2

LITERATURE REVIEW

The review of literature is grouped according to its literary period. The three literary periods are: military classics written prior to the nineteenth century; military classics written in the nineteenth century; and historical military accounts, doctrine and assessments after the nineteenth century.

The Roots of Strategy, Book 1, edited by Brigadier General Thomas R. Phillips, contains five of the most influential military classics written prior to the nineteenth century: *The Art of War* by Sun Tzu, 500 B.C.; *The Military Institution of the Romans* by Vegetius, A.D. 390; *My Reveries Upon the Art of War* by Marshal Maurice de Saxe, 1732; *The Instructions of Frederick the Great for His Generals*, 1747; and *The Military Maxims of Napoleon*, 1827.

The Art of War, the oldest military work in existence, provides timeless principles and fundamentals of warfare. These ancient principles and fundamentals of warfare are easily adapted to the study and analysis of modern warfare. Sun Tzu's teachings provide valuable insights into the conduct of war. His views on tactical dispositions, weak and strong points, and maneuvering provide valuable insights regarding the concentration or division of combat power.

The Military Institutions of the Romans is a compilation of the military wisdom and customs of the Romans. Vegetius's work is divided into three books. Book III, *Dispositions for Action*, directly addresses the employment and integration of reserves by the Lacedemonians, Carthaginians, and Romans. Vegetius's work provides an early insight as to the purpose of reserves and the tasks associated with their employment.

My Reveries Upon the Art of War is one of the great links in military development between Vegetius and Napoleon. Many of Maurice de Saxe's propositions, seen as absurd in his time, are commonplace in the military today. Saxe provides instruction to the modern military student and assists in the understanding of the evolution of armies. The evolution of the tactical reserve, in respect to task and purpose, is further analyzed. Saxe specifically addresses the offensive application and decisive potential of the reserve at the tactical level.

The Instructions of Frederick the Great for His Generals also recognizes the decisive nature of reserves and emphasizes their need for mobility. Frederick the Great provides instruction to his generals on the employment of a cavalry reserve. Such a reserve required the agility to respond to any flank where the enemy had decided to make his greatest effort to penetrate. Frederick's primary focus was offensive employment of the reserves, but he also dealt with defensive options. He stipulated the constitution of two large reserves of infantry, designed to respond to penetrations of the defensive line. Cavalry was positioned in a third line to conduct flanking maneuvers against the attacking enemy. The vast difference in mobility required for offensive and defensive reactions drove Frederick to separate the functions of forces initially withheld from battle between an offensively oriented cavalry and an infantry "reserve" to reinforce the defensive efforts of his forward line (Borden 1995, 5).

The Military Maxims of Napoleon provides a fairly complete exposition of the grand principles of war according to Napoleon. Napoleon employed a variety of reserves, but there is no indication that he intended that these forces be withheld from battle other than temporarily. Napoleon repeatedly stressed the importance of massing

the complete combat potential available to a commander. According to Napoleon, withholding uncommitted forces for unforeseen contingencies was not a typical purpose for reserves. The strength of reserves resided in their planned commitment to support combined operations rather than an unplanned piecemeal commitment.

The Roots of Strategy: Book 2, contains three of the most influential military classics written in the nineteenth century: *Battle Studies* by du Picq, *Principles of War* by Clausewitz, and *Art of War* by Jomini.

Chapter II of *Battle Studies* provides an excellent review of the tactical evolution of reserves with regard to the Greeks and Romans. Du Picq's analysis of the Battle of Cannae and the Battle of Pharsalus provides examples of how commanders allocated their combat power successfully when facing numerically superior forces (Du Picq 1987, 81). Du Picq recognizes that not all troops are immediately engaged in battle and that victory belongs to the commander who knows how to keep his troops in good order, to hold them, and to direct them (Du Picq 1987,127). He also believes that the concept of maintaining a reserve should be applied downward at each echelon. (Du Picq 1987, 194).

Chapter II of the *Principles of War* provides general principles concerning the tactics and theory of combat. Clausewitz provides guidance on the allocation of reserves, their composition and disposition, their commitment, and their purpose. He stresses the importance of maintaining an active defensive and seeking opportunities to attack the enemy rather than remaining passive (Clausewitz 1987, 319). In his book *On War*, Clausewitz concurs with the fundamental principle of retaining and exercising the use of a reserve, but he acknowledges that there are situations that do not warrant the retention of a reserve (Clausewitz 1976, 211).

Although many military writers have labeled Jomini's concept of war as being restricted in scope, *The Art of War* provides valuable insights concerning the disposition and composition of a reserve at the tactical level (Jomini 1987, 421). Jomini recognized that the reserve played an important part in modern warfare and favored strong reserves. He believed that they should always be used and applied at every echelon of command. Jomini saw a direct correlation between knowledge of the enemy and the size of the reserve: the less the knowledge of the enemy, the greater the reserve. In his book *Armored Warfare*, J. F. C. Fuller takes a similar position as Jomini, stating that the value of reserves cannot be exaggerated.

Attacks by Field Marshall Erwin Rommel provides a keen insight into the mind and character of an experienced combat leader. His firsthand accounts of battle during the First World War provide valuable lessons concerning the tactical employment and integration of reserves. In the defense of Mount Cosna, Rommel credits the retention of a strong reserve and integration of reserves during heavy fighting as instrumental to the success of the Mount Cosna defense. He further states that it would have been a mistake to put everything in the front line of nests.

A Time for Trumpets: The Untold Story of the Battle of the Bulge provides numerous accounts of the value of retaining and employing reserves in the defense. It gives the impression that the retention and employment of reserves during World War II was a very common practice at all levels of command.

The Evolution of US Army Tactical Doctrine, 1946-76, and *From Active Defense to AirLand Battle: The Development of Army Doctrine, 1973-1982*, provide insights into the development and evolution of Army tactical doctrine. These publications provide

contrasting views on the employment and integration of a reserve. Positioning the majority of the forces forward while maintaining a reserve rarely larger than one-third of the force is contrasted against maintaining the bulk of the force to the rear while the remainder occupies the forward defensive position.

The 1976 version of FM 100-5, *Operations*, is credited with breaking new ground concerning the elimination of the subtracted reserve. FM 100-5 asserted that the tactical defense could be constructed in the same manner as the strategic defense, that is, there need not be a subtracted reserve because all forces not irrevocably engaged were in reserve. The abandonment of the traditional disposition in the defense of “two up--one back” received much criticism from the traditionalists (Romjue 1984, 17).

Monographs by Gregory J. Borden “True Tactical Reserves in Striking Force Operations: Pilfering of Combat Power at the Line of Contact;” by Mark L. Hanna “Employment of Reserves in the Operational Defense;” by Terry Bullington “Considerations for the Organization and Employment of an Operational Reserve;” and by James M. Milano “Operational Reserves: Still Valid after all These Years?” provide valuable insights as to the historical application and analysis of reserves in the twentieth century. Although most of these monographs focus on the retention and employment of reserves at the operational level, they provide valuable insights into the advantages and disadvantages of retaining and employing reserves that can be applied at the tactical level of war as well.

“True Tactical Reserves in Striking Force Operations: Pilfering of Combat Power at the Line of Contact” considers the utility of constituting both a striking force and a supplemental tactical reserve when conducting a mobile defense. It considers the

conclusions of a 1993 Combined Arms Command (CAC) study of the mobile defense that recommended that both an offensively oriented striking force and a reserve be maintained. This monograph considered whether withholding two maneuver forces from the initial battle at the line of contact reduces or increases the risk of defeat in the mobile defense.

This monograph examines the reserve in classical theory and practice to establish the fundamental nature of tactical reserves. It then explores the evolution of the practice of withholding forces from the initial battle in the modern era, with particular emphasis on American doctrine. It offers two historical case studies in which numerically inferior forces conducted mobile defenses: the German Army Group Don at the Donetz River in 1943 and the Israeli Northern Command on the Golan Heights in 1973. These case studies consider commanders' ability to withhold forces from the line of contact when their forces have insufficient combat power to execute an area defense.

Finally, it presents the mobile defense doctrine presented in the 1993 edition of FM 100-5, along with the CAC study's conclusions and rationale, which directed revision of the primary doctrine in subordinate manuals. These modern interpretations are then analyzed in the light of the historical framework provided. Conclusions address the validity of the striking forces concept and the utility of a supplemental, or "true," reserve in seeking the destruction of the enemy main body in the high risk mobile defense (Borden 1995, ii).

"Employment of Reserves in the Operational Defense" is an analysis of how to employ operational reserves to counter an enemy operational offensive and developing penetration. The study addresses the questions of whether reserves should be employed

as they become available to limit and then reduce the enemy penetration; or whether they should be marshaled and built up, allowing the penetration to continue, and then committed in a decisive counterstroke. Classical theory concerning defensive operational art and employment of reserves is analyzed, including works of Clausewitz, Jomini, and Sun Tzu. Historical analysis compares and contrasts employment of operational reserves by the Germans in the 1943 Kharkov campaign and the Allies in the 1944 Ardennes campaign. Finally, AirLand Battle doctrine is analyzed in light of conclusions drawn from the theoretical and historical analysis.

The study concludes that the optimum employment of operational reserves involves allowing the penetration to develop while marshaling and concentrating one's reserves for a decisive counterstroke against the flanks and rear of successive portions of the enemy forces. Theoretical and historical analysis supports this conclusion. Historical analysis also shows that many factors may be present to mitigate this theoretically correct employment. These include terrain, relative tactical ability, strategic goals, risk, command structure, and command style of the operational commander. The study further concludes that AirLand Battle doctrine for the operational defense is well in line with the theoretical and historical conclusions (Hanna 1986, iii).

“Considerations for the Organization and Employment of an Operational Reserve” is an analysis of the operational reserve. The size, composition, positioning, and political and geographical factors that affect the employment of an operational reserve are discussed. Historical experiences in World War II and current doctrine are considered in the analysis of the operational commander's reserve force.

The study indicates that the current force structure of the US Army and ability to deploy forces to a theater directly affect the employment of an operational-level reserve. Moreover, the operational commander's ability to affect the battle is directly linked to an operational reserve that can maneuver to achieve the desired operational objectives. The size and composition of the operational reserve are less important than the fact that an operational reserve is constituted. The study concludes that an operational reserve is critical to ensure the success of operations and campaigns in a theater or operation. Suggestions are offered for the organization and employment of the operational reserve force (Bullington 1986, iii).

Regarding current doctrinal definitions of operational reserves, the monograph suggests that more precision is needed. Operational reserves must be viewed differently from tactical reserves. As Clausewitz discussed, while the tactical commander designates a reserve to prolong his battle and react to unanticipated enemy actions, and thereby commits his forces sequentially, the operational commander must strive for the simultaneous commitment of overwhelming force. This will preclude the creation of tactical liabilities as a result of withholding forces in operational reserves.

Finally, operational artists must be willing to rely on generating operational reserves from less-threatened areas, accepting prudent risks, and ensuring that battles and engagements are properly resourced and planned to create the tactical successes that produce operational success. By reducing uncertainty to an absolute minimum, commanders must be able to correctly anticipate the flow of the campaign to ensure the maximum concentration of decisive combat capability (Milano 1992, iii)

“The Operational Reserve: What Should It Be Used For?” discusses the operational reserve and the roles in which it can be employed in a Central European war. It examines operational theory and its discussion of the reserve. It then briefly reviews the missions specified for the reserve in tactical level doctrine. Using that as a basis, this monograph studies the differences between a tactical and operational reserve. It then suggests other missions that can be assigned to an operational reserve that would meet operational and strategic requirements. Included in the discussion is an assessment of the impact of nuclear weapons and future technology on the use of the reserve. The author suggests two methods for employing the reserve and applies them to historical case studies. A means to assess the utility of the model and, by extension, the use of the reserves both in the past and in the future is offered.

The monograph concludes that the operational reserve should be used in an offensive or counterattack manner. It also states that its use is a one time only affair and that, if employed, it should be in a manner that will achieve or set the precursor for achievement of a strategic goal. It also concludes that using the operational reserve defensively risks loss of the campaign and the theater (Turner 1988, iii).

“Operational Reserves in AFCENT: Another Look” examines the key issues governing the creation and employment of operational reserves by AFCENT in its defensive against a no-notice or short-notice Warsaw Pact attack. The theoretical notion of operational reserves as presented by FM 100-5 provides the background for a historical analysis of how operational reserves were used in three World War II defensive campaigns.

The primary conclusion of this study is that for AFCENT, the cost of creating a large operational reserve at the expense of its subordinate commands exceeds the benefits. In fact, the concept of a reserve at the operational level appears to be fundamentally different than the concept of a reserve at the tactical level.

A combination of several factors, some of the more critical of which are terrain, the political guideline of forward defense, and a defense organized around somewhat disparate national corps, does not lend itself to the employment of a large centrally controlled operational reserve. The author argues that AFCENT should not attempt to maintain operational flexibility through the use of a large operational reserve. Rather, it should maintain its flexibility through the proper sequencing of engagements and battles, the acceptance of risk, and the allocation of critical resources, such as air, logistics, and reinforcements (Eckert 1986, iii).

Other literature that influenced the military establishment during this period includes U.S. Army operational and tactical field manuals and regulations. The series of FM 100-5, *Operations*, from 1905 through 1986, and FM 101-5-1, *Operational Terms and Graphics*, from 1980 through 1997 provide doctrinal definitions, as well as tactics, techniques, and procedures concerning the employment and integration of tactical reserves.

Recently published FM 3-0, *Operations*, which replaces FM 100-5, and FM 3-90, *Tactics*, provides the current military doctrine, tactics, techniques, and procedures for the employment and integration of tactical level reserves. FM 3-0 recognizes that the initial strength and location of reserves vary according to the potential mission, form of maneuver, possible enemy actions, and degree of uncertainty. In addressing

counterattacks, FM 3-0 states that commanders use reserves, lightly committed forward elements, or specifically assigned forces.

FM 3-90 makes a distinction between lower-echelon commander and senior commander employment of reserves. Lower-echelon commanders primarily use reserves to conduct local counterattacks to restore their defensive integrity or to exploit an opportunity, while senior commanders use reserves to seize the initiative from the enemy when the opportunity presents itself. Secondary tasks include reinforcing the defense of committed forces, blocking or containing enemy forces that penetrate friendly defensive positions, relieving depleted units and providing continuous operations, reacting to threats directed against the friendly force's sustainment effort, extending the flanks of a defending unit to prevent envelopment, and covering a retrograde movement.

Both manuals state that the reserves are essential to preserve flexibility and provide a hedge against uncertainty. They also clearly recognize that reserves are not committed forces. If committed, other reserves should immediately be designated from uncommitted forces or forces in less threatened areas.

CALL newsletters and trend compendiums provide a compilation of repeated trends, both positive and negative, along with their associated techniques and procedures. A review of past and present CALL publications indicate brigade combat teams (BCTs) continually exercise poor planning in the allocation and employment of reserve forces. BCT staffs do not fully consider the criteria involved in planning for and committing the reserve to maximize its effects. As a result reserves are rarely committed at the decisive point and time in order to achieve its task and purpose, thus reducing the potential combat power of the brigade. In addition, brigades often do not even designate a reserve even

when sufficient combat power is available. When designated though, there is usually no thought as to re-designation of another reserve force once the original reserve is committed.

CALL Newsletter 00-1 provides observations on Force XXI and the three-company battalion. An observation from this newsletter is that the three-company organization does not allow the task force commander to effectively use a company as a reserve or counterattack force. The article concludes that if a task force commander designates a company as a reserve, he neutralizes one-third of his combat power.

Existing literature, past and present, overwhelmingly supports the concept of retaining a reserve for the purpose of providing flexibility through offensive action. Literature also asserts that a true reserve consists of only uncommitted forces and that the reserve should be kept to the rear or withheld from forward committed forces until its decisive commitment. Once committed, it is essential to designate another reserve to retain flexibility. Although a reserve is viewed as a practical and necessary allocation of combat power, there is general consensus that a commander's plan should be able to succeed without using his reserves.

CHAPTER 3

RESEARCH METHODOLOGY

The goal of this study, as was previously stated, is to determine if current doctrine concerning the retention and employment of reserves is efficient and effective at the tactical level. In answering the research question, this study will determine if commanders should retain reserves, and if retained, should reserves be kept to the rear or positioned forward. Whether reserves must be free from commitment or if committed forces can fulfill the role of a reserve will also be addressed. The study is conducted through a formative and summative evaluation of the historical evolution, application and theory of tactical reserves from past to present. The historical evolution, application, and theoretical findings will then be analyzed against the current principles of war, and the tenets of Army operations to determine if doctrine concerning the retention and employment of reserves is efficient and effective.

To assist in this analysis two courses of action are presented from which to compare and contrast the effectiveness and efficiency of retaining a reserve as prescribed by doctrine. Upon completion of the doctrinal analysis a simulation using the same courses of action will be conducted to substantiate or refute the historical and doctrinal findings. An all-encompassing analysis of the historical evolution and application of reserves, coupled with the theoretical, doctrinal, and simulated findings, will then be conducted to determine if doctrine concerning the retention and employment of reserves at the tactical level is both effective and efficient.

This methodology is basically deductive in nature. The evaluation of the historical evolution and application of reserves provides a base from which to understand

how doctrine concerning the retention and employment of reserves was developed.

These doctrinal deductions are then applied against the current application of reserves to determine if they are efficient and effective in today's tactical environment. The format of this paper is derived from this deductive methodology.

Chapter 1 introduces the topic, describes its general background, provides definitions of key terms, and states the limitations and delimitations of the study. This chapter also establishes the primary and subordinate research questions and explains the significance of the study.

Chapter 2 is an extensive literature review. It summarizes comprehensively and evaluates briefly the existing research literature and doctrinal publications concerning the retention and employment of reserves. This chapter then examines the contributions of notable military theorists and writers, such as Vegetious, Saxe, du Picq, Clausewitz, Jomini, and Fuller, concerning their concepts and views regarding the retention and employment of tactical reserves. The thoughts and practices of proven combat commanders, such as Alexander, Frederick the Great, Napoleon, and Field Marshall Erwin Rommel, supplement the findings of the theorists.

Chapter 3 provides the research methodology and techniques applied to examine the stated problem. It explains how the research moved, step by step, to answer all the research questions. It also explains the selection of the courses of action for analysis and the conduct of the simulation, with an explanation of the strengths and weakness of the chosen methodology.

Chapter 4 consists of the historical evolution, application, and theoretical analysis

of reserves. It presents, explains, analyzes, and interprets the evidence produced from the evaluation of historical evidence. This chapter examines the genesis of tactical reserves, their intended purpose, and their doctrinal development.

Chapter 5 consists of a doctrinal analysis concerning the effectiveness and efficiency of reserves at the tactical level. It presents, explains, analyzes, and interprets the evidence collected. A doctrinal analysis using the principles of war and tenets of Army operations is then presented through the use of two courses of action to determine the doctrinal effectiveness and efficiency of each course of action. Both courses of action portray a three company armor battalion in the defense. The battalion is conducting an area defense with companies in battle positions with the task to destroy an enemy brigade in order to prevent penetration of their rear boundary.

The enemy brigade attacks in two echelons with the task to destroy the defending battalion in order to facilitate the forward passage of follow on forces. The first echelon consists of two tank battalions attacking abreast to destroy forward positioned companies defending from the battle positions. The second echelon consists of one tank battalion following in the north with the task to complete the destruction of the defending battalion in order to facilitate the forward passage of follow-on forces.

Course of action one (COA 1) depicts three companies defending forward from battle positions. The task of the forward companies is to destroy the enemy brigade in order to prevent enemy penetration of the defending unit's rear boundary. The flank companies are given be prepared missions to counterattack forward of the battle positions in order to complete destruction of the brigade, reinforce other company battle positions

in order to complete destruction of the brigade, and block penetrations of the battle positions in order to prevent penetration of the defending unit's rear boundary.

COA 2 depicts two companies defending forward from battle positions with one company in reserve. The task of the forward companies is to destroy the brigade in order to prevent penetration of their rear boundary. A company reserve initially positions to the rear of the battle positions prepared to counterattack forward of the battle positions in order to complete the destruction of the enemy brigade, reinforce the company battle positions in order to complete the destruction of the enemy brigade, and or block penetrations of the battle positions in order to prevent penetration of their rear boundary.

Each COA will be analyzed using the principles of war and tenets of Army operations to determine their effectiveness and efficiency with and without the retention of an uncommitted reserve. These findings, coupled with the historical evolution and application of reserves, will provide the means from which to compare and contrast with the simulation analysis.

Chapter 6 consists of a simulated analysis concerning the effectiveness and efficiency of reserves at the tactical level. It presents, explains, analyzes, and interprets the evidence collected from the results of the simulation. These results are then compared and contrasted with the historical and doctrinal analysis findings to answer the research question of whether doctrine concerning the retention and employment of reserves is effective and efficient at the tactical level.

Chapter 7 presents the conclusions of this research and provides recommendations for change. It also provides recommended directions for future study and research applicable to employment of reserves.

The primary weakness in this methodology concerns the formative analysis of the assessment of retaining and employing reserves. In the absence of clear and complete evidence regarding the decision to retain and employ reserves the author relies on his experience and that of other subject matter experts to fill the voids. To further mitigate this weakness the author has carefully selected evidence that is most clear and complete.

Another weakness in this methodology is that it relies on the accuracy and completeness of summative evaluations concerning the historical retention and employment of reserves. To counter this weakness the author has carefully selected examples that span different time periods, peoples and places.

The inherent weakness of the doctrinal analysis is the subjectivity involved in assessing the advantages and disadvantages of each course of action. Acknowledging the subjective nature of the assessment, the author has attempted to ensure each course of action received a fair assessment of its advantages and disadvantages.

The inherent weakness of the simulation analysis regards the lack of a human dimension and ability to portray the fog of war. Being the effect of morale and fog of war does not exist in a simulation, this weakness has been accepted, given it will not provide an advantage or disadvantage to either combatant.

To mitigate the weakness of each respective analysis the author conducts an all-encompassing analysis of the historical, doctrinal, and simulated findings. Conducting an analysis of the historical findings, coupled with the art of the doctrinal analysis and the science of the simulated analysis, will significantly reduce the level of bias in this study.

CHAPTER 4

HISTORICAL ANALYSIS

Before analyzing whether doctrine concerning the retention and employment of reserves at the tactical level is efficient and effective, one must first gain an understanding of what influenced the development and use of reserves. How did reserves come about? What were the historical influences that shaped the development and employment of reserves to the doctrinally accepted definition and practice of today? To gain such understanding, a return to the time of the Greeks with the development of the phalanx is a must.

With the abandonment of individual, heroic combat in favor of fighting in close formation, the Greeks developed the phalanx. The phalanx, described as “a body of infantry drawn up in close order in several ranks which are also close together,” was the formation of choice to provide a decisive advantage during combat (Griess 1984, 4).

The Greek hoplite, being the fundamental fighting element of the phalanx, was equipped to fight straight ahead in one direction. The strength of the phalanx, therefore, remained in the ability of its members to maintain a continuous solid line. Once ruptured the integrity of the phalanx was in jeopardy as the formation was fragmented, which allowed the opposition to mass its effects against the vulnerable flanks and rear of the phalanx.

As a result, a general's first concern was to make his front at least equal in length to that of his enemy's in order to prevent an exposed flank. Such actions generally resulted in the establishment of two blocks of hoplites, each drawn up eight deep, which met face to face and pushed against the other. During the push forward the natural

tendency of the hoplites was to drift right to avoid exposing their unshielded right sides (Griess 1984, 5). Such actions often exposed the left flanks of each formation, making them vulnerable to attack. In many cases, battles resulted in each force's right defeating its opponent's left; victory or defeat then depended upon which force could recover soon enough to bring its right around to the flank or rear of the opponent's right.

The advantage laid then with the force that was better trained and drilled in repositioning its forces more rapidly. To counter such an advantage a less trained and equipped opponent could assume an economy of force posture in the center and to the right of his formation while massing his forces on the left. Such a tactic would provide an overwhelming advantage in firepower against the right element of the opponent, which negated the advantage in maneuverability gained through training and drill.

Although such a tactic proved to be successful, as demonstrated by Epaminondas at the Battle of Leuctra, 371 B.C., it also had its disadvantages (Griess 1984, 15-16). A significant disadvantage of this massing on the left tactic was that the center and right of the formation were more vulnerable to penetration and that there were no forces available to block such penetrations. Using such a tactic severely restricted the commander's ability to influence the fight once it started. Due to the challenge of effectively repositioning forces during the fight, a commander assumed great risk with the initial placement of his forces. Massing of forces on his flank committed him to that course of action, do or die, as the ability to disengage and reposition forces in a timely manner exceeded the capabilities of combat forces of that period.

Another tactic used to prevent the flank from being enveloped was to extend the width of the formation beyond that of the enemy's formation. Such action would deny

the exposure of a friendly flank while simultaneously exposing one or more of the enemy's flanks. Extending the width of a formation was a very rudimentary solution to the problem of protecting the flank and actually proved to be less effective, as it required the commander to weaken the depth and strength of his formation in order to extend one or more of his flanks. Such tactics actually diluted the mass of a commander's formation across the span of his formation and prevented him from concentrating his forces in a manner to gain a position of advantage over his opponent.

Another disadvantage of this tactic was that his entire formation became more vulnerable to a massed attack in any one area. Commanders were faced with the challenge of balancing the principles of mass and economy of force to create an offensive capability that did not forfeit the security of their formation.

Through numerous battles, and at the expense of many lives, commanders began to understand and appreciate the interrelationships of mass and economy of force. Rather than extending their forces equally across their front, thus neutralizing their ability to attain favorable combat ratios for a penetration, commanders refined their tactics to take into account the principles of mass and economy of force.

Given the rear and flank of a phalanx proved to be its most vulnerable parts, commanders were determined to mass their available forces on either flank to gain a position of advantage. Retaining uncommitted force to counter potential penetrations of the center or opposite flank was not practiced during this period (Greiss 1984, 5). Commanders chose instead to economize forces in the center and on one side of the formation while they massed forces on the opposite side. The phalanx allowed commanders to mass the effects of their combat power; however, the very strength of the

phalanx also proved to be its weakness. The mass of the phalanx formation required much time and great effort to redirect its actions once committed. As a result the phalanx lacked flexibility and became a very predictable formation.

Warfare continued as such until the Macedonian military reforms of Philip. Understanding the need for a more flexible and mobile force, Philip forged a force mixed with infantry, cavalry, archers, several types of lightly armed troops, and siege engines into a more balanced force which could fight both defensive and offensive actions. His idea was to create a force that maintained the massing capability of the phalanx, yet was flexible enough to capitalize on the advantages provided by terrain and the deficiencies of the enemy (Griess 1984, 20).

The hammer and anvil tactics of the Macedonian Army proved to be his solution. The phalanx would consist of heavy, less mobile, infantry soldiers that would serve as the anvil, while more mobile cavalry units were positioned on the flanks to serve as the hammer. Philip additionally positioned lighter infantry in depth behind the heavy infantry to the front. Although not recognized or used as a reserve, the lighter infantry, positioned in depth, did enhance the flexibility of the Macedonian battle formation (Griess, 22).

Alexander refined the art of hammer and anvil tactics, as developed by his father Philip, with great success. He also further expanded the effectiveness of his father's tactics through the abandonment of fixed schemes and adoption of decision-based tactics. Decision-based tactics involved making tactical decisions based on how the situation developed and changed, rather than just fighting the original plan. "He did not rely on a

single disposition of his army for battle nor on a set-piece plan but adapted both plans and dispositions to the circumstances” (Jones 1987, 26).

Such tactics further challenged those of his opponents, being it was difficult to predict the time and location of the decisive blow. It was the success of these decision-based tactics that caused Alexander’s opponents to develop their own tactics, techniques and procedures with which to counter and defeat Alexander.

Alexander was additionally skilled in identifying and, if necessary, creating a vulnerable point in the formation of his opponent. Although the envelopment of an enemy’s flank was preferred, Alexander, as demonstrated by the Battle of Chaeronea, was capable of creating a gap through which to penetrate the lines of his opponent. Flanking or penetrating an opponent’s line provided a marked advantage in combat, as it exposed the weakness of his formation and forced him to fight in multiple directions. Commanders, therefore, concentrated on flanking or penetrating an opponent’s line, for once accomplished the defender did not or could not counter such actions to prevent defeat.

The inability to counter such flanking actions or penetrations was the result of one or two factors: forces simply were not available for use, or they could not reposition to the critical point on the battlefield in a timely manner to prevent the enemy from gaining a position of advantage. A logical solution to such a problem would then be to position some forces to the rear of the forward elements to ensure their availability and secondly, to position them centrally so as to facilitate their commitment across the formation as a whole. As such the concept of retaining and employing a reserve began to gain relevance and acceptance among battlefield commanders.

As recorded by Flavius Vegetius Renatus, in his writings on the military institutions of the Romans, the Lacedaemonians are credited with the initial concept and use of a reserve in warfare, which was imitated by the Carthaginians and later observed by the Romans, given no better disposition could be found. Vegetius writes that the method of having bodies of reserves in the rear of the army, composed of choice infantry and cavalry, commanded by the supernumerary lieutenant generals, counts and tribunes, is very judicious and of great consequence towards the gaining of battle. He states that some should be posted in the rear of the wings and some near the center to be ready to fly immediately to the assistance of any part of the line which was hard pressed, to prevent its being pierced, to supply the vacancies made therein during action, and thereby, to keep up the courage of their fellow soldiers and check the impetuosity of the enemy.

The line was solely designed to repulse or, if possible, break the enemy. If it was necessary to form a wedge or pincers, it required supernumerary troops stationed in the rear. If a saw was to be formed, it required the commitment of reserves from the rear; for once men were drawn off from the line, all was throw into confusion.

If any flying platoon of the enemy fell upon the wing or any part of the army and if no supernumerary troops were positioned to oppose it or if a commander detached either horse or foot from the line for that service, an element of the command would be exposed. He concludes that by endeavoring to protect one part, the commander would naturally expose the other to greater danger.

Therefore, in armies with less combat power, it was much better to contract the front and have strong reserves. In short, combat required two things; a reserve of good and well-armed infantry near the center to form the wedge and thereby pierce the

enemy's line and bodies of cavalry armed with lances and cuirasses, with light infantry, near the wings, to surround the flanks of the enemy (Vegetius 1985, 156-157).

So it is with the Lacedaemonians that one may gain an initial understanding of how reserves were created and employed in warfare. The purpose of the reserve was to be ready to fly immediately to the assistance of any part of the line which was hard pressed, to prevent its being pierced, to supply the vacancies made therein during action, and thereby to keep up the courage of their fellow soldiers and check the impetuosity of the enemy (Vegetius 1985, 156).

In the closing of his book on the military institutions of the Romans, Vegetius provides a list of general maxims. Regarding the use of a reserve he states, "It is better to have several bodies of reserves than to extend your front too much" (Vegetius 1985, 172). Such a statement can be directly attributed to two principles of ancient warfare. Vegetius recognized that the extension of one's front actually weakened the whole of the formation, thus creating conditions favorable for a penetration; and secondly, if penetrated, forces were not available or capable of repositioning to defeat the penetration. Therefore, the retention of several bodies of reserves was seen as a practical and prudent measure to counter the threat of a penetration.

Vegetius also recognized the uncertainty of warfare and placed great value on attaining a true judgment of the situation prior to committing forces and taking action. In his general maxims he also stated, "A general is not easily overcome who can form a true judgment of his own and the enemy's force" (Vegetius 1985, 172). This maxim is interrelated with the maxim of retaining several bodies of reserves. Rather than commit all available forces forward in the initial arrangement for battle, Vegetius recognized the

value of retaining reserves for commitment once the enemy's intentions and dispositions were determined. Then and only then, could a commander effectively employ his forces to gain an advantage or to prevent his enemy from gaining an advantage over him.

The extension of the front, at the expense of the depth, of a formation has an additional consideration as well. What effect will such an extension have on the heart of men. In his book *My Reveries Upon the Art of War*, Marshal Maurice de Saxe addresses this very consideration.

I am convinced every unit that is not supported is a defeated organization, and that the principles which M. de Montecuculli had given in his memoires are correct. Infantry should always be supported by cavalry, and cavalry by infantry. Nevertheless we do not practice it. We place all our cavalry on the wings which are not supported by infantry. How are they supported? From four or five hundred paces! This destroys the assurance of the troops, for any man who has nothing behind him on which to retire or depend for aid is half beaten, and this is the reason that even the second line has sometimes given ground while the first was fighting. It is for these reasons that I place small bodies of cavalry twenty-five or thirty paces in the rear of my infantry, and battalions in square formation in the interval between my two wings of cavalry, behind which it will be able to rally and stop the enemy cavalry. (De Saxe 1985, 236)

Colonel Ardant du Picq further supports the views held by Saxe regarding the psychological impact of warfare. In his book *Battle Studies*, du Picq provides an excellent summary of frontline combat and its effects on the ranks. During engagement of the first two ranks, the one fighting and the other watching close at hand, the men of the rear ranks waited inactive at two paces distance for their turn in the combat, which would come only when their predecessors were killed wounded, or exhausted. They were impressed by the violent fluctuations of the struggle of the first rank. They heard the clashes of the blows and distinguished, perhaps, those that sank into the flesh. They saw wounded and the exhausted crawl through the intervals to go to the rear. Passive

spectators of danger, they were forced to await its terrible approach. These men were subjected to the poignant emotions of combat without being supported by the animation of the struggle. They were thus placed under the moral pressure of the greatest anxieties. Often they could not stand it until their turn came; they gave way.

The best tactics, the best dispositions were those that made easiest a succession of efforts by assuring the relief ranks of units in action, actually engaging only the necessary units and keeping the rest as a support or reserve outside of the immediate sphere of moral tension. The Romans, understanding these factors, adopted such tactics to gain a greater continuity of effort than their opponents (Du Picq 1987, 78-79).

The Gauls, on the other hand, did not reason. Seeing only the inflexible line, they bound themselves together, thus rendering relief impracticable. They believed, as did the Greeks, in the power of the mass and impulse of deep files and did not understand that deep files were powerless to push the first ranks forward as they recoiled in the face of death. It is a strange error to believe that the ranks will go to meet that which made the first ones fall back. On the contrary, the contagion of recoil is so strong that the stopping of the head means the falling back of the rear! (Du Picq 1987, 79).

The Greeks, also, certainly had reserves and supports in the second half of their dense ranks. But the idea of mass dominated. They placed these supports and reserves too near, forgetting the essential man (Du Picq 1987, 79).

The Romans also believed in the power of mass, but from the morale point of view only. They did not multiply the files in order to add to the mass, but to give to the combatants the confidence of being aided and relieved. The number of ranks was

calculated according to the moral pressure that the last ranks could sustain (Du Picq 1987, 79-80).

There is a point beyond which man cannot bear the anxiety of combat in the front lines without being engaged. The Romans did not increase the number of ranks as to bring about this condition. The Greeks did not observe and calculate so well. They sometimes brought the number of files up to thirty-two and their last files, which in their minds, were doubtless their reserves, found themselves forcibly dragged into the material disorder of the first ones (Vegetius 1985, 80).

In the order by maniples in the Roman legion, the best soldiers, those whose courage had been proved by experience in battle, waited stoically, kept in the second and third lines. They were far enough away not to suffer wounds and not to be drawn in by the front line retiring into their intervals. Yet, they were near enough to give support when necessary or to finish the job by advancing. The youngest, the most impetuous, were in the first lines. The legion was not increased simply to make numbers or mass. Each had his turn in action, each man in his maniple, each maniple in its cohort, and when the unit became a cohort, each cohort in the order of battle (Vegetius 1985, 80).

The Roman theory dictated a depth of ranks to furnish successive lines of combatants. The genius of the general would modify these established formations as he saw fit. If the men were inured to war, well-trained, reliable, tenacious, quick to relieve their file leaders, full of confidence in their general and their own comrades, the general diminished the depth of the files, did away with the lines even, in order to increase the number of immediate combatants by increasing the front. His men having moral and sometimes also physical endurance superior to that of the adversary, the general knew

that the last ranks of the latter would not, under pressure, hold sufficiently to relieve the first lines or forbid the relief of his own.

Hannibal, strong with the confidence with which he inspired his soldiers, drew up a line less deep by half the Roman army and at Cannae hemmed in an army which had twice his number and exterminated it. Caesar at Pharsalus, for similar reasons, did not hesitate to decrease his depth. He faced double his strength in the army of Pompey, a Roman army like his own, and crushed it (Du Picq 1987, 81).

So the extension of the front at the expense of the depth of the formation had a psychological impact as well. If the forward troops knew they had support to their rear and flank, they were a more cohesive fighting force; if not, they were more apt to break and run if opposed by a superior force. Some commanders, therefore, chose to retain a reserve force positioned behind the forward troops, rather than extending their line. Such a force would serve to strengthen the fighting spirit of the forward troops and provide flexibility. A centrally located reserve consisting of cavalry was well suited for this mission, as their superior mobility allowed them to effectively support the center or either flank of the formation.

Another consideration for retaining a force, separate, and to the rear of the forward troops was that the men behind add no weight to the pressure nor any strength to the swords of those that are in the foremost rank (De Saxe 1985, 280). This argument could also support the technique of extending the line, rather than maintaining formation depth. However, the commitment of all the forces in an extended single echelon restricted the commander's ability to reposition elements once engaged with the enemy.

Being the men behind the foremost rank did not contribute to the firepower of the force as a whole, their relative value remained in their positioning, which provided moral support to the foremost troops and made them readily available to sustain the fight. Commanders thus had to decide the optimal force to deploy in the forward echelon to ensure sustainment, while maximizing the remaining firepower of their force. At this point in history, the forward echelon, whatever the depth of its ranks, was a committed force. Once this element became engaged with the enemy, it survived or died as a unit, therefore the commander could not expect to reposition or utilize elements of the forward echelon for other contingencies once committed.

Over time commanders became more skilled in balancing the allocation of troops to sustain the fight and troops to influence the fight. Commanders began to understand the added tactical value of retaining troops to influence their fight. This becomes more evident in the Roman tactics as discussed by Saxe.

When the Romans attack the phalanx in front they never employ all their forces so as to make their line equal to that of the enemy, but lead on only part of their troops and keep the rest of the army in reserve. Now whether the troops of the phalanx break the line that is opposed to them, or whether they are broken themselves, the formation peculiar to the phalanx is alike dissolved. If they pursue the fugitives, or if, on the other hand, they retreat and are pursued, in either case they are separated from the rest of their own body. And thus there is left some space which the reserve of the Roman army takes care to seize and then charges the remaining part of the phalanx. But the charge is not made against the front, but the flank or in the rear. Since it is easy then to avoid the conditions that are favorable to the phalanx and since those, on the contrary, that are disadvantageous to it can never be avoided, it is certain that this difference alone must carry with it a decisive weight in time of action. (De Saxe 1985, 282)

In *The Instruction of Frederick The Great for His Generals 1747*, Frederick the Great placed great value on the retention of a reserve. “I observe that, regardless of the circumstance, a corps of your army should always be destined for the reserve, even when

you camp on two line. I shall have occasion to pluck this string in the articles of battles, for rear guards are the safety of armies and often carry victory away with them”

(Frederick 1985, 343).

In providing advice to his generals regarding the defense of an entrenchment, Frederick concurs with Saxe that it is essential to contract the front as much as possible. He further states that it is necessary to save two large reserves of infantry so as to be able to move them to points where they may be needed, and to post a third line of cavalry behind these reserves (Frederick 1985, 376). It is with this thought, establishing a third line behind that of the reserves, that one may gain an insight into the intended purpose of Frederick’s reserves. Frederick viewed the reserve as an active element of his plan and expected to use his reserve. He also viewed forces not actively engaged in the fight as potential reserves. “Whenever you engage in a battle with one flank, you are the master of your army; you can stimulate or slow down the combat as you deem appropriate, and the whole wing which is not fighting acts a reserve for you. Never forget to husband all the resources you are able on every occasion and to have, in consequence, reserves always at hand to repair disorder, if it occurs at some point” (Frederick 1985, 380).

Frederick also believed that the reserve should be commanded by a skillful general and placed in a locality where he could see everything. The reserve commander should act on his own initiative, and if he saw that one of the wings was in need of help, he should conduct a reserve there without being called. But if everything went well, the general should employ the reserve in the pursuit (Frederick 1985, 389).

Napoleon, like Frederick, concurs with the active use of the reserve. “When you have it in contemplation to give battle, it is a general rule to collect all your strength

and to leave none unemployed. One battalion sometimes decides the issue of the day” (Napoleon 1985, 415).

Napoleon recognized that hard-fought combat was usually won by the side committing the last reserves. Marengo, Borodino, and Ligny are typical examples of Napoleonic victories that demonstrated the importance of having reserves available to tip the scales. And his two greatest defeats--Leipzig and Waterloo--were suffered because his enemies still had reserves after his were all committed. The importance of committing the last reserves has stood the test of time as demonstrated with particular poignancy at Antietam in the American Civil War and at the battle of Kursk in World War II (Dupuy 1984, 331).

Therefore, simply retaining a reserve, without any plan for commitment, would be against the military maxims of Napoleon. If such forces, initially withheld from battle, were sequentially committed, it would equate to leaving them unemployed. Napoleon regards the decisions to retain a reserve, their composition and disposition on the battlefield, and their employment, to maximize the total strength of the force simultaneously, to be of great importance.

To simply withhold combat power in reserve for the end of the battle would be negligent according to Napoleon. “To wish to hold the cavalry in reserve for the end of the battle is to have no idea of the power of combined cavalry and infantry charges either for attack or for defense” (Napoleon 1985, 434). Napoleon also clearly states the importance of the employment of reserves. “The power of cavalry is in its impulsion. But it is not only its velocity that insures success: it is order, formation, and proper employment of reserves” (Napoleon 1985, 435).

The employment of available combat power to mass a commander's effects is of critical importance as well. Napoleon further states that, "The rules of fighting require that a part of an army should avoid fighting alone against an entire army that has already been successful" (Napoleon 1985, 436). The importance of utilizing and committing all available power is further illustrated in his ninety-sixth maxim. "A general who retains fresh troops for the day after a battle is almost always beaten. He should, if helpful, throw in his last man, because on the day after a complete success there are no more obstacles in front of him; prestige alone will insure new triumphs to the conqueror" (Napoleon 1985, 436).

Du Picq acknowledges that not all troops are immediately or hotly engaged in battle. He stresses the importance for commanders to always try to keep in hand, as long as possible, some troops capable of marching, acting at any moment, in any direction. "Today, like yesterday, like tomorrow, the decisive action is that of formed troops. Victory belongs to the commander who has known how to keep them in good order, to hold them, and to direct them. That is incontrovertible. But commanders can hold out decisive reserves only if the enemy has been forced to commit his" (Du Picq 1987, 127).

Du Picq further recommends that the system of holding out a reserve as long as possible for independent action, when the enemy has used his own, ought to be applied downwards. Each battalion should have its own, each regiment its own, firmly maintained (Du Picq 1987, 194).

Carl von Clausewitz, in his book *Principles of War*, agrees with the concept of retaining forces which will be available for future employment. Clausewitz recommends that the commander should not bring all of his troops into combat immediately. With

such action all wisdom in conducting a battle disappears. It is only with troops left at the commander's disposal that he can turn the tide of battle (Clausewitz 1987, 319).

Clausewitz provides the following advice concerning the importance of retaining troops for the uncertainties of battle. "In a tactical situation, where we frequently do not even know the enemy's measures until we see them, we must always be more or less prepared for unforeseen developments, so that positions that turn out to be weak can be reinforced, and so that we can in general adjust our dispositions to the enemy's actions" (Clausewitz 1984, 210).

Clausewitz further supports this concept in his third principle for the defense. "To be little or not at all concerned about the extent of the front. This in itself is unimportant, and an extension of the front limits the depth of the formation (that is the number of corps which are lined up one behind the other). Troops which are kept in the rear are always available. We can use them either to renew combat at the same point, or to carry the fight to other neighboring points" (Clausewitz 1987, 319-320).

If many troops are available to hold in reserve, Clausewitz states that only a part of them should stand directly behind the front, with the rest put obliquely behind. From that position they, in turn, can attack the flank of the enemy columns which are seeking to envelop one's formation (Clausewitz 1987, 320). If for example, he had two divisions, he would prefer to keep one in the rear. If he had three, he would keep at least one in the rear, and if he had four probably two in the rear. If he had five, he would hold at least two in reserve and in many cases even three (Clausewitz 1987, 321). Such statements show the value Clausewitz placed on retaining combat power to the rear for commitment at the decisive place and time.

Another fundamental principle of Clausewitz was never to remain completely passive, but to attack the enemy frontally and from the flanks, even while the enemy was attacking. He states that, “One should defend one’s given front merely to induce the enemy to deploy his forces in an attack. Then in turn one can attack with those of our troops which were kept back. This attack from a defensive position can take place the moment the enemy actually attacks, or while he is still on the march” (Clausewitz 1987, 320-321).

Clausewitz further stated that a commander should not bring all his forces into play haphazardly and at one time, thereby losing all means of directing the battle; but fatigue the opponent, if possible, with few forces and conserve a decisive mass for the critical moment. Once this decisive mass has been thrown in, it must be used with the greatest audacity (Clausewitz 1987, 334).

Baron de Jomini was also a strong advocate of retaining reserves. In his book *The Art of War*, Jomini states that reserves play an important part in modern warfare and that every commander, down to the platoon leader, deserves one (Jomini 1987, 478).

Jomini provides much analysis on the various orders of battle and their advantages and disadvantages. Constant throughout the various orders of battle though are his views on the retention and placement of a reserve. Jomini believed that the party acting on the defensive, not knowing from what quarter the storm will burst upon him, should hold a large part of his forces in reserve to be used as occasion may require (Jomini 1987, 508). “With the object of the defense being to defeat the plans of the attacking party, the arrangements of a defensive order should be such as to multiply the difficulties of approaching the position and to keep in hand a strong reserve, well

concealed and ready to fall at the decisive moment upon a point where the enemy least expects to meet it” (Jomini 1987, 509).

According to J. F. C. Fuller, in his book *The Foundations of the Science of War*, the relationship of concentration to reserve force is essential in the application of combat power. In the application of the principle of concentration a frequent mistake is to mass forces against a selected point when it is impossible to surprise that point. The mistake originates in failure to appreciate that concentration, in nine cases out of ten, means keeping troops out of battle, and not thrusting them in. Fuller states that men are not machines, and even if they were they would still require periods of rest and overhauling.

Men have a limited physical endurance, and it is this endurance which must be economized. If 10,000 men attack a position simultaneously, the majority of these men will be exhausted simultaneously. If 6,000 men attack, and 4,000 are held in reserve, even if the enemy numbers 10,000, by the time the energy of the 6,000 is exhausted, that of the 4,000 in reserve will, in all probability, be greater than the residual energy of the enemy—that is to say, if he has employed the whole of his forces in the attack.

In practice, as well as in theory, reserves can seldom be too strong. Again, the supply of reserves must be continuous, by which I mean that at no time during a battle or campaign should a reserve force be entirely used up. This means that when a commander is compelled to draw on his reserves he should simultaneously withdraw exhausted troops to take their place. As the recuperation of these troops will depend on the residual energy possessed by them at the time of withdrawal, unless the original reserves are exceedingly strong, these troops should be withdrawn before their endurance, especially moral endurance, is exhausted. It follows, therefore, that the true psychological moment to withdraw troops into reserve is immediately after they have gained a success, and not when they are so used up that failure stares them in the face. (Fuller 1983, 263-264)

Fuller concludes that a general should always remember that a shattered front may demoralize an intact rear. “Conversely, a victorious front, if it be withdrawn into reserve, will act as a moralizing tonic to every man behind it. If men are withdrawn into reserve with their tails well over their backs, all drooping tails in the rear will assume a like

attitude. To squeeze men like lemons, and then place them in reserve, is the act of a lunatic” (Fuller 1983, 276). According to Fuller, the composition of the reserve is also just as important as the decision to retain a reserve.

While forward elements are actively engaged in battle, reserves remain distant and removed from the action. They are surrounded by images and not by actualities. They know a battle is being waged in front of them, but they are out of touch with its reality. Time for brooding is ample; bad news travels swiftly, and fear is contagious. Curious as it may seem, though they are not fighting, they are frequently more susceptible to demoralization than those engaged. The uncertainty of the unknown is sapping their morale. They are like men looking in a convex mirror, the further back they withdraw their heads the more distorted becomes the reflection, until ultimately nothing is seen clearly. As physical weapons hit the fronts, so do moral weapons hit backs. Fuller states that it is more advantageous, therefore, to place the bravest, veteran troops in the reserve whose morale is less susceptible to defeat than the less brave, inexperienced soldier. The triarii of the Roman legion and the Old Guard of Napoleon are distant examples of the success of such practice. (Fuller 1983, 276-277)

Fuller states the distribution of forces falls into three categories: protective troops, offensive troops, and reserves. Although he acknowledges that the actual distribution of forces in these categories depends on the enemy situation, theater of war, communications, and time; he hints that until contact is actually made with the enemy, the strength of the reserve should be as strong as possible, because it is from the reserves that we feed our offensive and protective operations. Fuller recognizes the following duties of reserves in feeding offensive and protective operations:

1. To maintain offensive or protective strength.
2. To maintain freedom of maneuver.
3. To effect concentration of force.
4. To meet unexpected situations.
5. To carry out the pursuit.

6. To cover a withdrawal after a reverse. (Fuller 1983, 296)

Field Marshal Erwin Rommel, like Fuller, acknowledges that the composition and disposition of a reserve is dependent on the terrain, enemy and friendly situation. In his defense of Mount Cosna during World War I, Rommel retained strong reserves in great depth, given the circumstances at hand.

With no contact on either flank, his battalion had to prepare for strong hostile attacks not only on the front but also on the flanks. The very irregular, thickly wooded terrain on both sides of his position favored hostile approach to within attacking distance, and, furthermore, the Rumanian artillery was positioned in a semicircle around the Wurtttemberg Mountain Battalion.

In his observations following the engagement Rommel records that reserves were urgently needed during the heavy fighting and that without them the position could not have been held; again and again, losses in the principal combat zone had to be replaced by reserves. Rommel later states that it would have been a mistake to put everything in the front line of nests; the losses were heaviest there, and they would have been still greater if the garrison had been stronger. Rommel's belief that it was easy to break a line provides further evidence of the importance he placed on retaining uncommitted forces in the rear to counter such action (Rommel 1979, 186-187).

The consensus, then, among theorists and practitioners of warfare was that commanders should retain strong reserves, that such reserves should be positioned centrally and to the rear of forward troops, and that they should not be committed to any specific course of action so as to ensure their availability at the decisive moment in battle.

It is with the printing of the 1923 Field Service Regulation that these principles are reflected in US Army doctrine. The regulation states that the reserve is the leader's weapon which enables him to shape the course of action and finally enforce a decision; it gives him a means of meeting the adversary's initiative and of passing to the counteroffensive.

Once committed to action, infantry units lose their availability for employment in the execution of other missions. Infantry deployed and under fire can charge only at risk of incurring heavy losses. The leader can materially influence the course of action once begun only through the employment of his reserve, his air service, and the fire of his artillery.

In reaching his decision to commit his reserve to action, the leader must consider that he thereby loses one of his principal means of influencing the action. Nevertheless, at the decisive moment of action, every man that can be used to advantage must participate in the battle and the reserve must be launched without hesitation. As far as practicable, the reserve is sent in by complete units. Reinforcement by portions of troops engaged should be avoided, and commanders should endeavor to reconstitute reserves from troops which the course of action has made available.

The regulation states that the distance of a reserve from the units which have been committed to action varies with the extent to which clearness exists as to its employment. In the initial deployment, it is held at such distance from the troops engaged that it can be sent in at any point on the front where the plan of action contemplates its eventual employment and at the same time is not exposed to unnecessary losses. As developments in the situation more clearly define the place and time of its employment, the reserve is

moved closer to its probable point of intervention. In the defense, reserves are either held mobile for employment in the counterattack or are assigned to positions designed to limit a hostile penetration (Field Service Regulation 1923, 80-81).

The direction from which the main attack may be expected chiefly determines the location of the reserve. According to circumstance, it is echeloned for protective purposes in rear of an exposed flank, held in a position in readiness from which it can deliver a prepared counterattack, or so disposed that it can take up the counteroffensive by striking in flank a hostile attack which breaks down in front of the main line of resistance. (Field Service Regulation 1923, 104).

The 1940 Field Service Regulation concurs with the 1923 version that the reserve is the principal means available to the commander for shaping the battlefield. The 1940 regulation, however, provides more guidance regarding the size of reserve to retain. When the situation is relatively clear and when enemy capabilities are limited, the reserve may consist of a small fraction of the command disposed to favor maneuver. When the situation is obscure, the reserve may consist initially of the bulk of the command, centrally located and prepared to move to any point on the front or flanks (Field Regulation 1940, 104-105).

The 1944 Field Service Regulation retains the essence of the previous versions regarding the retention and employment of reserve. It is after World War II, with the printing of the 1954 Field Service Regulation, that the role of the reserve is expanded.

The 1954 regulation states that the reserve is used to execute counterattacks, to block hostile penetrations, to extend the flanks of the battle position, or to occupy a rear position, to reinforce or replace frontline units, to deal with guerrillas or infiltrators, or to

cover a retrograde movement. Plans are prepared for the employment of the reserve against all major foreseeable contingencies. Those elements of the command with the most mobility and shock action are normally held in reserve. The reserve should be located so that it can best execute prepared plans for its employment, taking into consideration the probable direction of the enemy main effort, the terrain, routes of communication, concealment, and the need for security (Field Service Regulation 1954, 126).

The 1962 version of FM 100-5 retains the established fundamentals and principles of the reserve. It recognizes that the forces of the reserve are the primary means by which the defender regains the initiative. The retention of a relatively large reserve, consistent with the requirement for forces in other echelons, permits offensive action both within and forward of the battle area. In addition, the reserve provides flexibility and may be used to:

1. Reinforce hard-pressed forward units
2. Occupy positions
3. Insure retention of key terrain
4. Assist in disengagement of units
5. Replace forward units
6. Extend flanks
7. Destroy counter guerrilla, infiltration, and airborne operations

Colonel (Retired) Trevor Dupuy concurs with the importance of maintaining a reserve. He clearly states in his timeless verities of combat that a successful defense requires depth and reserves.

It has been asserted that outnumbered military forces cannot afford to withhold valuable firepower from operations and keep it idle in reserve posture. History demonstrates that this is specious logic, and that linear defense is disastrously vulnerable. Napoleon's crossing at the Po in his first campaign is perhaps the classic demonstration of the fallacy of linear defense.

The defender may have all of his firepower committed to the anticipated operational area, but the attacker's advantage in having the initiative can always render much of that defensive firepower useless. Anyone who suggests that modern technology will facilitate the shifting of engaged firepower in battle overlooks three considerations: (a) the attacker can inhibit or prevent such movement by both direct and indirect means; (b) a defender engaged in a fruitless firefight against limited attacks by numerically inferior attackers is neither physically nor psychologically attuned to make lateral movements (even if the enemy does not prevent or inhibit it); and (c) withdrawal of forces from the line (even if possible) provides an alert attacker with an opportunity for shifting the thrust of his offensive to the newly created gap in the defense. (Dupuy 1984, 331)

In summary, the consensus among historical theorists and practitioners is that the retention and employment of reserves is fundamentally sound and of great value, given the uncertainty of the battlefield. All agreed that a reserve should be constituted; only its size and composition were debatable.

As to the question of its disposition on the battlefield, the majority suggested that it should be centrally located, so as to be able to influence the greatest portion of the battlefield; and positioned to the rear of forward troops, so as to prevent it from being decisively engaged prior to its commitment.

Whether a reserve had to be an uncommitted force or could consist of committed forces not currently engaged or lightly engaged was debatable. While most thought it was best to subtract a dedicated force uncommitted to any other action, some acknowledged that a reserve could consist of forces that had other commitments or be created from forces not in contact or those able to disengage from contact. In view of the great value they all placed on maintaining a reserve, how to reconstitute a reserve once

committed sparked most of the debate over the uncommitted versus committed status of a reserve.

With the historical context of the development of reserves established, the next chapter will use doctrine, specifically the principles of war and tenets of Army operations, to examine the effectiveness and efficiency of reserves.

CHAPTER 5

DOCTRINAL ANALYSIS

Now that one understands how reserves came about and what the historical influences were that shaped their evolution and development, a doctrinal analysis, utilizing the principles of war and tenets of Army operations, will now be conducted to determine the effectiveness and efficiency of doctrine concerning the retention and employment of reserves.

Army doctrine provides a common language and a common understanding of how Army forces conduct operations. It is rooted in time-tested principles but is forward looking and adaptable to changing technologies, threats, and missions. Army doctrine is detailed enough to guide operations, yet flexible enough to allow commanders to exercise initiative when dealing with specific tactical and operational situations. To be useful, doctrine must be well known and commonly understood (FM 3-0 2001, 1-14).

Joint Publication (JP) 1-02 currently defines the reserve as a portion of a body of troops that is kept to the rear, or withheld from action at the beginning of an engagement, in order to be available for a decisive movement (JP 1-02, 2001). FM 101-5-1 currently defines the reserve as that portion of a force withheld from action or uncommitted to a specific course of action, so as to be available for commitment at the decisive moment. Its primary purpose is to retain flexibility through offensive action. The primary purpose of the reserve today is to provide flexibility through offensive action. The key factors that enable such flexibility are its positioning and its availability for commitment at the decisive moment.

To assist in this analysis two courses of action are presented using a standard three-company battalion task force as the model. Course of action one (COA 1) depicts three committed companies abreast with no dedicated reserve. COA 2 depicts two committed companies forward and one uncommitted company to the rear of the forward companies serving as the reserve (fig. 3). The enemy threat remains the same for both scenarios; a brigade combat team with the mission to destroy the defending force. The terrain supports one brigade avenue of approach consisting of two battalion mobility corridors. The defending battalion occupies the only piece of key terrain in the area of operations (AO). Obstacles are limited in the AO, other than those located to the flanks of the defending battalion. Observation and fields of fire are excellent, with limited cover and concealment.

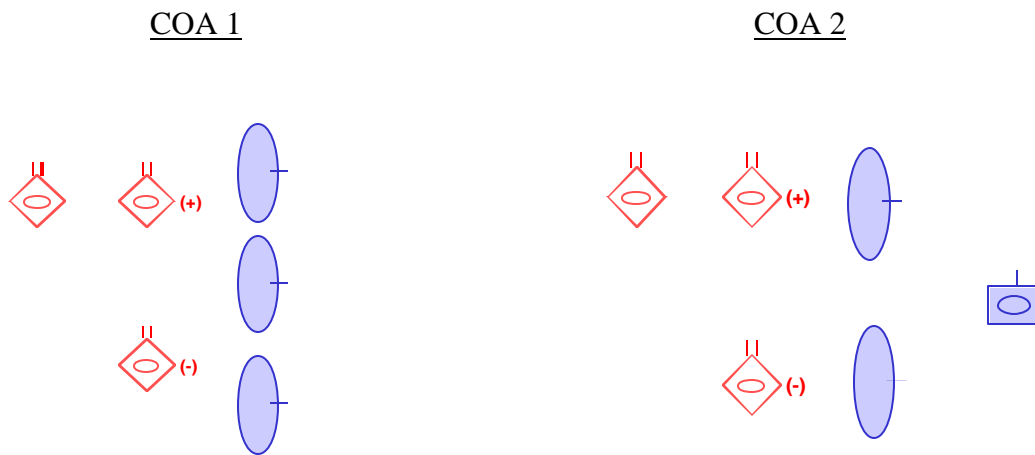


Figure 3. COA Depictions

Given the principles of war and tenets of Army operations form the foundation of Army operational doctrine, they are powerful tools with which to analyze its doctrine.

The nine principles of war--mass, objective, security, surprise, maneuver, offensive, unity of command, simplicity, economy of force--are the enduring bedrock of Army doctrine, having stood the tests of analysis, experimentation, and practice (FM 3-0 2001, 4-11).

The tenets of Army operations--initiative, agility, depth, synchronization, and versatility--build on the principles of war. They further describe the characteristics of successful operations. These tenets are essential to victory (FM 3-0 2001, 4-15). As such the principles of war and tenets of Army operations will serve as the evaluation criteria in conducting the analysis. Each analysis will be preceded by a brief definition of each principle or tenet, followed by an in-depth analysis given their effects with each respective scenario.

Mass

Commanders mass effects of combat power to overwhelm enemies or gain control of the situation. They mass combat power in time and space to achieve both destructive and constructive results. Massing in time applies the elements of combat power against multiple targets simultaneously. Massing in space concentrates the effects of different elements of combat power against a single target. Both dominate the situation; commanders select the method that best fits the circumstance (FM 3-0 2001, 4-13).

Generally speaking most experienced military theorists and practitioners will agree that a defending force must mass the effects of its combat power to overwhelm the enemy and gain the initiative (FM 3-90, 8-16). Clausewitz himself acknowledges that, “superiority of numbers is the most common element in victory” (Clausewitz 1984, 194). Therefore, the force that is capable of achieving a greater concentration of fires will have

a significant advantage over his opponent. It is only logical then that one should analyze the effects of mass in the comparison of the two given scenarios. By definition mass entails the ability to concentrate or bring together fires of multiple weapons or units. (FM101-5-1 1997, 1-98).

COA 1 provides greater mass initially as a result of the number of systems that can influence the fight. In COA 2 only two-thirds of the available combat power is initially postured to influence the fight. The remaining third, positioned in depth, requires movement forward or to the flank to utilize its potential firepower. Therefore COA 2's combat power is initially 33 percent less than that of COA 1 at the line of contact.

This is a significant factor, given the defender is usually at an overall disadvantage in combat power, hence the decision to defend and not attack. By placing one third of all available combat power to the rear, the defender would actually enhance the attacker's initial combat ratios at the forward point of contact.

Another advantage of COA 1 is that it would require the attacker to commit more combat power, initially along the forward line of contact, in order to ensure adequate combat power is generated to destroy the forward elements. This would, as a result, reduce his ability to mass forces at a specific point without accepting a higher level of risk along the rest of the line of contact. COA 2 on the other hand would only require the attacker to commit combat power to destroy two companies, rather than three. The combat power used to destroy the third forward company, as depicted in COA 1, would then be available for commitment at the area of concentration or to serve as a reserve.

Given the above analysis, COA 1 would more effectively dilute the attacker's initial allocation of combat power across the front, thus reducing the number of forces available for concentration at the point of attack, which would benefit the defender. COA 1 would also be advantageous in supporting a simultaneous massing of available combat power, compared to COA 2, which would be advantageous in supporting both simultaneous and sequential operations. Given commanders combine simultaneous and sequential operations to sustain mass effects in time and space, COA 2 would be more advantageous in ensuring a sequential massing capability.

Objective

The principle of objective drives all military activity. At the tactical level, objective means ensuring all actions contribute to the goals of the higher headquarters (FM 3-0 2001, 4-12). By definition, objective is the clearly defined, decisive, and attainable aims which every military operation should be directed towards (FM 101-5-1 1997, 1-111).

Clausewitz states that one should not start a war without first being clear in his mind what he intends to achieve by that war. This same principle can be applied to the decision to commit all available combat power forward or to retain a portion of the force in the rear as an uncommitted reserve. One must ask not only what a commander intends to accomplish with the commitment of all available combat power forward or retention of uncommitted power to the rear as depicted in COA 1 and 2, but also if his intentions are clearly defined, decisive and attainable.

For analysis purposes the given objective of the commander in both courses of action is to destroy the enemy brigade in order to prevent a penetration of the rear

boundary. FM 3-0 states that successful defenses maximize firepower, protection, and maneuver to defeat enemy forces. Static and mobile elements combine to deprive the enemy of the initiative. The defender resists and contains the enemy. Defending commanders seek every opportunity to transition to the offense. Defenders seek to increase their freedom to maneuver while denying it to the attacker. The enemy falters as losses increase and the initiative shifts to the defender, allowing counterattacks. Counterattack opportunities rarely last long; defenders strike swiftly to force the enemy to culminate. Preparation, security, disruption, massing effects, and flexibility all characterize successful defensive operations (FM 3-0 2001, 8-2).

The operations manual goes on to state that the commander's defensive plan should be able to succeed without using his reserve. However, the most likely mission of the reserve is to conduct a counterattack in accordance with previously prepared plans. A lower echelon commander uses his reserve primarily to conduct local counterattacks to restore the integrity of his defense or to exploit an opportunity. A senior commander uses his reserve to seize the initiative from the enemy when the opportunity presents itself.

Doctrine also states that the reserve is not a committed force. The commander can assign it a wide variety of tasks on its commitment, and it must be prepared to perform other missions. In certain situations, it may be necessary to commit the reserve to restore the integrity of the defense by blocking an enemy penetration or reinforcing fires into an engagement area. These secondary tasks include:

- Reinforcing the defense of committed forces.
- Blocking or containing enemy forces that penetrate friendly defensive positions.
- Relieving depleted units and providing for continuous operations.
- Reacting to threats directed against the friendly force's sustainment effort. This includes acting as the echelon TCF when a separate TCF cannot be resourced.

- Extending the flanks of a defending unit to prevent its envelopment.
- Covering a retrograde movement (FM 3-90 2001, 9-3, 9-4)

Having reviewed the purpose and characteristics of the defense, along with the most likely mission (objective) of the reserve, to include its secondary tasks, the thesis will now analyze the selected courses of action in accomplishing those objectives and tasks. COA 1, with its three companies abreast, is more advantageous than COA 2 in conducting local counterattacks forward of the line of contact, given the forward disposition of its forces. The disposition of forces in COA 2 requires additional movement forward from its rear location and a passage through or adjacent to a forward positioned unit. The advantage of COA 1 is that it already has forces positioned forward, which would reduce the movement time associated with being positioned in the rear. Not having to conduct a forward passage would also improve their responsiveness and commitment time. Committing forward positioned forces as depicted in COA 1 would also reduce the enemy's reaction time, whereas commitment of the rear positioned force in COA 2 would increase enemy reaction time.

While COA 1 is more advantageous in a counterattack role forward of the line of contact, COA 2 would be more advantageous in a reinforcing, blocking, or a relieving role, based primarily on its rearward disposition. The advantage of COA 2's disposition is that it limits the enemy's ability to utilize all his forms of contact, primarily direct fire and to some extent indirect fire. As such, forces positioned outside direct fire range and beyond indirect fire systems would most likely possess a greater mobility advantage to conduct the tasks of reinforcing, blocking, or relieving forward units.

Given such analysis, COA 1 would be more favorable if the commander's objective was forward of the line of contact, while COA 2 would favor an objective at or behind the line of contact.

Security

The next principle for analysis is security. Security is defined as the measures taken by a military unit, an activity or installation to protect itself against all acts designed to, or that may, impair its effectiveness (FM 101-5-1 1997, 1-138).

The advantages of COA 1 are that it maximizes security forward, places security responsibility on each unit across the front and depth of its respective area of operation, and reduces enemy air and indirect forms of contact upon initiation of the close direct fire fight. Maximizing security forward is advantageous in that it would reduce unoccupied terrain in the area of operations, making penetration of enemy reconnaissance more difficult. Denying or reducing the enemy reconnaissance effort would also significantly limit the enemy's knowledge of the defense, thus reducing the overall effectiveness of his forms of contact.

The psychological impact of positioning units on line as in COA 1 or in depth as in COA 2 has a significant effect on the security of an AO. Soldiers who know that they are the only line of security in the AO and that they are securing their own interests are more apt to perform their duty with great diligence, for it is their own unit that suffers if an enemy force is able to infiltrate their position. The disadvantage of COA 2 is that the unit positioned in depth becomes dependent on the forward units for security, which reduces its security diligence, believing the forward elements will detect and destroy enemy infiltration attempts. At the same time, forward units that have an area one-third

larger to cover are less likely to detect and destroy enemy infiltration. They also have the mind-set that the unit to their rear can destroy any enemy forces that infiltrate their forward position. It should also be noted that the reserve, as depicted in COA 2, normally attempts to hide itself from enemy observation, which would further reduce elements tasked to conduct security (FM 3-90 2001, 8-20).

The obvious disadvantage of COA 1 is that it maximizes security forward and to the flanks, which reduces security in the rear. If any of the forward positions are infiltrated, the enemy has total freedom of maneuver, which would facilitate his intelligence gathering objectives.

Although COA 1 assumes a higher risk of enemy intelligence gathering if forward units are infiltrated, COA 2 actually provides a greater probability of infiltration, given the increased area of coverage for the forward units and the propensity of the reserve force in COA 2 to hide from enemy detection rather than contribute to the security effort. Therefore, COA 1 is more advantageous than COA 2 regarding the principle of security.

Surprise

The next principle for analysis is surprise. Surprise is defined as attacking the enemy at a time or place, or in a manner for which he is unprepared and which he did not expect (FM 101-5-1 1997, 1-148). It is a powerful but temporary combat multiplier. It is not essential to take the adversary or enemy completely unaware; it is only necessary that he becomes aware too late to react effectively. Factors contributing to surprise include speed, information superiority, and asymmetry (FM 3-0 2001, 4-14).

Being reserves are normally committed after the initial contact of forward forces and identification of the enemy's main effort, the element of surprise is often lost or

disregarded as a combat multiplier. As the use of reserves grew in prominence and actually became the decisive factor of battles, the surprise they retained diminished in value as attacking commanders aggressively sought their location. Technological advancements in reconnaissance and detection capabilities have only further enhanced the identification and targeting of reserves, thus reducing the element of surprise they once possessed.

Retaining such a reserve for the decisive action and protecting the reserve to ensure its availability became paramount. In order to preserve the integrity of the reserve and ensure its availability at the decisive point and time, commanders often concealed their reserves to retain an element of surprise. To counter such actions attacking commanders placed a high priority on detecting and tracking the commitment of the reserve to avoid being surprised. In fact, the location and composition of the reserve has become a routine priority intelligence requirement for attacking and defending commanders.

As a result it has become more difficult for defenders to conceal their reserves. If, however, they were successful in concealing them from enemy observation while static, their detection was inevitable upon movement from their hide position. As a result, the surprise retained while being static was quickly lost upon movement. The question then becomes if the detection of the reserve upon movement will still offer an element of surprise that would limit the attacker's ability to counter effectively. If the answer is no, then the advantage of surprise is negated. If the answer is yes, then the retention of a reserve is advantageous with regard to surprise.

The detection time, once committed, therefore becomes a critical factor in retaining the element of surprise. Being there is a positive correlation between distance and time, the time available for detection increases, the greater the distance to the point of commitment. Therefore, the farther the reserve is positioned from where the commander intends to employ its effects, the greater the chance of detection and lesser impact of surprise.

COA 1, then, is more favorable regarding surprise for two reasons. First of all the attacker would have a more difficult time detecting the reserve, given its absence from the traditionally accepted placement on the battlefield as depicted by COA 2. Given the historical disposition of reserves, attacking forces would template the reserve to be positioned behind the forward units. As such, the attacker's reconnaissance effort to detect and target the reserve would be focussed to the rear of the forward units. Therefore, it is more likely that a forward-positioned reserve would go undetected or misidentified. The second advantage of COA 1 is that the travel time upon commitment would be less than that of the reserve in COA 2. As such, the detection time would be less, thus facilitating the element of surprise. Being the enemy would focus reconnaissance efforts to detect and interdict reserve movement to the rear of forward troops, the element of surprise would be reduced with COA 2.

Maneuver

Maneuver is the employment of forces on the battlefield through movement of combat forces in relation to the enemy, supported by fire or fire potential from all sources in order to gain a position of advantage from which to destroy or threaten destruction of the enemy (FM 101-5-1 1997, 1-96). Maneuver thus creates and exposes enemy

vulnerabilities to the massed effects of friendly combat power. A commander employs his elements of combat power in symmetrical and asymmetrical ways so as to attain positional advantage over an enemy and be capable of applying those massed effects. (FM 3-90 2001, 2-8).

Given the above definition, the maneuver analysis will be focussed on the ability to maneuver at, beyond, and behind the line of contact. The forward disposition of units in COA 1 provides a positional advantage for massing the effects of fire and fire potential at and beyond the initial line of contact, while the disposition of units in COA 2 provides a positional advantage for massing the effects of fire and fire potential to the rear of the line of contact. The reason for such analysis is that enemy forces, not friendly forces, would only restrict the movement of the forward positioned units in COA 1 at and beyond the line of contact. However, the rear positioned unit in COA 2 would be restricted by both the friendly and enemy forces if committed forward of the line of contact.

Another advantage concerning the maneuver of forward positioned units in COA 1 is their increased situational understanding of the terrain and enemy activity forward of their position. Such understanding would allow them to act faster and more effectively than a unit that lacked such situational understanding. Their position would also enable them to maintain contact and sustain pressure on the enemy while they maneuvered to a position of advantage.

The disadvantage of COA 2 is that the situational understanding of the rear unit would be filtered through the eyes of the forward units. As such it would not have as clear a picture as the forward units, once committed beyond the line of contact. In

addition, the movement of the rear unit depicted in COA 2 would be restricted as it passed through the forward units, thus disrupting and increasing the difficulty of its maneuver. Such movement would also be advantageous to the enemy, as it would provide a lucrative target during the passage and provide the enemy a moment of relief as responsibility changed from the forward to the passing unit.

The obvious disadvantage of COA 1 regarding maneuver is the ability of the forward positioned units to retain their freedom of maneuver upon contact. It is more probable, given their location, that the forward positioned units would be subject to direct fires, whereas the rear unit depicted in COA 2 would initially be free from such enemy direct fire contact.

While it is expected that both the forward and rear positioned units would be subject to observation and indirect fires, the unit positioned to the rear in COA 2 would be subject to other forms of contact that would be restricted for fratricide considerations from use in the forward positions. Such forms of contact include enhanced indirect fire systems, such as multiple rocket launchers, rotary and fixed aviation assets, scatterable mines, and chemical munitions, all of which could significantly restrict their maneuver, thus degrading their ability to influence the fight.

As such, given modern weaponry capabilities, there is no guarantee that a rear positioned reserve would retain its freedom of maneuver any more than a forward positioned unit. In fact, some would argue that a rear positioned reserve would have more difficulty retaining its freedom of maneuver, given the focus of attacking forces to detect, interdict and destroy such capability. Furthermore, considering that the maneuver of both the forward unit and rear unit was degraded, the defending force would best be

positioned to mass fires at and beyond the line of contact if its forces were already positioned as depicted in COA 1.

As for retaining freedom of maneuver behind the line of contact, COA 2 would be viewed as being more advantageous than COA 1, given the disposition of its unit in depth. Since the creation of reserves to present day, commanders have traditionally positioned reserves as depicted in COA 2. The purpose for such positioning was to prevent reserves from being fixed at the line of contact and to maximize their ability to influence the fight across the entire front. Clausewitz's belief that troops which are kept in the rear are always available is no longer applicable, given the technological advancements that enable commanders to influence that fight throughout the depth of the battlefield.

The advantage of such positioning then, given the attacker's inability to interdict or fix the reserve, was the flexibility such positioning afforded the defending commander. A unit positioned centrally and to the rear of forward troops could more effectively support forward units across the entire front. Such theory is effective if the reserve is able to retain its freedom of maneuver. If not, then the positioning of such force serves no value other than reducing available combat power at the line of contact.

Assuming, for analysis purposes, that the reserve retained its freedom of maneuver, there are other considerations that need to be considered regarding the effectiveness of the maneuver in creating a position of advantage. Maintaining the freedom of maneuver in itself is only a part of the principle of maneuver. Maneuver must also create and expose enemy vulnerabilities to the massed effects of friendly combat power.

Assuming that the attacker is only able to destroy, suppress, or fix two units simultaneously, the thesis will analyze the effectiveness and efficiency of the maneuver for each COA in creating and exposing enemy vulnerabilities. The disadvantages of COA 2 are that it attacks into the enemy's strength and increases the likelihood of friendly fratricide. Attacking an enemy force frontally rather than from the flank or rear significantly improves the enemy's ability to detect targets and survive if hit. The reason for this is that attacking forces usually focus observation systems and armor protection to the front. COA 1, on the other hand, avoids each of these disadvantages. COA 1 attacks forward of friendly troops rather than attacking between and among friendly troops, thus reducing the probability of fratricide. COA 1 also attacks into the flank of the enemy rather than into his strength. Given the attacker's ability to destroy only two units simultaneously, COA 1 would then be the more favorable course of action regarding the principle of maneuver beyond, at, or behind the line of contact. If, however, the attacker was able to destroy three units simultaneously, then neither course of action would offer a significant advantage (fig. 4).

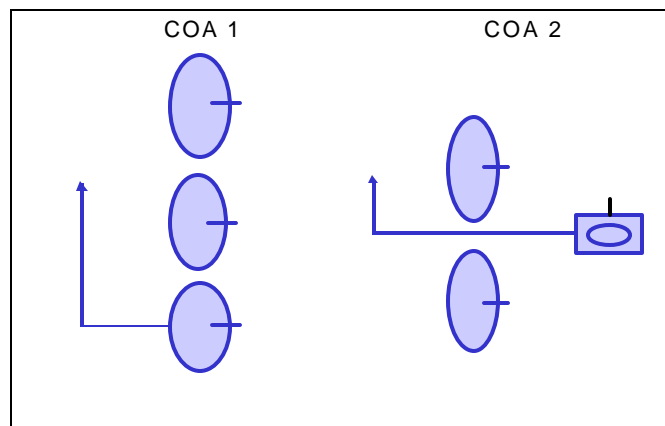


Figure 4. Maneuver comparison of COAs

Offensive

Offensive is the principle by which a military force achieves decisive results by acting with initiative, employing fire and movement, and sustaining freedom of maneuver and action while causing an enemy to be reactive (FM 101-5-1 1997, 1-113). FM 3-90 states that a defending force conducts operations throughout the depth of the enemy's formation in time and space to destroy his key units and assets, particularly his artillery and reserves, or to disrupt their timely introduction into battle at the point of engagement. This allows the defending force to regain the initiative. The defending force counterattacks enemy successes rapidly with its reserve, the forces at hand, or a striking force before the enemy can exploit success (FM 3-90 2001, 8-16). FM 3-90 also states that the defender does not wait passively to be attacked, he aggressively seeks ways of attriting and weakening attacking enemy forces before initiation of close combat. The defender maneuvers to place the enemy in a position of disadvantage and attacks him at every opportunity using direct and indirect fires (FM 3-90 2001, 8-2).

Being that the offense is the more decisive type of combat and that FM 3-90 states that a defender should aggressively seek opportunities to counterattack the attacker, the thesis will analyze the effectiveness and efficiency of each course of action regarding the principle of offense.

Based again on their disposition of forces, COA 1 and COA 2 have varying advantages and disadvantages regarding the principle of offense. The basic difference is that COA 1 is better postured for offensive action beyond the line of contact, while COA 2 is more advantageous for conducting offensive actions at and behind the line of contact.

COA 1 is more efficient for offensive operations beyond the line of contact, given the disposition of its units at the line of contact. Such disposition eliminates the need for passage through friendly units and provides enhanced situational understanding of enemy forces and terrain. The most significant advantage of COA 1 though is that it facilitates offensive actions beyond the line of contact rather than behind or at it, which has some significant advantages. The most significant advantage is that it begins to shift the initiative to the defender early in the fight. The enemy commander is forced to make a decision to commit combat power to counter the threat or to accept risk. If he chooses to commit combat power to meet the threat, it weakens his ability to mass at the line of contact; and if he chooses to accept the risk, it forces him to fight in two directions. In either case the defending commander has begun to wrestle the initiative from the attacker.

Another advantage of engaging the enemy forward of the line of contact is that it disrupts the enemy's attack forward of the line of contact, which would affect his ability to synchronize combat power at the line of contact. Every enemy vehicle destroyed or disrupted forward of the line of contact is one less available to influence the engagement at and behind the line of contact.

The disadvantage of COA 2 regarding offensive action beyond the line of contact is the increased distance of travel required for the rear-positioned unit in comparison to the forward-positioned unit and the friction of conducting a forward passage of lines. The increased time for commitment of the rear unit in COA 2 is critical, as it reduces the decision-making time for the defender, given the travel time involved; and it increases the enemy's ability to detect and react to the action. The friction involved in a forward

passage of line would further increase the required commitment time, while also simultaneously disrupting the actions of the stationary and moving force.

While COA 2 is more advantageous than COA 1 in retaining offensive capability at and behind the line of contact, one must weigh that cost with the cost of allowing the enemy success at the line of contact. The question then becomes what contribution does the retention of an offensive capability make once the forward position is attrited beyond effectiveness, or worse yet, penetrated?

There are three possible outcomes concerning such contribution. First, the offensive capability is able to counterattack and eliminate the enemy threat; secondly, the offensive capability is able to place the threat in check; and thirdly, the offensive capability is eliminated by the threat. The disadvantage of each outcome is that friendly combat is attrited in each situation. The level of attrition is the only issue. Even if the threat is eliminated, as stated in the first outcome, the bottom line is that combat power potential has been degraded at the line of contact.

Offensive action forward of the line of contact also provides three possible outcomes. The first outcome is that the enemy is eliminated forward of the line of contact. The second outcome is that the offensive action places the enemy in check. And the third outcome is that the enemy destroys the offensive action forward of the line of contact, and subsequently penetrates the line of contact. In two of the three outcomes, combat power is retained at the line of contact. However, in the third outcome, there are no forces available that can counter the penetration.

Another consideration regarding the principle of offensive action at or behind the line of contact is the psychological effect on the morale of troops. An attacker who tastes

success is likely to gain an appetite for a fight, whereas a defender who tastes defeat is likely to lose his appetite to fight. As such, the psychological factors of morale are a significant factor that should be considered in the planning of offensive actions beyond, at, or behind the line of contact.

According to Frederick the Great, entrenchments are taken: (1) because whoever is enclosed in them is restricted to one ground, (2) and because whoever attacks can maneuver freely, (3) He who attacks is bolder than the one who defends himself; because, if a point in one's entrenchment is forced, all the rest is lost on account of the discouragement that this occasions among the troops (Frederick 1985, 378). It can be concluded then that offensive action forward of the line of contact is more favorable than offensive action at or behind the line of contact, given the potential effects on combat power and morale at and behind the line of contact. Therefore, COA 1 is more favorable than COA 2, as it facilitates offensive action forward of the line of contact more effectively and efficiently than COA 2.

Unity of Command

Unity of command is another principle of war that affects the employment of reserves. Unity of command entails all forces operating under one responsible commander who possesses requisite authority to direct forces in pursuit of a common unified purpose (FM 101-5-1 1997, 1-159). On the surface unity of command would not seem to be an issue, assuming all the forces remain under control of the higher command for both courses of action. At the outset of the engagement, this would hold true; however, as units become committed throughout the AO, retaining unity of command becomes a significant factor to be considered at the decisive point.

COA 1 is advantageous in retaining unity of command, given the anticipated commitment of its forces once the engagement begins. Anticipated commitments for units in COA 1 are: (1) maneuver forward to destroy attacking enemy forces forward of the line of contact, (2) remain in current positions at the line of contact, (3) or maneuver rearward of the line of contact to destroy attacking forces that have penetrated the line of contact.

For each of these commitments, unity of command remains clear at the higher command and also at the level of command committed, given the disposition of forces. The anticipated commitments for the reserve unit depicted in COA 2 remains the same as COA 1 beyond and behind the line of contact; however, its commitment to reinforce a unit at the line of contact, as depicted in Branch 1, has the potential to significantly degrade unity of command at the line of contact. To begin with, the very requirement to reinforce a forward unit signifies that the situation at the point of contact is tenable. Having another unit enter the fight at this time would only increase the command and control challenges for directing and deconflicting direct and indirect fires. The level of degradation of the forward unit would also be a factor once the reserve is integrated into the fight. The question of who maintains unity of command for the fight at hand; the unit in contact that has been degraded in combat power, or the fresh unit from the rear, which lacks a feel for the engagement at hand is crucial. Even if the forward unit retains command at the onset of the rear unit's arrival, at what point does that command shift to the rear unit?

Another concern would be that each unit is looking out for its best interests rather than that of the whole. The forward unit commander might make decisions that conserve

his combat power and place his unit in a more advantageous position, leaving the newly arrived reinforcement vulnerable to the enemy. The same would also hold true for the reinforcing unit commander; should he do what is in the best interest of his force or that of the whole? Having to make these decisions would only stress unity of command at the most critical point in the engagement. As such, COA 1 would be more favorable, given the anticipated commitments beyond, at and behind the line of contact.

Simplicity

The next principle for analysis is simplicity. Simplicity is the preparation and execution of clear, uncomplicated, and concise orders and plans to facilitate mission execution in the stress, fatigue, and fog of war (FM 101-5-1 1997, 1-141). For the purpose of analysis the thesis will assume that the enemy is capable of attacking either flank or in the center of the defending units. The analysis will also consider enemy culmination forward of the line of contact, stalemate at the line of contact, and penetration of the line of contact. COA 1 is advantageous concerning the principle of simplicity, given its initial disposition and anticipated commitments based on the enemy courses of action. If the enemy's main effort is in the north, the northern unit blocks the enemy attack to prevent penetration of the line of contact, the center unit fixes enemy forces to facilitate the counterattack by the southern unit, and the southern unit counterattacks into the flank of the attacking force. If the enemy's main effort were in the south, friendly actions would mirror those discussed above. If the enemy attacks in the center, the center unit blocks the enemy attack to prevent penetration of the line of contact, and the flank unit most decisively engaged fixes the attacking force to facilitate the counterattack by the opposite flank. The flank unit least decisively engaged

counterattacks to complete the destruction of the enemy force forward of the line of contact.

If the northern unit is unable to block the attacking force in the north, it delays in sector to facilitate a counterattack in depth. The center unit fixes follow on enemy forces to protect the counterattacking unit's western flank. The southern flank unit counterattacks behind the line of contact to complete destruction of the enemy penetration. If the southern unit is unable to block the attacking force in the south, friendly actions would mirror those discussed above.

If the center unit is unable to block the attacking force in the center, it delays in sector to facilitate a counterattack in depth. The flank unit most decisively engaged delays in sector, with the center unit to facilitate the counterattack by the opposite flank. The flank unit least decisively engaged counterattacks into the flank of the penetrating force to complete its destruction (fig 5).

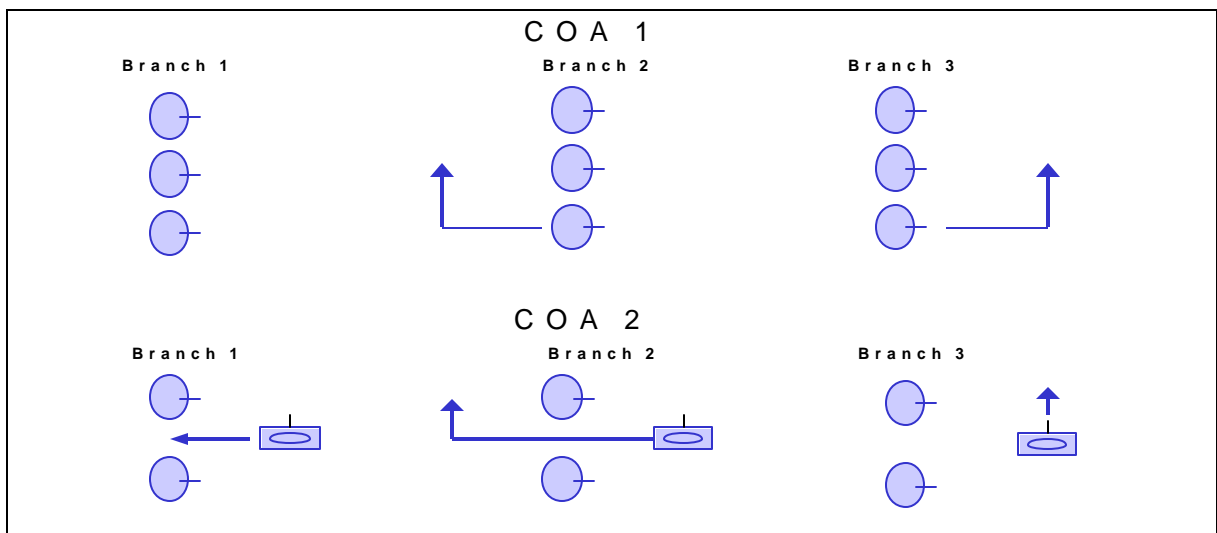


Figure 5. Depiction of COA 1 and 2 branch plans.

The branch plans of COA 1 do not require any forward or rearward passages during contact, and only require one decision, counterattack beyond or behind the line of contact. COA 2, however, would be more complex, given the requirement to conduct a forward passage of lines in order to counterattack forward of the line of contact. The numerous contingencies associated with reinforcing each forward position, as well as the establishment of blocking positions to counter any penetrations in the north, center, or south, would add to the complexity of the plan. The reserve unit would have to coordinate plans, preparations, and execution of actions for three, rather than two, possible branches, whereas COA 1 would only require the coordination for two branches. With each additional planning, preparation, and execution requirement, the complexity of a COA increases exponentially, thus affecting the simplicity of the operations. Therefore, COA 1 is more favorable, given its enhanced simplicity.

Economy of Force

The final principle of war is economy of force, the allocation of minimum essential combat capability or strength to secondary efforts so that forces may be concentrated in the area where a decision is sought (FM 101-5-1 1997, 1-58). As the reciprocal of mass, economy of force requires accepting prudent risk in selected areas to achieve superiority--overwhelming effects--in the decisive operation. Economy of force involves the discriminating employment and distribution of forces. Commanders never leave any element without a purpose. When the time comes to execute, all elements should have tasks to perform (FM 3-0 2001, 4-13).

Clausewitz concurs that all forces should be involved, leaving no part of the whole force idle. He states, "If a segment of one's force is located where it is not

sufficiently busy with the enemy, or if troops are on the march-that is, idle-while the enemy is fighting, then these forces are being managed uneconomically” (Clausewitz 1984, 213).

COA 1 and COA 2 each demonstrate the principle of economy of force, with their differences being what they each identify as secondary efforts and where they want to achieve decisive results. This very principle often becomes the most critical decision a commander faces when allocating combat power in the defense. Being that the decision to assume a defensive posture often indicates a lack of combat power to conduct offensive operations, the defender is often at a numerical disadvantage in combat power to that of the attacker. As such, decisions regarding the principle of economy of force are only magnified in importance.

On the surface it would appear that the disposition of units in COA 2 demonstrate a more efficient application of economy of force; however, after closer analysis, COA 1 is a more efficient application of the economy of force principle. COA 1 allocates its units across its entire front, accepting prudent risk in depth. The advantage of such disposition is that the attacker must account for these forces sooner and simultaneously or accept risk across his front. The disadvantage of this disposition is the lack of depth as a result of economizing combat power across the entire front.

COA 2, on the other hand, economizes its forces in the forward positions, accepting prudent risks on its flanks in order to retain one-third of its force to the rear. Although this disposition is more favorable to operations in depth, it takes combat power from the forward positions, which results in creating more favorable combat ratios for the enemy at the line of contact. As such, a third of the available combat power is left

initially unemployed and without a task or purpose at the onset of the engagement. Such a disposition would allow the enemy to maximize his available combat power at the line of contact, then sequentially in depth against the reserve. Having more favorable combat ratios at the line of contact would actually increase the attacker's probability for success at the line of contact, which would, in turn, result in the sequential commitment of the reserve to reinforce the forward unit(s) or block a penetration.

The decisive action of COA 2 then is tied to the disposition and capability of the rear positioned reserve unit. Although flexibility is enhanced behind the line of contact, the disadvantage in combat ratios at the line of contact would most likely result in even less favorable combat ratios in depth, thus negating the enhanced flexibility. Although less flexible in depth, the flexibility of COA 1 across the forward positions would enable the forward units to create more favorable combat ratios at the line of contact, thus reducing the attacker's potential combat power in depth. As such COA 1 would be more favorable than COA 2 regarding the principle of economy of force.

The tenets of Army operations--initiative, agility, depth, synchronization, and versatility--build on the principles of war. They further describe the characteristics of successful operations. While they do not guarantee success, their absence risks failure (FM 3-90 2001, 2-4).

Initiative

Initiative is setting or dictating the terms of action throughout the battle or position. Initiative implies an offensive spirit in all operations. To set the terms of battle, commanders eliminate or reduce the number of enemy options. They compel the enemy

to confirm to friendly operational purposes and tempo, while retaining freedom of action (FM 3-0 2001, 4-15).

COA 1 is more favorable than COA 2 with respect to initiative. The disposition of units in COA 1 compel the attacker to commit combat power sooner in the engagement in order to create more favorable conditions at the line of contact, while also enhancing the active commitment of combat power forward of the line of contact. Such a disposition thus enhances the proactive offensive commitment of units forward of the line of contact. COA 2, on the other hand, relinquishes the initiative to the enemy, reserving the commitment of the rear position force until the enemy has committed his forces. As such, the attacker retains control and sets the tempo of the operation, causing the defender to be reactive rather than proactive in nature.

Agility

Agility is the ability to move quickly and easily. Tactical agility is the ability of a friendly force to react faster than the enemy. It is essential to seizing, retaining, and exploiting the initiative (FM 3-0 2001, 4-16).

While COA 1 retains a greater agility forward of the line of contact, COA 2 retains a greater agility at and behind the line of contact. Therefore, if the decisive action is intended forward of the line of contact, COA 1 would be the more favorable COA. If the decisive action is intended at or behind the line of contact, COA 2 would then be the more favorable COA, given the disposition of the reserve. The forward disposition of all units in COA 1 is the reason for such agility beyond the line of contact, while the rearward disposition of a unit in COA 2 provides for agility at and behind the line of contact.

Depth

Depth is the extension of operations in time, space, and resources. Commanders use depth to obtain space for effective maneuver, time to conduct operations, and resources to achieve and exploit success. Depth enables momentum in the offense, elasticity in the defense, and staying power in all operations (FM 3-0 2001, 4-17).

COA 2 is clearly more advantageous regarding the tenet of depth, based on the disposition of its units. The disposition of the reserve unit in depth as depicted in COA 2 facilitates the reallocation of combat power at and behind the line of contact, whereas the forward disposition of all the units in COA 1 fails to provide depth.

Synchronization

Synchronization is arranging activities in time, space, and purpose to mass maximum relative combat power at the decisive place and time. Without synchronization there is no massing of effects. Commanders balance synchronization against agility and initiative; they never surrender initiative or miss a decisive opportunity for the sake of synchronization (FM 3-0 2001, 4-17).

COA 2 is less favorable than COA 1 regarding synchronization, given the variety of contingencies expected, decreased decision time for commitment, and increased coordination requirements of the rear positioned unit in COA 2. Although the retention of a rear positioned reserve is intended to preserve an offensive capability for the defender, it must also be prepared to perform other missions. In certain situations, it may be necessary to commit the rear positioned unit to restore the integrity of the defense by blocking an enemy penetration, reinforcing fires into an engagement area, or relieving depleted units. Reacting to threats directed against the friendly force's sustainment

effort, extending the flanks of a defending unit to prevent its envelopment, and covering a retrograde movement are a few other tasks traditionally expected of a rear-positioned unit.

The advantage of the disposition of units in COA 1 is that a forward passage of lines is not required and each unit only has two branches to synchronize, as discussed earlier, compared to three for COA 2. Therefore COA 1 is more favorable than COA 2 regarding synchronization.

Versatility

Versatility is the ability of Army forces to meet the global, diverse mission requirements of full-spectrum operations. Versatility entails the ability to quickly transition from one type of operation to another with minimum changes to the deployed force structure. Commanders maximize versatility by developing the multiple capabilities of units and soldiers. Versatility contributes to the agility of Army units (FM 3-0 2001, 4-17,18).

COA 2 is more versatile than COA 1, given its ability to counter a variety of planned and unplanned contingencies. The rear unit in COA 2 must retain the capability to conduct a variety of tasks as previously discussed. COA 1 though is more advantageous than COA 2, given its ability to quickly transition from a defensive to an offensive posture with minimum changes to its composition. As previously discussed, the forward disposition of its units facilitates this transition.

The author acknowledges that the advantages and disadvantages of each COA in respect to the principles of war and the tenets of Army operations may change, given the

tactical situation at hand. Tactics always require judgment and adaptation to the unique circumstances of a specific situation.

War is, above all things, an art, employing science in all its branches as its servant, but depending first and chiefly upon the skill of the artisan. It has its own rules, but not one of them is rigid and invariable. As new implements are devised new methods result in its mechanical execution; but over and above all its mechanical applications, it rests upon the complex factors of human nature, which cannot be reduced to formulas and rules. The proper use of these thinking and animate parts of the great machine can be divided only by the genius and instinct of the commanders. No books can teach this, and no rules define it. (FM 3-0 2001, 1-1)

Regarding the principles of war and the tenets of Army operations, given the respective courses of action, it would appear that the forward disposition of forces depicted in COA 1 is more favorable overall than the disposition of two units forward and one in reserve as depicted in COA 2. Such findings would challenge the historical analysis that found that the retention and employment of reserves was fundamentally sound and of great value, given the uncertainty of the battlefield.

As for the question of the reserve's disposition, given the decision to retain a reserve, it appears that the majority of the principles of war and tenets of Army operations would favor a forward rather than rearward positioning of such combat power. Such reasoning was that the positioning of the reserve in the rear did not protect them from attrition or decisive engagement, as was true in the past, and that positioning reserve forces forward would produce more favorable combat ratios. Again such findings would challenge the historical analysis that found it most effective to position the reserve centrally and to the rear of the line of contact.

Concerning the effectiveness and efficiency of an uncommitted versus a committed reserve force, it would appear that the principles of war and tenets of Army

operations favor the utilization of a committed force over an uncommitted force. Such reasoning was attributed to the assessment that uncommitted forces are not exempt from enemy effects, which was once true, and that the commitment of all available combat power would provide more favorable combat ratios. Although the issue of commitment was the subject of the greatest debate with the historical analysis, the doctrinal analysis clearly favors the commitment of all available forces in order to create more favorable combat ratios throughout the whole engagement.

Given the discrepancies between the historical and doctrinal analysis the thesis will now present a simulated analysis to substantiate or refute such findings.

CHAPTER 6

SIMULATION ANALYSIS

Although simulations have their limitations, they provide a means that is void of historical accounts and doctrinal analysis, that is, the means to analyze a specific situation given variables in a controlled environment. The significant shortcoming of history is that it only establishes what happened given the conditions at hand. History can only speculate what would have happened had the conditions been modified or a different tactical solution chosen for the problem at hand. The shortcoming of the doctrinal analysis is that it only provides an expectation of the application of doctrine, not the actual outcome of the application of the doctrine. As such, a simulation analysis, concerning the retention and employment of reserves, was conducted to fill the voids of the historical and doctrinal analysis.

JANUS version 7.2 was selected as the simulation for conducting the simulation analysis based on its ability to provide as realistic a model of the battlefield at brigade and below that can be found in the model and simulation world. Its ability to provide analytical information and graphical comparisons between enemy and friendly forces further precipitated its selection. In addition, its availability and accessibility at the time of the research was also instrumental in its selection. The significant disadvantage of JANUS is that it is not capable of replicating the dynamics of the human dimension involved in the application of combat power.

The terrain, enemy situation, and friendly courses of action utilized during the simulated analysis were identical to those compared in the doctrinal analysis. The terrain did not provide a significant advantage to either combatant. It consisted of excellent

fields of fire with limited cover and concealment. Obstacles on the flanks restricted maneuver for each combatant. The weather was clear with unlimited visibility. The time was set at 1200 P.M. to eliminate any advantage or disadvantage from the sun. The level of moral and training proficiency was equal for each combatant as well. To further reduce variables both the attacker and defender were equipped with M1A1 tanks to negate any advantage or disadvantage of specific weapon systems. In addition, all forms of contact, other than direct fire, were eliminated to reduce the number of variables that could influence the simulation results.

The enemy consisted of a tank brigade pure with the mission to destroy the defending tank battalion. The enemy attacked with two battalions in the first echelon and one in the second. The first echelon consisted of a battalion(-) in the south to fix and suppress defending forces and a battalion(+) in the north to create a penetration. A third battalion followed in the north in the second echelon with the mission to complete the destruction of the defending battalion. The enemy course of action was noninteractive. It remained the same for both BLUFOR courses of action and each branch within the respective courses of action, to further limit the variables involved.

The defending force consisted of a three-company M1A1 tank battalion pure with the mission to destroy the attacking tank brigade in order to prevent penetration of its rear boundary. Two courses of action, with three branch plans each, were utilized to compare and contrast the advantages and disadvantages of each COA.

COA 1 depicted three companies defending forward from battle positions. The task of the forward companies was to destroy the tank brigade in order to prevent penetration of their rear boundary. The flank companies were given prepared missions

to reinforce other company battle positions in order to complete the destruction of the brigade; counterattack forward of the battle positions in order to complete the destruction of the brigade; and block penetrations of the battle positions in order to prevent penetration of the rear boundary.

COA 2 depicted two companies defending forward from battle positions with one company in reserve. The task of the forward companies was to destroy the brigade in order to prevent penetration of their rear boundary. A company-sized reserve initially positioned to the rear of the forward battle positions prepared to reinforce the company battle positions in order to complete the destruction of the brigade; to counterattack forward of the battle positions in order to complete the destruction of the brigade; and/or block penetrations of the battle positions in order to prevent penetration of their rear boundary. The two COAs, with respective branch plans, are as depicted in figure 6.

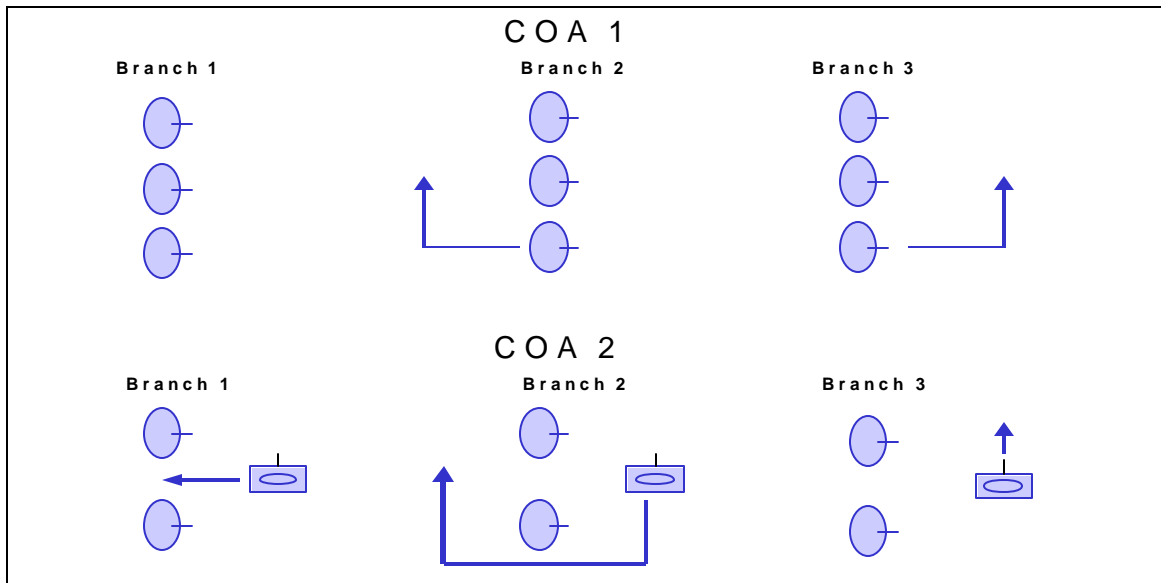


Figure 6. Simulation COAs with branch plans

The simulation revealed that the COA 1 was overall more effective and efficient than COA 2. The attacker's starting combat power was 132 and the defender's 44. The total losses at end state for both the attacker and defender are depicted in table 1.

Table 1. Simulation Results

	COA 1	COA 2
Iteration	Branch 1 (Reinforce BPs)	Branch 1 (Reinforce BPs)
	Losses Attacker/Defender	Losses Attacker/Defender
1	123 / 28	97 / 34
2	123 / 28	88 / 34
3	123 / 28	85 / 34
Avg.	123 / 28	90 / 34
% losses	93% / 64%	68% / 77%
	Branch 2 (CATK Forward)	Branch 2 (CATK Forward)
1	132 / 12	67 / 22
2	132 / 12	57 / 44
3	132 / 04	69 / 28
Avg.	132 / 09	64 / 31
% losses	100% / 20%	48% / 71%
	Branch 3 (CATK Rear)	Branch 3 (CATK Rear)
1	132 / 28	132 / 27
2	132 / 25	132 / 26
3	132 / 25	132 / 26
Avg	132 / 26	132 / 26
% losses	100% / 59%	100% / 59%
COA Avg.	129 / 21	95 / 30
COA %	98% / 48%	72% / 69%

Branch 2 of COA 1 was the most effective, given the simulation results. Although two other branches (Branch 3, COA 1 and Branch 3 COA 2) also attained 100 percent destruction of the attacking force, the defender only lost 20 percent of its force, on average, using Branch 2 of COA 1. On the flip side, Branch 2 of COA 2 was the least

effective given the simulation results. It only destroyed 48 percent of the attacking forces while losing 71 percent of its defending force.

The explanation for such results is directly related to the principle of mass and maneuver. In COA 1 a greater percentage of the enemy was destroyed prior to the counterattack forward, which improved combat ratios for the counterattacking force. Although the forces in each COA counterattacked at precisely the same time across the line of contact, the attacker retained a greater capability in combat power when the defender used Branch 2 of COA 2. As a result of only facing two rather than three defending companies at the line of contact, the attacker retained almost a battalion more worth of combat power. It is evident from the results then that COA 1, with its massing of combat power forward, was more effective than COA 2, which only massed two companies forward while retaining one idle in the reserve. Other advantages of Branch 2, COA 1, are that they took advantage of attacking the enemy in the flank and made the attacker fight in more than one direction, which affected his ability to mass in any one direction. It should be noted, though, that a counterattack forward and into the flank of the attacker was only effective if the enemy threat opposing the counterattack force was defeated prior to the counterattack. The results of Branch 2, COA 2, provide evidence to this fact, being the defending force suffered 51 percent more casualties during the counterattack forward when the attacker retained a capability to oppose the counterattack force.

Branch 3, of each COA, was the next most effective option. Both branches destroyed 100 percent of the attacking force while retaining 41 percent of their defending force. Although COA 1 was effective in destroying more of the attacking force forward

of the line of contact, it retained less combat power to counterattack rear of the line of contact. COA 2, on the other hand, which destroyed less of the attacking force forward of the line of contact, had more combat power to counter a larger penetration to the rear of the line of contact. In the end Branch 3 of each COA produced the same results. The explanation for these results can be attributed to the tenet of depth and maneuver.

Extending the attrition of the attacker force over ten kilometers, rather than just five, facilitated the defenders ability to mass in depth while making it more difficult for the attacker to concentrate his force as he attacked in depth. Retaining the ability to maneuver also contributed to the success. Branch 3 of COA 1, based on the disposition of its counterattack force, again took advantage of attacking into the flank of the attacking force. Branch 3 of COA 2 however, based on its disposition, only partially took advantage of attacking into the flank of the attacking force. It is evident, though, that the principle of attaining a position of advantage through the application of maneuver was effective.

Branch 1 was the least effective combined option for the COAs. Branch 1, COA 1, was the fourth best option while Branch 1, COA 2, was the fifth best option overall. Only Branch 2 of COA 2 was less effective. While Branch 1, COA 1, destroyed 93 percent of the attacking force, it only retained 36 percent of its defending force. Branch 1, COA 2 was even less effective, destroying only 68 percent of the attacking force while retaining only 23 percent of its combat power. In both courses of action the attacking force was successful in penetrating the defender's rear boundary. Again, as with the other branches, COA 1, with its three companies abreast, was successful in destroying a higher percentage--25 percent more, to be exact--of the attacking forces forward of the

line of contact than COA 2. This difference of 25 percent can be attributed again to the principle of mass over time. Whereas COA 1 massed the effects of three companies over the entire length of the engagement, COA 2 only massed the potential effects of three companies for a portion of the engagement.

The results from the simulation serve to substantiate elements of both the historical and doctrinal analysis. In respect to the historical analysis, the simulation substantiated the benefit of having an uncommitted force positioned to the rear to counter a penetration of the forward position. In respect to the doctrinal analysis the simulation substantiated that a committed forward positioned force could equally counter a penetration of the forward position. The simulation also substantiated that a committed forward-positioned force was more effective than an uncommitted rear-positioned force in conducting a counterattack forward of the line of contact. The simulation also substantiates that a committed forward-positioned force is slightly more effective than an uncommitted rear-positioned force in defeating an attacking force at the line of contact.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that historical documentation supports current US Army doctrine of retaining an uncommitted force kept to the rear, for the purpose of retaining flexibility through offensive action and to provide a hedge against uncertainty. The consensus among historical theorists and practitioners was that the retention and employment of reserves was fundamentally sound and of great value, given the uncertainty of the battlefield. All agreed that a reserve should be constituted; only its size and composition were debatable. As to the question of its disposition on the battlefield, the majority suggested the reserve should be centrally located, so as to be able to influence the greatest portion of the battlefield and that it should be positioned to the rear of forward troops, so as to prevent it from being decisively engaged prior to its commitment.

Whether a reserve had to be an uncommitted force or could consist of committed forces not currently engaged or lightly engaged was debatable. While most thought it was best to subtract a dedicated force uncommitted to any other action, some acknowledged that a reserve could consist of forces that had other commitments or had been created from forces not in contact or from those able to disengage from contact. In view of the great value they all placed on maintaining a reserve, how to reconstitute a reserve once committed sparked most of the debate over the uncommitted versus committed status of a reserve.

Although current US Army doctrinal manuals support the historical findings of: retaining a reserve, positioning the reserve to the rear, and keeping the reserve free from

commitment elsewhere, they do acknowledge that a commander's defensive plan should be able to succeed without using his reserve. They also address that lightly committed elements or units not in contact may be used to reconstitute a reserve once committed to action.

As such, doctrine is viewed by historical theorists and practitioners of war to be efficient and effective concerning the retention and employment of reserves at the tactical level. The doctrinal analysis and simulation results, however, indicate otherwise. The doctrinal analysis and simulation findings indicate that doctrine concerning the retention and employment of reserves at the tactical level is not as efficient and effective as positioning all available combat power forward along the line of contact. These findings indicate that a defender can be as or even more effective without the retention of a uncommitted reserve positioned to the rear of forward troops.

Given the respective courses of action for study, it appears that the principles of war, the tenets of Army operations, and simulation results favor the forward disposition of forces depicted in COA 1 more than the disposition of two units forward and one in reserve as depicted in COA 2. Such findings challenge the historical analysis that found that the retention and employment of reserves was fundamentally sound and of great value, given the uncertainty of the battlefield.

As for the question of the reserve's disposition, given the decision to retain a reserve, it appears that the majority of the principles of war, tenets of Army operations, and simulation results favor a forward rather than rearward positioning of such combat power. Such reasoning was based on the fact that the positioning of the reserve in the rear did not protect them from attrition or decisive engagement, as was true in the past,

and that positioning reserve forces forward would produce more favorable combat ratios throughout the duration of the engagement. Again such findings would challenge the historical analysis that found it most effective to position the reserve centrally and to the rear of the line of contact.

Concerning the effectiveness and efficiency of an uncommitted versus a committed reserve force, it would appear that the principles of war, tenets of Army operations, and simulation results favor the utilization of a committed force over that of an uncommitted force. Such reasoning was attributed to the assessment that uncommitted forces are not exempt from enemy effects based on their positioning, which was once true, and that the commitment of all available combat power would provide more favorable combat ratios at the line of contact.

As a result of these findings the author recommends further study to validate the effectiveness and efficiency of doctrine concerning the retention and employment of reserves at the tactical level. Recommendations for further study include: analyzing the effectiveness and efficiency of doctrine concerning the retention and employment of reserves in support of offensive tactical operations; analyzing the effectiveness and efficiency of doctrine concerning the retention and employment of reserves in an asymmetrical, noncontiguous environment; investigating the effects of information superiority regarding the necessity and decision to retain and employ reserves on the future battlefield; and investigating the effects of organizational, doctrinal, and threat changes on the retention and employment of reserves at the tactical level.

In closing the author recommends, pending the results of further study that substantiates these findings, that the doctrinal definition of a reserve be modified to omit

the requirement for a reserve to be an uncommitted force and positioned to the rear. The author acknowledges that the best solution to a tactical problem may support the initial positioning of uncommitted combat power elsewhere than the line of contact. However, given the intent of doctrine is to guide, rather than dictate operations, the current doctrinal definition and understanding of reserves, restricts the optimal employment of all available combat power.

The author also recommends the restructuring of the current definition and understanding of a reserve, with the emphasis being that a defender should position his forces in a manner that maximizes the use of all available combat power throughout the engagement. Depending on the tactical situation at hand and forces available this could very well require the retention and employment of a traditional reserve, however, the situation may require a more innovative and non-traditional approach in maximizing the use of all available combat power throughout the engagement.

Acknowledging that such thought and practice is beyond the comprehension and applicability of doctrinally established norms, the author has suggested the following revised definition: That portion of a force, available for commitment at a designated time, that retains a commanders flexibility to conduct decisive offensive actions.

REFERENCE LIST

- Albertson, Michael, Major. 2000. Observation on Force XII and the three company battalion. *CALL Newsletter "First Look!" No.00-1* (Fort Leavenworth, KS).
- Borden, Gregory J. 1995. True Tactical Reserves in Striking Force Operations: Pilfering of Combat Power at the Line of Contact. Monograph, School of Advanced Military Studies, USACGSC, Fort Leavenworth, KS.
- Bullington, Terry W. 1986. Considerations for the organization and employment of an operational reserve. Monograph, School of Advanced Military Studies, USACGSC, Fort Leavenworth, KS.
- Center for Army Lessons Learned (CALL). 1996. *NTC Priority Trends: A compendium of trends, with techniques and procedures that work!* Fort Leavenworth, KS: United States Government Printing Office.
- _____. 1998. *NTC Trends Compendium, no. 97-17, September 1997*. Fort Leavenworth, KS: United States Government Printing Office.
- _____. 1995. BCBST (Brigade Command and Battle Staff Training Team): Perceptions II, FY95. Fort Leavenworth, KS: United States Government Printing Office.
- Clausewitz, Carl, von. 1976. *Principles of War*. In *Roots of Strategy: Book 2*. Pages 300-387. Harrisburg, PA: Stackpole Books.
- _____. 1984. *On war*. Edited and translated by Michael Howard and Peter Paret. Princeton, NJ: Princeton University Press.
- De Saxe, Maurice. 1985. My reveries upon the art of war. In *Roots of Strategy*. Pages 65-175. Harrisburg, PA: Stackpole Books.
- Du Picq, Ardant. 1987. *Battle Studies*. In *Roots of Strategy: Book 2*. Pages 13-299. Harrisburg, PA: Stackpole Books.
- Dupuy, T. N. 1984. *The evolution of weapons and warfare*. Fairfax, VA: Hero Books.
- Eckert, Gregory M. 1986. Operational reserves in AFCENT: Another look. Monograph, School of Advanced Military Studies, USACGSC, Fort Leavenworth, KS.
- Field Service Regulation 1923. See Headquarters, Department of the Army. 1923.
- Field Service Regulation 1940. See Headquarters, Department of the Army. 1940.

- Field Service Regulation 1944. See Headquarters, Department of the Army. 1944.
- Field Service Regulation 1954. See Headquarters, Department of the Army. 1954.
- FM 3-0. 2001. See Headquarters, Department of the Army. 2001.
- FM 3-90. 2001. See Headquarters, Department of the Army. 2001.
- FM 100-5. 1962. See Headquarters, Department of the Army. 1962.
- FM 100-5. 1993. See Headquarters, Department of the Army. 1993.
- FM 101-5-1. 1997. See Headquarters, Department of the Army. 1997.
- Frederick, The Great. 1985. The instruction of Frederick the Great for his generals 1747. Translated by Phillips, Thomas R. In *Roots of Strategy*. Pages 301-400. Harrisburg, PA: Stackpole Books.
- Frost, John. 1983. *PARA Falklands*. London: Buchan & Enright.
- Fuller, J. F. C. 1983. *Armoured Warfare*. Westport, CT: Greenwood Press Publishers.
- Gregory, Charles P. 1988. Operational reserves: renewing the offensive spirit. Monograph, School of Advanced Military Studies, USACGSC, Fort Leavenworth, KS.
- Griess, Thomas E. 1984. *Ancient and medieval warfare*. New Jersey: Avery Publishing Group.
- Guderian, Heinz. 1992. *Actung-Panzer!*. London: Arms and Armor Press.
- Hanna, Mark L. 1986. Employment of reserves in the operational defense. Monograph, School of Advanced Military Studies, USACGSC, Fort Leavenworth, KS.
- Headquarters Department of the Army 1923. Field Service Regulation. Baltimore: United States Government Printing Office.*
- _____. 1940. *Field Service Regulation*. Baltimore: United States Government Printing Office.
- _____. 1944. *Field Service Regulation*. Baltimore: United States Government Printing Office.
- _____. 1954. *Field Service Regulation*. Baltimore: United States Government Printing Office.

- _____. 1962. FM 100-5, *Operations*. Baltimore: United States Government Printing Office.
- _____. 1993. FM 100-5, *Operations*. Baltimore: United States Government Printing Office.
- _____. 1997. FM 101-5-1, *Operational terms and graphics*. Washington, DC: United States Government Printing Office.
- _____. 2001a. FM 3-0, *Operations*. Baltimore: United States Government Printing Office.
- _____. 2001b. FM 3-90, *Tactics*. Baltimore: United States Government Printing Office.
- Hooker Jr. Richard D. 1993. *Maneuver warfare: An anthology*. Novato, CA: Presido Press.
- House, Jonathon M. 2001. *Combined arms warfare in the twentieth century*. Lawrence, KS: University Press of Kansas.
- Jomini, Baron De. 1987. *The Art of War*. In *Roots of Strategy: Book 2*. Pages 388-557. Harrisburg, PA: Stackpole Books.
- Jones, Archer. 1987. *The Art Of War In The Western World*. Chicago: University of Illinois Press.
- JP 1-02. 2001. *Department of defense dictionary of military and associated terms*. Baltimore: United States Government Printing Office. Available from <http://www.dtic.mil/doctrine/jel/doddict/data/r/>. Internet. Accessed on 18 April 2002.
- Kahlani, Avigor. 1984. *The heights of courage*. Westport, CT: Greenwood Press Publishers.
- Komroff, Manuel. 1964. *The battle of Waterloo*. New York: The MacMillian Company.
- MacDonald, Charles B. 1985. *A time for trumpets*. New York: Bantam Books.
- Manstein, Erich von. 1985. *Lost victories*. Novato, OK: Presido Press.
- Milano, James M. 1992. Operational reserves: Still valid after all these years? Monograph, School of Advanced Military Studies, USACGSC, Fort Leavenworth, KS.

- Napoleon, Bonaparte. 1985. *Military maxims of Napoleon*. In *Roots of Strategy*. Pages 401-441. Harrisburg, PA: Stackpole Books.
- Romjue, John L. 1984. *From active defense to airland battle: The development of Army doctrine, 1973-1982*. Washington: United States Government Printing Office.
- Rommel, Erwin. 1979. *Attacks*. Provo, UT: Athena Press.
- Sun Tzu. 1982. *The Art of War*. Translated by S. B. Griffith. London: Oxford.
- Turner, Albert F. 1988. The operational reserve: What should it be used for? Monograph, School of Advanced Military Studies, USACGSC, Fort Leavenworth, KS.
- Vaux, Nick. 1986. *Take That Hill!* Mclean, VA: Pergammon-Brassey's International Defense Publishers.
- Vegetius, Flavius R. 1985. *The military institutions of the Romans*. In *Roots of Strategy*. Pages 65-175. Harrisburg, PA: Stackpole Books.

INITIAL DISTRIBUTION LIST

1. Combined Arms Research Library
U.S. Army Command and General Staff College
250 Gibbon Ave.
Fort Leavenworth, KS 66027-2314
2. Defense Technical Information Center/OCA
825 John J. Kingman Rd., Suite 944
Fort Belvoir, VA 22060-6218
3. Director
CTAC
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352
4. Colonel Stephen M. Sittnick
TSM MCS/GCCS-A
USACAC
415 Sherman Ave. Unit 5
Fort Leavenworth, KS 66027-1352
5. Lieutenant Colonel Paul Cal
CSI
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352
6. Harold S. Orenstein
DTTD
USACGSC
1 Reynolds Ave.
Fort Leavenworth, KS 66027-1352

STATEMENT A: Approved for public release; distribution is unlimited. (Documents with this statement may be made available or sold to the general public and foreign nationals).

STATEMENT B: Distribution authorized to U.S. Government agencies only (insert reason and date ON REVERSE OF THIS FORM). Currently used reasons for imposing this statement include the following:

1. Foreign Government Information. Protection of foreign information.
2. Proprietary Information. Protection of proprietary information not owned by the U.S. Government.
3. Critical Technology. Protection and control of critical technology including technical data with potential military application.
4. Test and Evaluation. Protection of test and evaluation of commercial production or military hardware.
5. Contractor Performance Evaluation. Protection of information involving contractor performance evaluation.
6. Premature Dissemination. Protection of information involving systems or hardware from premature dissemination.
7. Administrative/Operational Use. Protection of information restricted to official use or for administrative or operational purposes.
8. Software Documentation. Protection of software documentation - release only in accordance with the provisions of DoD Instruction 7930.2.
9. Specific Authority. Protection of information required by a specific authority.
10. Direct Military Support. To protect export-controlled technical data of such military significance that release for purposes other than direct support of DoD-approved activities may jeopardize a U.S. military advantage.

STATEMENT C: Distribution authorized to U.S. Government agencies and their contractors: (REASON AND DATE). Currently most used reasons are 1, 3, 7, 8, and 9 above.

STATEMENT D: Distribution authorized to DoD and U.S. DoD contractors only; (REASON AND DATE). Currently most reasons are 1, 3, 7, 8, and 9 above.

STATEMENT E: Distribution authorized to DoD only; (REASON AND DATE). Currently most used reasons are 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.

STATEMENT F: Further dissemination only as directed by (controlling DoD office and date), or higher DoD authority. Used when the DoD originator determines that information is subject to special dissemination limitation specified by paragraph 4-505, DoD 5200.1-R.

STATEMENT X: Distribution authorized to U.S. Government agencies and private individuals of enterprises eligible to obtain export-controlled technical data in accordance with DoD Directive 5230.25; (date). Controlling DoD office is (insert).