

2

AD-A258 104



AIR ASSAULT FORCES IN
THE COUNTERPENETRATION ROLE:
A VIABLE OPTION FOR THE FUTURE?

A Monograph
by
Major James A. Helis
Infantry



DTIC
ELECTE
DEC 21 1992
S E D

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

First Term AY 91-92

Approved for Public Release; Distribution is Unlimited

92-32398



92 12 18 088

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 2 January 1992	3. REPORT TYPE AND DATES COVERED Monograph	
4. TITLE AND SUBTITLE Air Assault Forces in the Counterpenetration Role: A Viable Option for the Future?			5. FUNDING NUMBERS	
6. AUTHOR(S) Major James A. Helis, U.S. Army			8. PERFORMING ORGANIZATION REPORT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) School of Advanced Military Studies U.S. Army Command and General Staff College Fort Leavenworth, Kansas 66027			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)			11. SUPPLEMENTARY NOTES	
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; distribution is unlimited.			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) See Attached				
14. SUBJECT TERMS Air Assault Operations Air Assault Forces			15. NUMBER OF PAGES 45	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT	

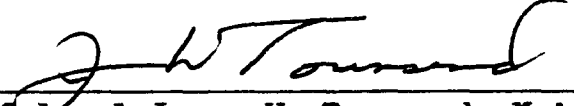
SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

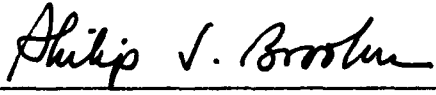
Student: Major James A. Helis, Infantry

Title of Monograph: Air Assault Forces in the
Counterpenetration Role: A Viable
Option for the Future?

Approved by:

 Monograph Director
Colonel James V. Townsend, M.A.

 Director, School
Colonel James R. McDonough, M.S. of Advanced
Military Studies

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

Accepted this 21st day of December, 1991

ABSTRACT

Air Assault Forces in the Counterpenetration Role: A Viable Option for the Future? By Major James A. Helis, USA, 45 pages.

The goal of this monograph is to determine if the use of air assault forces to counter armored penetrations on the modern battlefield is a viable option for the U.S. Army. The paper examines the problem of defeating penetrations; the theoretical and historical bases for using air assault forces against armored forces; and the capabilities and limitations of air assault forces in the counterpenetration role. The paper then moves to the employment of an air assault counterpenetration force, with emphasis on the defender's decision cycle and how the defender must decide how to commit such a force. Finally, U.S. force structures are examined to determine if U.S. forces as currently organized can execute air assault counterpenetration operations.

The author concludes that air assault forces can be effective against armored penetrations. In the U.S. Army, only the air assault division can perform such a mission, while the light and airborne divisions are capable of air assault counterpenetration operations only if given proper augmentation.

Accession For	
NTIS	CRA&I ☒
DTIC	TAB ☐
Unannounced ☐	
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	

DTIC QUALITY INSPECTED 1

TABLE OF CONTENTS

Introduction.	1
The Counterpenetration Problem	3
Theoretical Background.	7
Historical Examples	9
Capabilities and Limitations	16
Planning Considerations.	21
Capabilities of U.S. Forces.	32
Conclusions.	35
Endnotes	40
Bibliography	43

I. INTRODUCTION

Speed is the essence of war.

Sun Tzu¹

Rotor is to track as track is to boot.

Richard Simpkin²

On the modern nonlinear battlefield forces will be dispersed over large distances creating lateral gaps between friendly units and offering the opportunity for penetrations, flanking attacks, and envelopments. Offensive operations are likely to be characterized by fixing attacks that will permit maneuver through existing gaps or around exposed flanks. Even defending forces will have the opportunity to seize the initiative by counterattacking through gaps to objectives in the enemy's rear, thus forcing him to divert resources from offensive operations to defense.

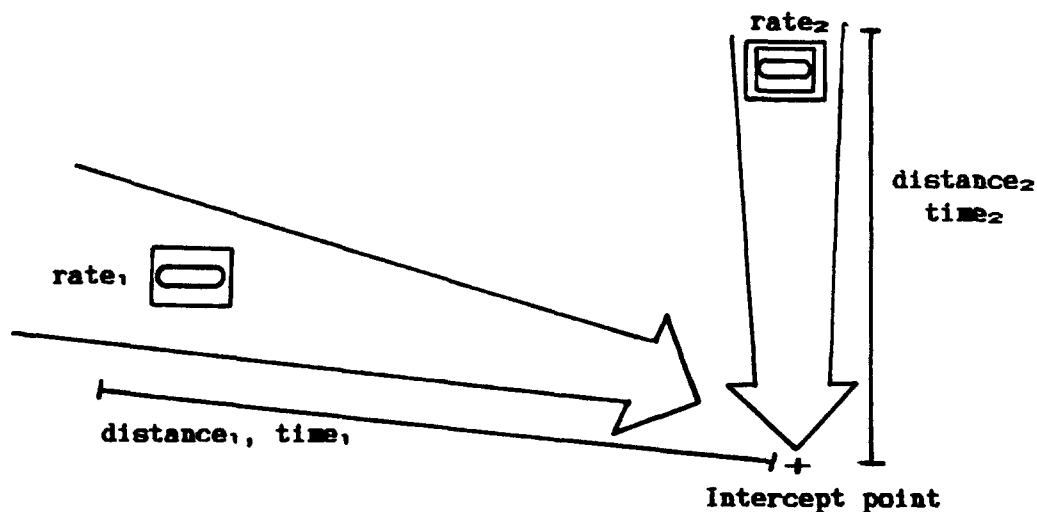
Examination of the problem of defeating penetrations reveals mobility differentials as perhaps the biggest obstacle the defender must overcome. Helicopters may offer the mobility advantage necessary to defeat an armored penetration on the modern battlefield. The potential of air assault forces in defeating armored threats was recognized as early as 1972 in a Vietnam Study on airmobile operations: "Air cavalry and airmobile infantry can find and fix the enemy so that armored and mechanized forces can be brought in at the decisive moment to finish him."³

Army aviation doctrine gives mention to the role of air assault forces to "give the commander time and space so that he can reposition his resources to destroy [a] penetration."⁴ The goals of this paper are to provide a detailed analysis of the employment of air assault forces in countering armored penetrations and to answer the following question: Is the use of air assault forces to counter armored penetrations on the extended battlefield a viable option for the U.S. Army?

To answer the research question, I will examine the problem of defeating penetrations; the theoretical and historical bases for using air assault forces against armored forces; and the capabilities and limitations of air assault forces in a counterpenetration role. I will then move to the employment of an air assault counterpenetration force, with emphasis on the defender's decision cycle and how the defender must decide to commit such a force. Finally, I will look at U.S. force structure to determine whether or not U.S. forces as currently organized can execute air assault counterpenetration operations.

II. THE COUNTERPENETRATION PROBLEM

The tempo of mechanized operations increases the threat posed by a force that has maneuvered into the rear area by penetration, envelopment, or turning movement. An enemy force in the rear will likely be able to move deep rapidly. A commander presented with this threat must quickly move forces to defeat it. But if the defender's mobility is equal to that of the attacker, then for every kilometer the defender must move to intercept the attacker, the attacker can move almost as far in depth in the same time (Figure 1). The defender must intercept the attacker before he has moved so deep and done so much damage as to unhinge the entire defense. If the attacker gets much of a



IF: $rate_1 \sim rate_2$ and $distance_1 \sim distance_2$

THEN: $time_1 \sim time_2$

THEREFORE: Friendly force may miss enemy at intercept point

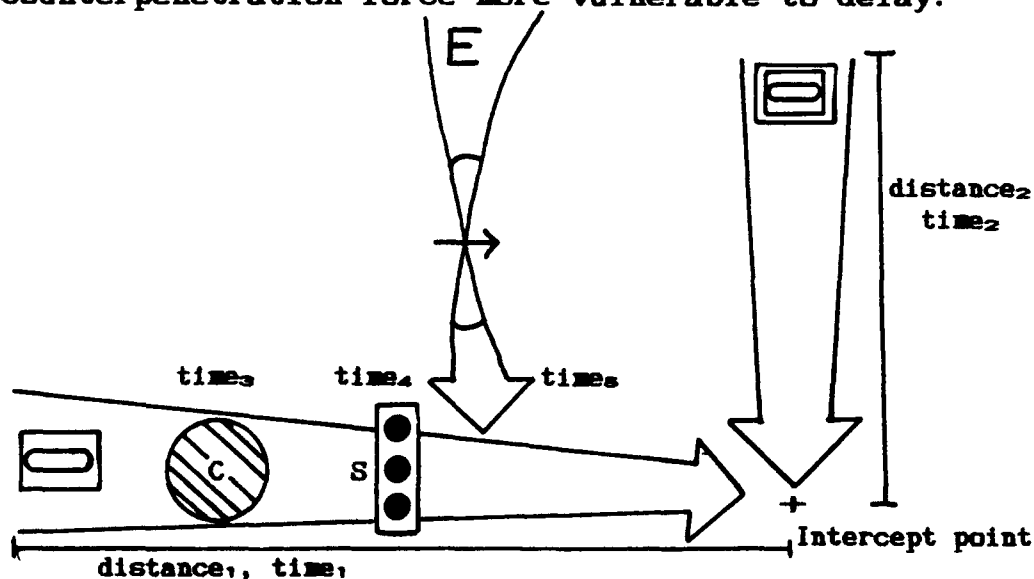
FIGURE 1: Time/distance factors and intercepting a moving force.

head start on the defender, he can move so far in depth as to disrupt support operations and sever lines of communication before a heavy force can catch him. Thus, to counter the threat of an armored penetration into the rear, the defending commander must reorient and move a force capable of more rapid movement than the enemy.

The defender's problem is compounded by the difficulty of executing such an operation with a heavy force. Repositioning heavy forces is not only time-consuming; it is also vulnerable to disruption. When time is critical, as it will be in a counterpenetration operation, even a brief delay in movement can cause the defender to miss the attacker.

The movement of a heavy force to counter a penetration is subject to disruption by various means. To move quickly enough to intercept an enemy force that is penetrating in depth, a heavy force must move mainly by road. Its movement can therefore be disrupted by scatterable mines or other obstacles as well as by air attack. Chemical weapons can also be used to slow the response of heavy reserves either by fixing them in their assembly areas or contaminating their routes.* Any or all of these means in combination can delay the defender's response too long to effectively counter the penetration (Figure 2).

In addition to dealing with enemy disruption, a heavy force moving through the rear will be hindered by the congestion of friendly forces, particularly if it is moving laterally across unit boundaries. While the attacker will be able to fight through or around anything that gets in his way, the defender must coordinate movement through his own forces. The battlefield clutter created by friendly forces will impede the counterpenetration force no matter how well planners attempt to deconflict its movement. The defender will be further constrained by the availability of lateral routes between the counterpenetration force and the attacker's route of march, thus making the movement of the heavy counterpenetration force more vulnerable to delay.



IF: $time_1 \sim time_2$

THEN: $time_1 + time_3 + time_4 + time_5 > time_2$

THEREFORE: Friendly force will miss enemy at intercept point

FIGURE 2: Disruption of the movement of a heavy force.

Finally, the defender will lose more time after moving across the battlefield as he deploys from march formation into battle formation, unless he is willing to risk a meeting engagement. "[The] time lost by deployment will be from one and a half to two and a half times the normal pass time of the leading tactical group."

In short, the defender will be driven by an interception problem: How do you hit a moving target when your bullet (the defender's force) can do no better than move at the same speed as the target (the penetrating force) but must follow a circuitous, congested path?

The solution to the counterpenetration problem is for the defender to employ a force whose mobility is greater than that of the attacker. Helicopter-borne units offer superior mobility, for they move faster than land-bound forces and can fly over disruptive ground clutter. The initial blunting and slowing of the attacker could be conducted by an air assault force that would either fix or impede the attacker's movement long enough to allow a heavy force to move laterally through the rear area to intercept and defeat the attacker. This two phase operation--counterpenetration followed by counterstroke--would allow the defender to overcome the attacker's initial advantage in mobility."

The focus of this paper is the employment of an air assault counterpenetration force. I will first explore the theoretical basis for using air assault forces to slow or fix armored units and then examine historical examples that support the theory.

III. THEORETICAL BACKGROUND

On the surface, the idea of using light air assault forces to blunt or even fix a rapidly advancing armored force may seem far-fetched. However, strong theoretical bases for air assault counterpenetration operations can be found in the classical writings of Karl von Clausewitz and the contemporary works of Richard Simpkin.

Clausewitz viewed the defense as the stronger form of war. Decisive advantage derives from "surprise, the benefit of terrain, and concentric attack."⁸ Since the defender enjoys the advantage of choosing the site of the battle he can, through careful selection of the battlefield, possess the advantage of terrain by defending in a location unfavorable for the attack. The defender can also gain surprise by defending in an unexpected place or in a location from which his presence can be concealed from the enemy, thus allowing the defender to initiate the fight. By concentric attack, Clausewitz meant "all forms of tactical envelopment."⁹ While the attacker should seek to envelop his opponent, the defender can envelop

the attacker by fixing the attacker, and then counterattacking into a flank. The time, location, and direction of these counterattacks provide the defender the opportunity to surprise the attacker. The defender can thus gain superiority in the three areas that bring advantage: surprise, terrain, and envelopment.

Simpkin offers a "hammer and anvil" approach for defeating penetrations that exploits Clausewitz' advantages of the defense. The anvil is provided by a light force that is moved by helicopter and placed in the path of the enemy. This light force holds long enough for an armored force to arrive at the battle and strike a decisive blow into the flank or rear of the penetrating enemy units. The defender gains the advantage of terrain by placing the holding force at a location that is unfavorable to the attacker. Surprise first comes from the appearance of a substantial combat force on a piece of previously unoccupied terrain that the enemy must control to continue his penetration. The surprise is amplified by the the subsequent armored attack into the enemy's flank and rear. By exploiting the advantages of the defender, a light force can block a heavy force and set the conditions for its defeat by an armored counterattack.'°

A light force which is assigned the mission to slow or fix a heavy force must use the advantages of the defense to overcome the heavy force's advantages of firepower and mobility, and thus set up the decisive armored counterstroke. We will now turn to several historical examples of the employment of light forces to counter the penetrations of armored forces. In the first case, the Battle of the Bulge, U.S. airborne forces deployed into the Ardennes in December 1944 and successfully held against German armor. As a counterpoint, in 1950 Task Force Smith was defeated in its efforts to blunt North Korean forces that were advancing deep into South Korea. In the Arab-Israeli Wars, both sides demonstrated the capabilities of infantry against armor on the modern battlefield. These cases will highlight the potential strengths and weaknesses of light forces employed against armored penetrations.

IV. HISTORICAL EXAMPLES

World War II, the Korean War, and the Arab-Israeli Wars all provide examples of efforts to use light infantry forces to defend against armored penetrations. We will look at four cases in which infantry were assigned the mission of stopping or at least slowing armored forces that were penetrating deep. During the Battle of the Bulge, the 82d Airborne Division successfully withstood a German

armored advance in its sector along the northern shoulder of the Bulge. During the Korean War, Task Force Smith failed to halt an advancing North Korean armored force near Osan. At the Chinese Farm in the Sinai in 1973, Egyptian and Israeli infantry were both effective in anti-armor roles. During the Israeli invasion of Lebanon in 1982, the Syrians used attack helicopters and infantry to inflict significant casualties on Israeli armored columns. All four cases illustrate the principles of using light infantry as a counterpenetration force.

In December 1944, the 82d Airborne Division was occupying billets in France in anticipation of future airborne operations to support a crossing of the Rhine River or to seize Berlin. After the Germans attacked and broke through the Allied lines in the Ardennes, the 82d was committed as part of the XVIII Airborne Corps to block a portion of the northern shoulder of the German penetration.¹¹ The division was rushed to the front lines by truck beginning on 18 December; the first units were ready to fight within twenty-four hours.¹²

The 82d focussed its efforts on blocking the key avenues through its sector. The dense woods and narrow roads provided excellent restricted terrain for the infantry. Obstacles were emplaced to hinder the Germans' movement. Bridges were blown and roadblocks

established to canalize the Germans' approach, and artillery observers were positioned to call continuous fire on German units once they were committed to restrictive routes.¹³ Towns were fortified to further hinder the Germans' movement. All of these measures denied the Germans the capability to advance rapidly with armor. The Germans' subsequent efforts to break through the 82d sector with infantry were repeatedly turned back.¹⁴

The 82d succeeded in defending against German armor by properly using the available terrain and coordinating the employment of artillery, engineers, and infantry. The 82d's fight in the Bulge contributed to the Allied victory and is a good example of how light infantry can block an armored penetration.

The case of Task Force Smith provides lessons on how not to employ infantry against armor. Task Force Smith consisted of two companies of 1st Battalion, 21st Infantry reinforced with recoilless rifle and heavy mortar teams and a battery of 105mm howitzers from the 52d Field Artillery Battalion. The Task Force (TF) was dispatched to Korea in July 1950 as the first American ground force to fight in the Korean War. The TF's mission was to block the North Korean advance "as far north as possible."¹⁵ If TF Smith could not stop the North Koreans, it could at least

buy time for additional U.S. forces to arrive in Korea and establish an adequate defense.¹⁶

The North Koreans had broken through the South Korean lines and were penetrating in depth. The North Koreans had to be blocked before they could capture the ports U.S. forces planned to use to enter Korea, so TF Smith was ordered to delay the North Korean advance in the vicinity of Osan while the 24th Infantry Division prepared its main defenses near Pyongtaek.¹⁷ On the night of 4 July 1950, TF Smith occupied positions along the main road from Osan to Pyongtaek. The next morning, the North Koreans attacked and defeated TF Smith. The TF had little impact on the North Koreans' advance.¹⁸

TF Smith failed for a variety of reasons. The TF did occupy terrain that dominated an avenue the North Korean armor had to follow.¹⁹ Weapons were properly sited and artillery and mortars were available. However, the TF was not equipped to defeat the North Korean armor. Its anti-tank weapons were ineffective against North Korean tanks. The TF had no engineer support, no mines or barrier materiel for obstacles, and no air support. Had the TF been equipped and supported to defeat armor, it could have stopped the tank column that was leading the 4th Infantry Division and forced the North Korean infantry to fight through TF Smith's positions. This would have bought more time

for the 24th Division to prepare its defenses.

Instead, TF Smith was merely a speed bump--and a low bump at that.

The Arab-Israeli wars offer more recent examples of the successful use of infantry against armor. In the 1973 Yom Kippur War, a series of engagements around a position in the Sinai known as the Chinese Farm witnessed successful defenses by infantry armed with anti-tank missiles. On 15 October Israeli forces were counterattacking westward across the Sinai towards the Suez Canal. An Israeli force attempting to cross the Canal just north of the Great Bitter Lake had to move past an abandoned experimental farm occupied by Egyptian troops. The Egyptians engaged the Israelis from the farm with anti-tank fires and later Egyptian infantry moved out of the farm and cut off the road along which the Israelis were advancing. Although the initial Israeli force reached and crossed the Canal, the follow-on Israeli columns had to fight through and clear the Chinese Farm in order to maintain an open corridor to the Canal.²⁰ Egyptian infantry with anti-tank weapons near the Chinese Farm temporarily disrupted the timetable of the Israeli attack. The Egyptian defense was so successful that at one point the Israelis considered withdrawing the spearhead force that had broken through to the west side of the Canal.²¹

After a day-long battle, the Israelis occupied the Chinese Farm early on 17 October. Later that morning an Egyptian armored brigade launched a counterattack from the south. The Israelis used helicopters to move TOW missiles and their crews onto a line about six miles south of the Chinese Farm. The Israeli TOWs were positioned on a ridge 300 feet above an irrigation canal that would block the Egyptian advance. When the Egyptians halted short of the canal, the Israelis opened fire and inflicted such losses on the Egyptians that they were compelled to withdraw.²²

When the Israelis invaded Lebanon in 1982, their armored forces fell victim to Syrian infantry in at least two major engagements. Near Ain Zhalta, the Syrians positioned antitank weapons on high ground above a horseshoe curve in a road along which a major Israeli column was advancing. The Syrian ambush halted the Israeli attack for several hours while the Israelis had to bring up infantry (some by helicopter) to clear out the Syrian positions.²³

The Israeli advance into the Bekaa Valley encountered similar problems. The Syrians employed infantry with antitank weapons and attack helicopters to slow Israeli armor, although the Israelis did break through to more open terrain and forced the Syrians to retreat. As they tried to continue into the Bekaa,

however, the Israelis were again ambushed by infantry with antitank weapons supported by artillery and armor. This time Israelis were unable to break through; it took almost six hours for the Israelis to withdraw from the ambush site.²⁴

The experiences of the 82d in the Bulge, TF Smith at Osan, and the Israelis, Egyptians, and Syrians illustrate the capabilities and limitations of using light infantry against armored penetrations. Given good terrain, the proper weapons, and employed as part of a combined arms team, light infantry can halt or delay armor. In the case of the Bulge, infantry was successful in blocking an armored force. Rapid employment was critical to the 82d's success--it was able to establish a defense before the Germans arrived in its sector. TF Smith was also in position in time and, if properly equipped, may have successfully delayed the North Koreans by stripping away their armored spearhead and forcing them to fight with infantry alone. This would have slowed the North Koreans' rate of advance and allowed the U.S. to establish a more coherent defense rather than commit forces piecemeal as they became available. The experiences of the Israelis and the Arabs reinforce the lessons of earlier wars and demonstrate the improved lethality of modern antitank weapons.

On today's battlefield, mobility of a counterpenetration force is vital. With the advent of the helicopter, infantry has gained a significant mobility advantage over armor. We will now turn to the capabilities and limitations of air assault forces in the counterpenetration role.

V. CAPABILITIES AND LIMITATIONS

An armored force that has penetrated the main battle area can move through rear areas with great speed. The Soviet Union has sought to develop forces and doctrinal concepts that provide them with greater mobility than their enemy's reserves.²⁵ As we have noted, armored reserves may lack the mobility necessary to intercept and defeat a penetration. "There are many places where only light forces will reach in time--or indeed at all."²⁶

To fulfill its role as an anvil, the air assault force should be organized with infantry with an anti-armor capability, artillery, and engineers, and be supported by attack helicopters. It must be employed on terrain that maximizes its capabilities, and it must be provided sufficient time to plan what will be a fast-paced operation: rapid relocation across the battlefield on short notice to fight against an attacking armored force.²⁷ While the air assault force may not be of sufficient strength or staying power to defeat an armored penetration, it may be the

only force that can move quickly enough to have an impact on the battle. An overview of the capabilities and limitations of an air assault force committed to a counterpenetration mission is a necessary prelude to developing a tactical concept for its employment.

The first and most important strength of an air assault force is its mobility. A helicopter-borne force can move over the battlefield independent of terrain and ground clutter much faster than any ground force. A movement that would take a heavy force several hours under ideal circumstances can be executed in minutes by an air assault force.^{2a} The air assault force can be employed as an anvil that will buy time for the slower but more potent heavy force that otherwise could not get into the fight.

While it may be outnumbered and outgunned, the air assault force can achieve its mission of blunting the penetration and setting up the heavy force's counterstroke by exploiting the advantages of the defender. The penetrating force will be committed and moving rapidly; its momentum will be high, and the commander will be focussed on reaching his deep objectives as quickly as possible. The role of the anvil is to rupture the attacker's momentum. The sudden appearance of a substantial force in his way can surprise and shock the attacker, interrupt his plan, and confront him with unexpected decisions. The

attacker will lose speed, momentum, and confidence. While the attacker is adjusting to the problem of the anvil, a heavy force should strike a hammer blow that will defeat the penetration.²⁹

The air assault force can also exploit the advantages of terrain. An air assault force can not fight armor on any terrain and "should not . . . be employed in open terrain against heavy forces."³⁰ However, in restrictive terrain that limits the flexibility and mobility of the attacker, an air assault force can effectively blunt or fix an armored foe. The ideal choice of ground would be an "operational defile"--a route the enemy is forced to follow which also offers good defensible terrain.³¹ As an example, the air assault force could be landed to block the enemy's exit from a valley and simultaneously attack his exposed flanks in the valley.³² We will examine terrain considerations in more detail in the next section.

Another advantage of an air assault force is its capability to rapidly concentrate and disperse.³³ A heavy force normally occupies a single assembly area, giving off a larger signature and increasing its vulnerability to disruption. An air assault force can disperse itself to limit its signature and reduce its vulnerability and then rapidly concentrate just prior to its commitment. While the enemy may detect the

massing of an air assault force, by that time he will probably have insufficient time to take action to disrupt its movement. This makes the air assault force a good choice for the quick response required of the initial counterpenetration force.

While the potential of a light air assault force is attractive, there are limitations that must also be recognized. The greatest problem for any helicopter force is weather. "Adverse weather, extreme heat and cold, and other environmental conditions such as blowing snow and sand [can] limit flight operations or helicopter lifting capability."³⁴ Of particular concern are conditions that would limit the load the aircraft would carry, which would increase sortie requirements and slow the movement of the air assault force. There will be times when weather will prevent a helicopter-borne force from moving at all.³⁵ Any commander counting on an air assault force must have a contingency for bad weather. Otherwise, he may not be able to get his anvil into place on time or at all.

The commander who is planning on using an air assault force in a counterpenetration operation is not totally beholden to weather. Weather is, to some extent, predictable.³⁶ If poor flying conditions are expected over an extended period, the commander should not develop plans that are largely dependent on good weather. If bad weather is predicted for limited

periods of time (e.g., early morning fog), the commander should include this factor in his plans.

To begin with, the commander should have an armored force available for delivering the decisive counterstroke after the air assault force has blocked or delayed the enemy. If a penetration has developed and weather will prevent the air assault from going in, the commander may have to launch the armored force earlier than he had planned. The point at which the enemy is to be intercepted may have to be shifted further in depth to allow the armored force to catch up with the enemy. If weather is expected to improve quickly, the air assault and the hammer and anvil operation may also be shifted further in depth.

Weather also works both ways. Many weather conditions that restrict flying (sandstorms, fog, heavy rains) also restrict the mobility of ground forces. While the air assault force's mobility may be degraded, so will the advancing enemy's. Even if the air assault force is grounded, the enemy's rate of advance will still be slowed. When weather clears, the air assault force may still have the opportunity to get into the fight, although it may have less time to prepare its defense and may have to hold longer since the counterstroke force will take longer to get to the fight. In some instances, it may even be possible to move the air assault force by ground

transportation if the enemy's movement is sufficiently degraded by bad weather and trucks are available. In any case, weather is a limiting factor for air assault operations. All plans entail risk. In air assault operations, the risks posed by weather must be addressed and appropriate contingencies developed.

Air assault forces suffer reduced tactical mobility once they are landed.³⁷ The air assault force must be placed in the right position the first time, and at a location where it is not easily bypassed. Otherwise, it becomes an anvil that is blocking nothing.

An air assault/heavy anvil and hammer operation is a complex undertaking. It requires meticulous planning, as well as standard operating procedures, communications, and "command skills. . . for full exploitation of the helicopter's mobility."³⁸ Later, I will address the complexities of the planning process in more detail.

In sum, air assault forces have significant capabilities and limitations for performing counterpenetration missions. I will now turn to examining how to exploit these capabilities and overcome or minimize the limitations.

VI. PLANNING CONSIDERATIONS

Given that defeat of a penetration will be a time-sensitive operation, prior planning may determine its success or failure. The commander must determine in

advance potential scenarios in which his rear may be penetrated and develop appropriate contingency plans.

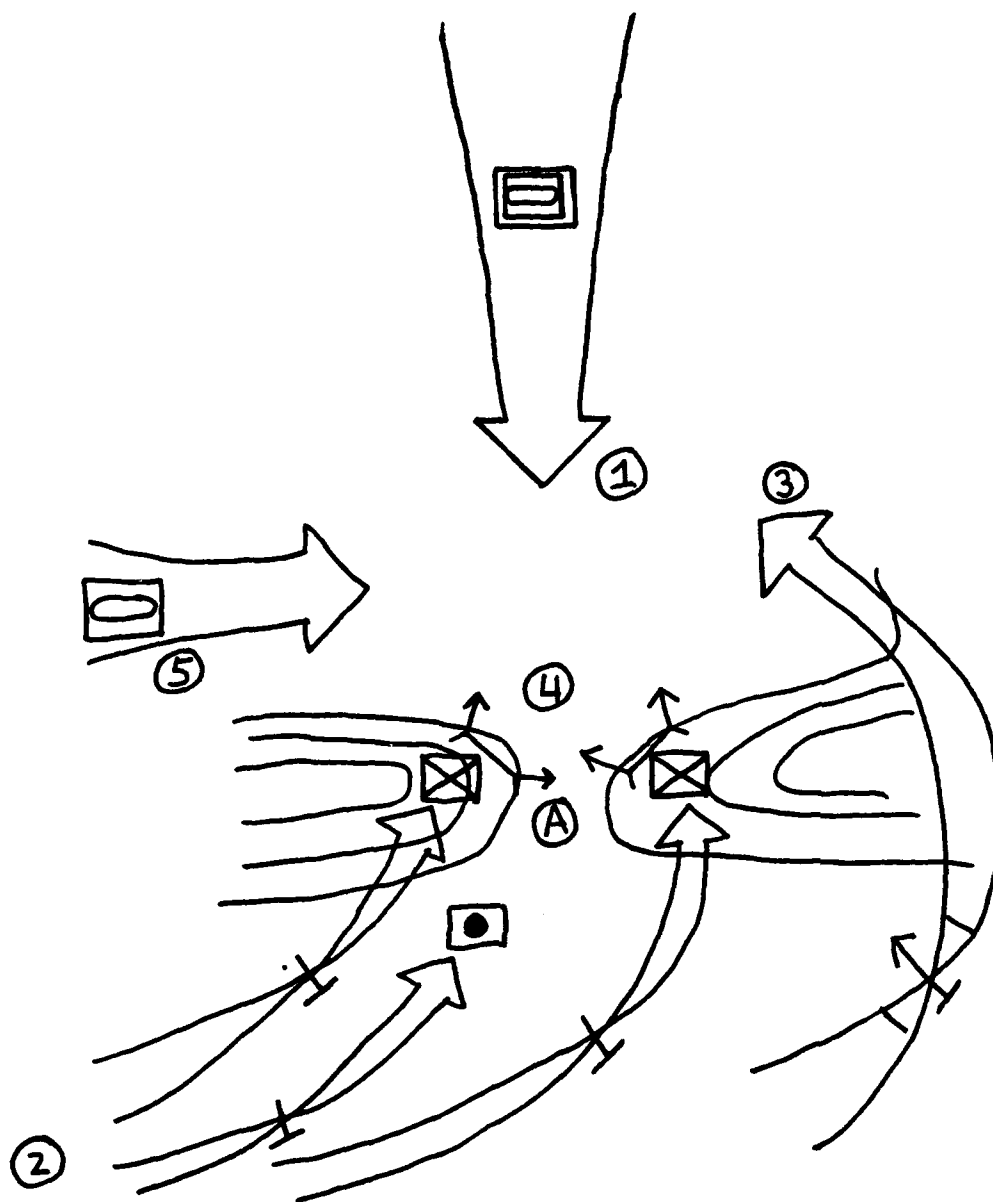
In planning for his defense, the commander should identify avenues of approach into his sector. After he has decided how to array his forces on the battlefield, he should then identify areas in which he has taken risk by either leaving gaps in his forces (a very real possibility in modern operations) or thinning his forces to concentrate strength elsewhere. Finally, he should plan how to defeat enemy attacks that penetrate in these identified areas of risk or maneuver around exposed flanks into the rear..

The commander, as in any case, must consider the terrain and time-distance factors in selecting where and how to fight the counterpenetration battle. He should of course look for terrain suitable for light forces that will negate some of the mobility and firepower advantages of the armored attacker. At the same time, he must remember that the second phase, the counterstroke, will be conducted by a heavy force. Therefore the terrain chosen for the fight must permit the heavy force to enter the battle and defeat the attacker. This may require preparation of the terrain in advance to support the counterstroke.

The commander has two basic options for employment of the counterpenetration force. He can use it to stop the penetrating force at some point on the

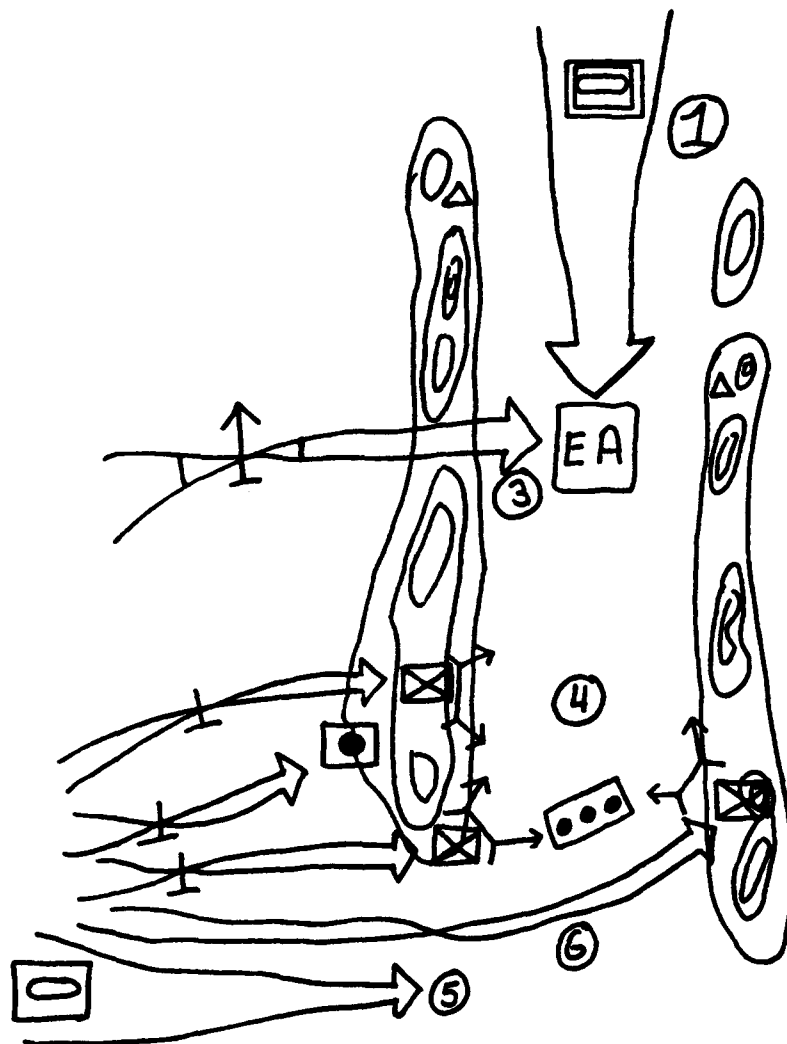
battlefield, thus creating a fixed target for the heavy force. (Figure 3) Or, he can use the light force to slow the attacker, thus creating a relatively slow-moving target. (Figure 4) In the latter case, the heavy force can either try to intercept the attacker or, while the counterpenetration fight is underway, occupy attack positions from which to strike the enemy. In both cases, the counterstroke force is no longer chasing, but is instead able to attack an enemy which is delayed at a precise location.

In wargaming his contingency plans, the commander must carefully consider the timing of the counterpenetration and counterstroke phases of the operation. First, he must establish the conditions under which he will commit the counterpenetration force. Next, he must determine how much time will be required to move both the counterpenetration and counterstroke forces so he can determine when he must commit the counterpenetration force. He must keep in mind that he must commit both organizations quickly enough so they can defeat the penetrating enemy. The commander must also remember that the air assault force will have limited staying power, so he cannot commit it to the fight too far in advance of the armored counterstroke. This coordination of the counterpenetration and counterstroke blows is vital to the success of the operation. (Figure 5)



1. Enemy committed to using pass A.
2. Lift helicopters move air assault force (infantry, artillery, engineers) to block the pass.
3. CAS and attack helicopters, supported by artillery, delay enemy force during preparation of defense.
4. Enemy reaches pass. Infantry fixes enemy, who must stop and clear pass before continuing.
5. Armor reserve and attack helicopters strike exposed flanks of fixed enemy.

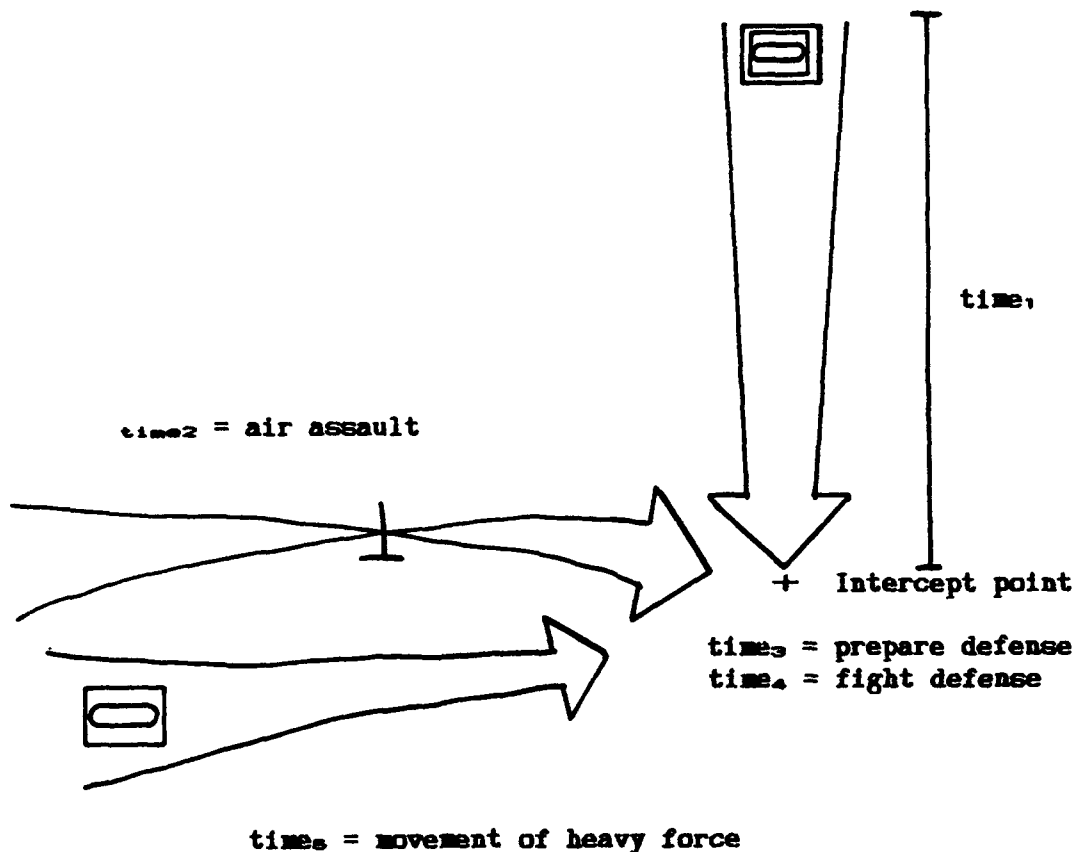
FIGURE 3: Blocking the penetrating force.



1. Penetrating force committed to moving down a defile.
2. Lift helicopters move air assault force (infantry, artillery, engineers) to positions at exit of defile.
3. CAS and attack helicopters, supported by artillery, delay enemy during preparation of defense.
4. Enemy reaches defenses. Infantry, supported by attack helicopters and artillery, further slows enemy near exit of defile.
5. Armor reserve arrives at attack positions outside defile.
6. Enemy forces his way through the infantry, exits defile.
7. Armor strikes enemy flanks from attack positions while infantry continues to engage follow-on enemy units (artillery, CSS, etc.)

FIGURE 4: Delaying the penetrating force.

For the commitment of the counterpenetration force, timing is especially critical. The air assault has to get the units to the scene of the battle quickly enough to be in position and prepared to fight before the enemy arrives. If the air assault is too late,



- | | |
|--------------------------------|--|
| IF: $time_2 + time_3 < time_1$ | THEN: air assault force is fast enough to execute counterpenetration mission |
| IF: $time_5 < time_1 + time_4$ | THEN: heavy force will arrive in time for counterstroke |
| IF: defender needs more time | THEN: use attack helicopters, FASCAM, CAS, artillery to delay enemy and increase time ₁ |

FIGURE 5: Timing the phases of the battle.

the enemy may have passed, and the counterpenetration phase will be a failure. If the air assault arrives at the same time as the attacker, it will fly into the midst of an armored force on the move. While this situation will create confusion and some delay for the enemy, the air assault force will likely be destroyed. In either case, late arrival will probably cause the counterpenetration to fail.

To facilitate the timely commitment of the two forces, the commander should establish decision points at which he will decide to increase the forces' alert status or move them. Named areas of interest and intelligence requirements must also be identified to insure the necessary information is available for the commander when a decision point is reached.

Once the higher commander has set his plan, the counterpenetration force commander can begin planning. Because time will be short and the mission complex, the counterpenetration operation simply cannot be put together *ad hoc*. It must be planned in considerable detail prior to execution. There are too many places where friction can take over the operation to leave much to chance.

The counterpenetration force's defense must be carefully planned. Siting of weapons and troops will of course be critical. The limited ground mobility of the air assault force and the lack of time to

reposition will require prior reconnaissance and selection of positions.³⁹ There will probably not be enough time to relocate forces if they are inserted in the wrong place or to shift the landing sites of forces once they are en route. Therefore, landing zones must be selected based on proximity to planned fighting positions and ease of identification for pilots.

Since he is unlikely to have sufficient assets to move everything he needs in one lift, the counter-penetration force commander must determine how to best sequence his forces into the fight. He can buy time to move into and prepare his defense by using attack helicopters, scatterable mines, and observed fires directed by ground or air scouts to slow the enemy once he has committed himself to a particular route.⁴⁰ To support this operation, the air assault commander should first move scouts and then artillery and engineers into position to prepare an engagement area and to support the the attack helicopters' fight. The air assault commander can then begin movement of his main body.

The air movement phase will require a separate, detailed support plan. Management and maintenance of aircraft will be critical to insure the rapid and efficient employment of the force. Because the air assault force will be operating at some distance from

its assembly area and the heavy counterstroke force will have priority of road movement, sustainment will probably be by air, and therefore resupply loads must be preconfigured and planned for in the airflow.

Prepositioning or prestocking of ammunition and barrier materiel will also be done by air, although some truck support may be utilized for prestocking supplies if the location of the defense is identified early enough and assets are available and positioned close enough to permit timely ground movement.

Location and operation of forward refuel points will be essential to maintaining the airflow as well as supporting attack helicopter operations.

Since the various units of the counterpenetration force may likely initially occupy different assembly areas, the commander must have a detailed plan for staging the force. He must balance the requirements of operational security and dispersion with the need to be able to respond quickly when the overall commander orders him to execute the counterpenetration mission. The best solution is to have a phased assembly of forces, with the phasing based on the development of the enemy situation. For security reasons, the lift helicopters should be moved to the staging area as late as possible. However, the commander must timeline his movement from the fight backwards and insure all of his forces, including the

lift helicopters, are in position and ready to launch when he decides to commit the counterpenetration force.

Finally, coordination between the counterstroke and counterpenetration forces must be made in advance. Once the penetration has begun, time will be too short for the units to coordinate all of their actions. The commanders and staffs will be busy enough simply executing their portion of the plan. Final details may have to be completed just prior to execution, but most of the groundwork must be done well in advance.

The opportunities for friction to emerge in such a complex undertaking are almost too numerous to count. The more working parts in the machine, the more places where friction can cause breakdown. "Countless minor incidents--the kind you can never really foresee--combine to lower the general level of performance."⁴ Aircraft will break or get lost, fuel pumps at refuel points will fail, ammunition will be prestocked in the wrong place, the wrong resupply loads will come forward, weather will suddenly change for the worse, and communications will of course fail at the critical moment. The far-flung nature of the operation, the many units involved, and the pressure of timing will magnify the impact of these incidents. While the counterpenetration plan must be flexible enough to handle the myriad of problems both minor and major

that are bound to develop, it is the responsibility of the air assault force commander to exercise the "iron will-power" necessary to overcome friction and accomplish the mission.⁴²

The nature of a counterpenetration operation creates a considerable burden for the overall commander. He must identify possible areas of penetration in advance and develop plans to deal with those contingencies. He must then identify forces for the counterpenetration and counterstroke phases, and provide sufficient lead time for them to develop their own plans.

After determining when he must decide to commit the force, the commander must then ascertain if he can reasonably expect to have the necessary information on the enemy at hand in time to make his decision. If such information will likely not be available in time to influence his decision, the commander may have to alter the decision criteria, which may cause him to commit his force on the basis of insufficient information. The commander will, in that case, have to rely on Clausewitz' "inner light which leads to the truth; and. . . the courage to follow this faint light."⁴³ As a minimum, the commander must identify in advance when he will be called on to make his decision to commit the air assault and subsequent heavy counterstroke force and what practical criteria

he will use to help him decide. He must be morally prepared to make that decision in the midst of the fog of battle.

VII. CAPABILITIES OF U.S. FORCES

Are U.S. forces capable of conducting large-scale air assault counterpenetration operations? With the exception of the air assault division, the answer is no, although light and airborne units can perform this mission if properly augmented.

Across the board, U.S. divisions (less the air assault division) simply do not have the organic helicopter assets necessary for the conduct of large-scale air assault operations. Corps level aviation can be used for augmentation, but these lift assets are limited and would likely be heavily committed to other operations, particularly logistics.⁴⁴ Their diversion for a counterpenetration mission could not be accomplished on short notice without disrupting these operations. On the other hand, if corps lift assets were placed on stand-by to support the counter-penetration air assault, their capability to perform other missions would be reduced. The corps commander would have to accept a degradation of aviation support for critical sustainment functions in anticipation of the counterpenetration mission unless he had an air assault unit attached to the corps.

Most U.S. maneuver organizations have limitations in addition to the lack of helicopters that make them unsuitable for large-scale air assault counterpenetration operations. Heavy units are not suitable for air assault counterpenetration missions because they do not possess the right forces. Armor and mechanized infantry units lack sufficient dismounted infantry strength and heavy anti-armor systems that are both ground and air mobile. Heavy forces should be used for the counterstroke, but not for the rapid response and airmobility required for the counter-penetration.

Light infantry forces have the necessary infantry strength for large-scale air assault operations, but they lack sufficient anti-armor capability to halt or significantly slow an armored force. The four High Mobility Multi-purpose Wheeled Vehicle-mounted TOWs (HMMWV TOWS) in the light infantry battalion will normally not pose enough of a threat to an armor force to slow its momentum. Only in extremely restrictive terrain that would prevent the enemy from deploying into company-level battle formations and under circumstances that call for a limited delay of the enemy's advance could a light infantry battalion hope to serve as an anvil against an armored enemy. Light forces can disrupt the enemy's support assets, but, if faced with a large armored force, they cannot perform

the counterpenetration role. If augmentation from a separate anti-armor battalion is available, or TOWs from several units can be task organized to support the counterpenetration force, then light units could perform in the counterpenetration role.

Airborne forces have greater airmobile anti-armor capability than standard light infantry forces (20 HMMVV TOWs per battalion), but they still lack the necessary helicopters to conduct large-scale air assaults. Augmented with non-divisional aviation assets, airborne forces could perform in the counterpenetration role.

The air assault division is the only U.S. formation organized and equipped to perform the airmobile counterpenetration role. By massing its lift assets, the air assault division can quickly move a brigade-sized force with considerable anti-armor capability across the battlefield.⁴⁵ However, the division could probably only perform one such mission at a time due to the requirement to mass lift assets. The division could, given sufficient planning time, conduct sequential lifts to support near-concurrent counterpenetration operations by its three infantry brigades, each in turn supported by massed aviation assets. The division could only function in this manner for a limited period due to strains on aircraft maintenance and limitations on aircrew endurance.

VIII. CONCLUSIONS

In spite of their limitations, air assault forces can play a significant role in countering armored penetrations. The lower density of forces on the modern battlefield increases the mobility requirements of counterpenetration forces.⁴⁶ Helicopter-borne forces provide this mobility through their capability to move rapidly across the battlefield independent of terrain. An air assault task force organized with infantry with an anti-armor capability, artillery, engineers, and attack helicopters and employed on suitable terrain could blunt or delay a penetrating armored force. The goal of this counterpenetration force would be to buy enough time for a heavy force to reach the area and deliver a decisive counterstroke against the penetrating enemy.

The exact size and composition of a counterpenetration force would depend on the circumstances in which it was to be employed. The size of the enemy force to be delayed would be the first factor to be considered. Terrain would also be important, as well as the length of time the counterpenetration force would have to buy for the counterstroke force. More restrictive terrain that limits the ability of the enemy to deploy his forces into battle formations would permit deployment of a smaller air assault force. A requirement to block or

delay an enemy for an extended period would normally require a larger counterpenetration force.

Friendly assets would also impact on the composition of the air assault force. Combat power counts more than raw size. In organizing the counterpenetration force, the commander must consider the availability of close air support, attack helicopters, artillery, engineers, heavy anti-tank weapons, and lift helicopters. Since air assault forces are a limited asset, the commander must also keep in mind the impact on future operations of employing his air assault capability against an armored opponent. Light forces are capable of holding off heavy forces but if left in the fight for too long will become combat ineffective. The commitment of an air assault force to a counterpenetration operation will probably limit its near-term availability for future operations.

Training would be critical to the execution of such an operation. The air assault force must be prepared to conduct far-flung, short-notice operations against armored opponents. Heavy and light forces must be prepared to operate together in first countering and then defeating the penetration. And headquarters must practice planning the integration of air assault forces into counterpenetration operations.

The only U.S. force currently organized and equipped to conduct air assault counterpenetration operations against armored forces is the air assault division. With augmentation, light and airborne units can perform this mission. Heavy corps and divisions must rely on a mix of attack helicopters and relatively slow-moving heavy forces to combat penetrations.

Proposals to create air assault forces organic to heavy divisions and corps⁴⁷ would provide an improved counterpenetration capability to heavy force commanders. Unfortunately, such solutions would be costly. The Army simply does not possess, nor can it afford, the necessary aircraft, crews, and aviation support systems to fill and maintain such organizations.

Another proposal is the consolidation of Army aviation assets into light divisions to improve their air assault capability. Presently, helicopters are spread throughout the force structure. While this dispersion offers some advantages, it reduces the impact achieved by massing helicopter assets. An analogous situation would be the dispersal of tanks throughout the French army prior to World War II. While every commander had an armor capability, the overall effect of French armor on the battlefield was reduced. On the other hand, concentration of armor in

Panzer units provided Germany with a force multiplier of enormous magnitude.⁴² The French have already concentrated aviation assets in their airmobile division.⁴³ A thorough evaluation of the utility of the reorganization of Army aviation assets in such a manner is beyond the scope of this paper.

Planning capabilities and decision cycles should not be limiting factors in the use of air assault forces in the counterpenetration role. U.S. headquarters should be capable of planning the use of air assault forces in the counterpenetration role. The process that would lead a commander to commit an air assault reserve should be the same as those for committing a ground reserve. In the case of an air assault reserve, advance planning might take longer because of the complexity of air assault operations. However, the speed with which the air assault force could be committed to the fight gives the commander more time to make his decision. The plan for how to employ an air assault force would be based on the same factors--mission, enemy, terrain, troops, and time available (METT-T)--as for any other force.

Air assault forces offer an effective means to counter penetrations on an extended battlefield. The planning process for use of air assault forces is, as for the use of any force, METT-T based. However, only the air assault division is currently capable of

conducting such operations without significant augmentation. Shifting lift helicopter assets to light and airborne divisions and increasing the organic anti-armor firepower of light infantry units could make all light units capable of air assault counterpenetration operations without augmentation, but such force structure changes might prove too costly in terms of increased strategic lift requirements for those units and reduced capabilities elsewhere. Proposals for force structure changes such as the addition of air assault units to heavy corps and divisions or the consolidation of lift assets in light divisions merit further study by force developers.

In any case, the Army should be prepared to exploit the counterpenetration capabilities offered by air assault forces. Today's advanced attack and lift helicopters are orders of magnitude superior to the Army's Vietnam-era aircraft. We have the soldiers and the equipment, and others have provided the concepts. It is now up to us to train for the race that will be to the swift.^{so}

ENDNOTES

¹Sun Tzu, *The Art of War*, translated by Samuel B. Griffith (New York: Oxford University Press, 1963), p. 134.

²Richard E. Simpkin, *Antitank: An Airmechanized Response to Armoured Threats in 90s* (London: Brassey's Defence Publishers, 1982), p. 236.

³John J. Tolson, *Airmobility 1961-1971 from Vietnam Studies Series* (Washington, D.C.: U.S. Government Printing Office, 1973), p. 255.

⁴U.S. Department of the Army, *Aviation Brigades, Field Manual 1-111* (Washington, D.C.: U.S. Government Printing Office, 1990), p. 3-83.

⁵Barry, B. W. (Team Leader, Camberley Team), "Future Airmobile Forces," *RUSI Journal*, vol. 133, no. 3 (Autumn 1988), p. 34.

⁶Richard E. Simpkin, *Race to the Swift: Thoughts on Twenty-First Century Warfare* (London: Brasey's Defence Publishers, 1985), p. 111.

⁷John Hughes-Wilson, "The Helicopter on the Battlefield," *NATO's Sixteen Nations*, vol. 34, no. 4 (July-August 1989), p. 68.

⁸Karl von Clausewitz, *On War*, translated by Michael Howard and Peter Paret (Princeton, New Jersey: Princeton University Press, 1976) p. 360.

⁹Clausewitz, p. 360.

¹⁰Simpkin, *Race to the Swift*, pp. 96-98.

¹¹James M. Gavin, *On to Berlin: Battles of an Airborne Commander 1943-1946* (New York: Viking Press, 1978), pp. 203-206.

¹²Clay Blair, *Ridgway's Paratroopers: The American Airborne in World War II* (New York: Dial Press, 1985), pp. 363-364.

¹³Gavin, pp. 230-231.

¹⁴Gavin, pp. 240-243.

¹⁵Roy E. Appleman, *South to the Nakdong, North to the Yalu (June-November 1950)*, from *The United States Army in the Korean War*, (Washington, D.D.: U.S. Government Printing Office, 1961), p. 60.

¹⁶Clay Blair, *The Forgotten War: America in Korea, 1950-1953*, (New York: Times Books, 1987), p. 97.

¹⁷Blair, *The Forgotten War*, pp. 96-97.

¹⁸For a detailed account of Task Force Smith's battle see Appleman, pp. 65-76.

¹⁹Appleman, p. 62, p. 66.

²⁰Edgar O'Ballance, *No Victor, No Vanquished: The Yom Kippur War* (San Rafael, California: Preidido Press, 1978), pp. 225-226, 230-231.

²¹O'Ballance, p. 229.

²²O'Ballance, pp. 232-234.

²³Richard A. Gabriel, *Operation Peace for Galilee: The Israeli-PLO War in Lebanon* (New York: Hill and Wang, 1984), p. 97.

²⁴Gabriel, pp. 102-105.

²⁵Barry, p. 33.

²⁶Simpkin, *Antitank*, p. 27.

²⁷Simpkin, *Antitank*, p. 194-196.

²⁸Simpkin, *Antitank*, p. 195.

²⁹Simpkin, *Antitank*, p. 238.

³⁰U.S. Department of the Army, *Corps Operations, Field Manual 100-15* (U.S. Government Printing Office, 1989), p. 3-5.

³¹Simpkin, *Antitank*, p. 240.

³²U.S. Department of the Army, *Light Infantry Battalion, Field Manual 7-72* (Washington, D.C.: U.S. Government Printing Office, 1987), pp. 4-7 and 4-8.

³³U.S. Department of the Army, *Air Assault Operations, Field Manual 90-4* (Washington, D.C.: U.S. Government Printing Office, 1987), p. 1-3.

³⁴FM 90-4, p. 1-3.

³⁵See Tolson, pp. 54-55, 98-99, 162-163, 162-163, 173-174, 186-187, and 238 for cases of air assault operations conducted in Southeast Asia under adverse weather conditions.

³⁶Simpkin, *Race to the Swift*, p. 175.

³⁷U.S. Department of the Army, *Division Operations*, Field Manual 71-100, (Washington, D.C.: U.S. Government Printing Office, 1990), p. D-11.

³⁸Simpkin, *Antitank*, p. 241.

³⁹Simpkin, *Antitank*, p. 240.

⁴⁰U.S Army Command and General Staff College, *Light Infantry Division Operations*, Field Circular 71-101, July 1984, pp. 5-51 through 5-52; Simpkin, *Race to the Swift*, p. 110.

⁴¹Clausewitz, p. 119.

⁴²Clausewitz, pp. 119-120.

⁴³Clausewitz, p. 102.

⁴⁴FM 1-111, p. 3-40.

⁴⁵FM 71-100, p. D-12.

⁴⁶Hughes-Wilson, p. 69.

⁴⁷See Van-George R. Belanger, "The Corps Air Assault Brigade," SAMS Monograph, 6 December 1988; and James E. Sikes, "The Air Dimension and the Heavy Division: The Utility of an Organic Light Infantry Air Assault Battalion in the Heavy Division," SAMS Monograph, 21 December 1987.

⁴⁸Simpkin, *Antitank*, p. 234.

⁴⁹Barry, p. 38.

⁵⁰Simpkin, *Race to the Swift*.

BIBLIOGRAPHY

a. Books:

Appleman, Roy E. *South to the Naktong, North to the Yalu (June-November 1950), from The United States Army in the Korean War.* Washington, D.C.: U.S. Government Printing Office, 1961.

Baxter, William. *Soviet Airland Battle Tactics.* Novato, California: Presidio Press, 1986.

Blair, Clay. *The Forgotten War: America in Korea, 1950-1953.* New York: Times Books, 1987.

_____. *Ridgway's Paratroopers: The American Airborne in World War II.* New York: Dial Press, 1985.

Clausewitz, Karl von. *On War.* Translated by Michael Howard and Peter Paret. Princeton, New Jersey: Princeton University Press, 1976.

Cole, Hugh M. *The Ardennes: The Battle of the Bulge from The United States Army In World War II: The European Theater of Operations.* Washington, D.C.: U.S. Government Printing Office, 1965.

Gabriel, Richard A. *Operation Peace for Galilee: The Israeli-PLO War in Lebanon.* New York: Hill and Wang, 1984.

Gavin, James M. *On to Berlin: Battles of an Airborne Commander 1943-1946.* New York: Viking Press, 1978.

Nolan, Keith William. *Into Laos: The Story of Dewey Canyon II/Lam Son 719.* Novato, California: Presidio Press, 1986.

O'Ballance, Edgar. *No Victor, No Vanquished: The Yom Kippur War.* San Rafael, California: Presidio Press, 1978.

Schnabel, James F. *Policy and Direction: The First Year, from The United States Army in the Korean War.* Washington, D.C.: U.S. Government Printing Office, 1972.

Simpkin, Richard E. *Race to the Swift: Thoughts on Twenty-First Century Warfare.* London: Brassey's Defence Publishers, 1985.

_____. *Mechanized Infantry.* London: Brassey's Defence Publishers, 1983.

_____. *Antitank: An Airmechanized Response to Armoured Threats in the 90s*. London: Brassey's Defence Publishers, 1982.

Sun Tzu. *The Art of War*. Translated by Samuel B. Griffith. New York: Oxford University Press, 1963.

Toland, John. *Battle: The Story of the Bulge*. New York: Random House, 1959.

Tolson, John J. *Airmobility 1961-1971 from Vietnam Studies Series*. Washington, D.C.: US Government Printing Office, 1973.

b. Articles:

Barry, B. W. (Team Leader for a Camberley Team). "Future Airmobile Forces." *RUSI Journal*, Vol. 133, No. 3 (Autumn 1988), 33-40.

Hughes-Wilson, John. "The Helicopter on the Battlefield." *NATO's Sixteen Nations*, Vol. 34, No. 4 (July-August 1989), 66-69.

McLoughlin, Peter and Robson, Keith. "Military Mobility Post-CFE: Meeting the Requirements?" *RUSI Journal*, Vol. 135, No. 1 (Spring 1990), 17-22.

c. School of Advanced Military Studies Monographs:

Belanger, Van-George R. "The Corps Air Assault Brigade: An Integrated Combined Arms Force to Conduct the Heavy Corps Deep, Close, and Rear Battle in Three Dimensions." 6 December 1988.

Sikes, James E. "The Air Dimension and the Heavy Division: The Utility of an Organic Light Infantry Air Assault Battalion in the Heavy Division." 21 December 1987.

Taddonio, Frank T. "What Can We Learn From a War Lost? The Relevance of the Vietnam Experience for Today's Assault Helicopter Doctrine." 2 December 1985.

d. U.S. Army Field Manuals

FM 1-111, Aviation Brigades, August 1990.

FM 7-72, Light Infantry Battalion, March 1987.

FM 71-100, Division Operations, June 1990.

FM 90-4, Air Assault Operations, March 1987.

FM 100-5, Operations, May 1986.

FM 100-15, Corps Operations, September 1989.

FM 100-15-1, Corps Operations: Tactics and Techniques
(Unedited Coordinating Draft), April 1991.

e. Others

U.S. Army Field Circular 71-101, Light Infantry
Division Operations, July 1984.