EVOLUTION OF ARMY ATTACK AVIATION: A CHAOTIC COUPLED PENDULUMS ANALOGY

A Monograph

by

Major Darren W. Buss
U.S. Army

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

2013-01

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
05-23-2013	Master's Thesis	June 2012 – May 2013

4. TITLE AND SUBTITLE
Evolution of Army Attack Aviation: A Chaotic Coupled Pendulums Analogy

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Darren W. Buss, MAJ, USA

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Command and General Staff College
ATTN: ATZL-SWD-GD
100 Stimson Ave.
Ft. Leavenworth, KS 66027-2301

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

United States Army corps and division commanders pursued varied approaches to integrate Army attack aviation into their schemes of maneuver over the past thirty years. Two predominant schools of thought emerged: close combat attack or deep attacks. After focusing on deep attacks during the 1980s and 1990s, the attack aviation community drastically "about faced" towards supporting ground maneuver units in the close fight in mid-2003.This monograph analyzes the development and employment of attack aviation over the past three decades through the analogy of chaotic coupled pendulums to explore the influence of corps, divisions, ground maneuver brigades, and the Army Aviation branch upon aviation brigades. As the Army transitions out of sustained stability and counterinsurgency operations, the Army Aviation community should embrace the opportunity to explore methods for attack aviation to execute deep operations in support of corps and division operations while retaining the proficiency in integrated air-ground close combat.

15. SUBJECT TERMS
Army Aviation, attack aviation, Operation Iraqi Freedom, Operation Desert Storm, Operation Allied Force, deep attack, close combat attack, corps aviation operations, division aviation operations

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. TELEPHONE NUMBER** *(include area code)*
Unclassified	Unclassified	Unclassified	UU	63	

MONOGRAPH APPROVAL PAGE

Name of Candidate: MAJ Darren W. Buss

Monograph Title: Evolution of Army Attack Aviation: A Chaotic Coupled Pendulums Analogy

Approved by:

_____, Monograph Director
Nathan W. Toronto, Ph.D.

_____, Seminar Leader
Thomas A. Shoffner, COL

_____, Director, School of Advanced Military Studies
Thomas C. Graves, COL

Accepted this 23rd day of May 2013 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, 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

EVOLUTION OF ARMY ATTACK AVIATION: A CHAOTIC COUPLED PENDULUMS ANALOGY, by Major Darren W. Buss, 63 pages.

United States Army corps and division commanders pursued varied approaches to integrate Army attack aviation into their schemes of maneuver over the past thirty years. Two predominant schools of thought emerged: close combat attack or deep attacks. After focusing on deep attacks during the 1980s and 1990s, the attack aviation community drastically "about faced" towards supporting ground maneuver units in the close fight in mid-2003. Since that time, Army attack units dedicated training to improving air-ground integration, reconnaissance and security operations, and providing close combat attacks in support of ground maneuver units.

This monograph analyzes the development and employment of attack aviation over the past three decades through the analogy of chaotic coupled pendulums to explore the influence of corps, divisions, ground maneuver brigades, and the Army Aviation branch upon aviation brigades. Coupled pendulums consist of a series of steel balls suspended from an overhead wire and capable of swinging laterally without touching the adjacent balls. Each of these steel balls, acting like a simple pendulum, relates to an aviation brigade. The overhead connecting rod, representative of the Army Aviation branch, couples the individual pendulums by transferring the vibrations of the numerous oscillating pendulums. This coupling produces periods of synchronization, slight synchronization, and anti-synchronization with transitions in-between. Corps, division, and maneuver brigade commanders, acting like magnets, pull their supporting aviation brigade pendulum either towards the deep attack spectrum or close combat.

Analyzing the evolution of attack aviation in light of multiple influential actors reflected in the chaotic coupled pendulum model evidences a more nuanced view of attack aviation. Corps significantly influenced attack aviation towards deep operations. Divisions, after overcoming hindrances to integrating attack aviation embraced a deep focus for their attack units. Operation Allied Force in 1999 caused many corps and division commanders to rethink this focus; they gradually shifted their attack helicopter units to supporting close operations while exploring means to strike deep. Army force structure changes and sustained stability operations in Iraq and Afghanistan since 2003 stripped corps and divisions of their influence over attack aviation resting power with ground maneuver brigades, who focused attack aviation on supporting close operations.

As the Army transitions out of sustained stability and counterinsurgency operations, the Army Aviation community should embrace the opportunity to explore methods for attack aviation to execute deep operations in support of corps and division operations while retaining the proficiency in integrated air-ground close combat. Army attack aviation succeeded in Operation Desert Storm due to the experimentation during the late 1980s. Attack aviation units experienced in both deep attack and close combat operations adapted more rapidly and easier to combat conditions in Iraq than those units that focused solely on deep attack scenarios. As the Army explores means to execute Unified Land Operations in the coming decade, innovative applications of attack aviation, developed in training, will enable success in future conflicts.

ACKNOWLEDGMENTS

Although an Army Aviator, I am not an Apache pilot. I chose this topic out of personal curiosity about the evolution of attack aviation. Serving as a company grade officer in the 101st Airborne Division, I developed a different view of Army Aviation than that held by officers in other types of divisions. I wanted to learn how attack aviation worked in heavy divisions, how the deep attack tactic developed, and the role of corps attack units. Having participated in several academic and operational unit exercises over the past four years, I have grown concerned that staffs still seek to employ attack aviation in deep operations despite the lack of training by attack units to execute such tactics. Recent developments by the Army Aviation branch, particularly the republication of the *U.S. Army Aviation Digest*, encourage me that Army Aviation is appropriately adapting to meet future challenges. I did not hold this view in the late 1990s.

I extend my deepest thanks to my wife and children for allowing me to work on this paper at the expense of time with them. I also would like to thank by faculty and advisory committee for helping me expand my mental abilities.

TABLE OF CONTENTS

ACRONYMS

AAA	Anti-Aircraft Artillery
ADA	Air Defense Artillery
AHR	Attack Helicopter Regiment
CTC	Combat Training Centers
DOCC	Deep Operations Coordination Cell
FLOT	Forward Line Own Troops
JAAT	Joint Air Attack Team
OAF	Operation Allied Force
ODS	Operation Desert Storm
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
TF	Task Force
ULO	Unified Land Operations

ILLUSTRATIONS

Page

INTRODUCTION

> You just don't want to get pigeonholed into one type of mission because once you're in a combat zone you never know what's going to happen.
>
> —Major Fred Toti, Interview

The flexibility, mobility, and firepower of the United States Army's attack aviation units presents a challenge for division and corps commanders — how best to employ attack aviation in support of their scheme of maneuver. Two primary schools of thought exist: close combat attack or deep attack. The first school of thought, close combat attack, focuses attack aviation on the close fight in direct support of ground based maneuver units, primarily infantry and armor. Army attack aviation provides aerial observation and direct fires while in coordination with the ground unit. Aviation serves as an enabling function to these ground based maneuver units forming a three-dimensional combined arms team with synergistic effects. This school of thought came about during the infancy of attack aviation in the Vietnam War, but decreased in focus throughout the 1980s and 1990s. Since mid 2003, however, attack aviation increasingly refocused back on supporting ground maneuver in the close fight.

Deep independent attack aviation operations, directed primarily against enemy armor and artillery units, characterize the second school of thought. The AirLand Battle doctrine of the 1980s birthed the deep attack tactic, which the U.S. Army Aviation community embraced for a multitude of reasons.[1] Employment of deep attacks during Operation Desert Storm by attack aviation units validated the tactic leading to its continued refinement throughout the 1990s. Following Operation Allied Force in 1999, the Army entered a transition period lasting until the spring of 2003 and Operation Iraqi Freedom I. The failed deep attack by the 11th Attack

[1] Matthew Allen, *Military Helicopter Doctrines of the Major Powers, 1945-1992: Making Decisions About Air-Land Warfare* (Westport, CT: Greenwood Press, 1993), 37-42.

Helicopter Regiment (11 AHR) on 23 April 2003 coupled with the end of combat operations against the Iraqi Army days later appeared to shift attack aviation's focus back upon the close fight.

Motivated by multiple factors, the Army and Army Aviation now enter a post-conflict reflective period necessitating attack aviation to transition again. The Iraq conflict concluded for Army Aviation in late 2011 while current surge efforts in Afghanistan wane as the 2014 transition approaches. In late 2011, the U.S. Army instituted a new capstone doctrinal concept, *Unified Land Operations (ULO),* which harkens back to the AirLand Battle doctrine of the 1980s.[2] This pulls the Army to look again at operations in depth against a state military employing hybrid threat tactics.[3] Additionally, the Army initiated a holistic doctrinal review entitled *Doctrine 2015* that restructures and revises all Army doctrine, including Army Aviation doctrine, to align with ULO.[4]

To understand how Army Aviation should guide attack aviation employment under ULO, one needs to analyze attack aviation employment tactics of the past thirty years. Although pundits often criticize the military for relearning lessons of the last war, historical analysis of recent military experiences upholds successful interwar innovation. Founded upon such historical analysis, open-ended experimentation and exercises aimed at improving the effectiveness of units

[2] Raymond T. Odierno, foreward to *Army Doctrinal Publication No. 3-0, Unified Land Operations,* by Department of the Army (Washington, DC: Army Publication Directorate, 2011), forward.

[3] Department of the Army, *Training Circular 7-100, Hybrid Threat* (Washington, DC: U.S. Army Publication Directorate, 2010), 5-1.

[4] Clinton J. Ancker III, and Michael A. Scully, "Army Doctrine Publication 3-0: An Opportunity to Meet the Challenges of the Future," *Military Review* (January/February 2013): 39-40.

and the military service by testing systems to the breaking point enabled U.S. interwar innovation in the early 20th century.[5]

Historical analysis of Army attack aviation should incorporate two groups of actors who influenced the development of aviation tactics. The Army Aviation branch constitutes the first group of actors. The branch influences through development and training of employment tactics, through doctrine, and through training and education of Aviation leaders. Corps and division commanders serve as the second group of actors who directly influence attack aviation units. Aviation commanders employ their units to support their commanding general's scheme of maneuver. These schemes of maneuver differ between the levels of command, corps versus division, and depend upon the type of unit, e.g. heavy, light infantry, or airborne infantry. The concept of chaotic coupled pendulums, explained in more detail in a subsequent section, appropriately models the complex interactions of these multiple organizations affecting the Army attack aviation community, more so than the amalgamated approach by other authors.[6]

To succeed in tomorrow's battlefield, the combined arms community, especially corps and division commanders teamed with the Army Aviation branch, must enable attack aviation units to rapidly and comfortably transition between conducting deep shaping operations and supporting ground maneuver units with aerial direct fires and observation. When corps and division commanders accurately predicted the enemy's tactics, they appropriately employed

---

[5] Williamson Murray and MacGregor Knox, "The Future Behind Us," in *The Dynamics of Military Revolution: 1300-2050,* ed. MacGregor Knox and Williamson Murray (Cambridge, UK: Cambridge University Press, 2001), 188.

[6] Allen, *Military Helicopter Doctrines*, 235-36. In the chapter dedicated to the doctrine decision-making process, Allen notes that scholars often simplify their description to the major underlying causes. Allen concludes the two underlying factors in helicopter doctrine development by multiple countries include: the interaction of numerous factors and the influence of certain individuals. Rather than focus on influential persons affecting Army Aviation over the past thirty years, this monograph looks at organizational commands.

attack aviation. Challenges arouse, though, when commanders improperly anticipated the enemy and the aviation units had focused exclusively on one form of attack, deep or close. The 11 AHR's experiences during Operation Iraqi Freedom support this assertion. Aviation units, such as the 101st Aviation Brigade, proved more adaptable given their traditional deep focus and previous close combat experience in Afghanistan. The flexibility to transition between these two forms of aviation employment requires a trained combined arms team, which division and corps commanders influence.

This monograph traces the evolution of Army attack aviation over the past thirty years analyzing anticipations held leading into combat, lessons learned during combat, adaptations implemented during and after combat. To provide a more accurate assessment of the influence of the Army Aviation branch, corps commanders, and division commanders, the monograph assess the trends of the attack aviation community towards supporting the close fight or conducting deep attacks through a chaotic coupled pendulum model for each phase. This dual analysis method incorporates a historical component through vignettes of corps and division aviation brigade operations during Operation Desert Storm and Operation Iraqi Freedom I.

Chaotic Coupled Pendulums Analogy: A Model

A chaotic coupled pendulums model facilitates ones' understanding of the relationships between the multiple organizations that influenced attack aviation employment. Coupled pendulums consist of a series of steel balls suspended from an overhead wire and capable of swinging laterally without touching the adjacent balls. Each of these steel balls equates to a simple pendulum. The overhead connecting rod couples the individual pendulums by transferring the vibrations of the numerous oscillating pendulums. This coupling produces periods of synchronization, slight synchronization, and anti-synchronization with transitions between.

Physicists have termed these types of multiple coupled pendulums as chaotic coupled pendulums due to their emergent patterns of movement.[7]

Correlating the chaotic coupled pendulums analogy to attack aviation emphasizes the ability of attack aviation units to influence each other through the Army Aviation branch and literature. In this analogy, each ball represents an aviation brigade with its organic attack aviation unit. The two directions of deflection represent the two schools of thought, deep attack or close combat attack. The wires, representative of Army Aviation doctrine and literature, connect these attack aviation units into the Army Aviation branch, the overhead support rod.

An extension of the analogy to include movable electromagnets allows inclusion of the influence of corps, division and maneuver brigade commanders upon attack aviation units. Command magnets attract their associated aviation brigade toward their position. Positioning of a unit's command magnet on the deep side, for example, reflects the commander's guidance to train and employ their supporting attack aviation on deep attacks. While division magnets only attract their associated aviation brigade, corps magnets attract their associated aviation brigade directly and influence subordinate divisions magnets, either attracting or repelling based upon the commander's preference. Ground maneuver brigades, typically positioned on the close combat side of the pendulums, require inclusion in the model as division commanders may focus their attack aviation on supporting divisional brigades in the close fight.

Command magnets vary in strength based upon Army force structure. A rheostat controlled by the Army supplies electrical current to the command electromagnets allowing for variable power between corps, divisions, and brigades. The power distribution to these magnets depends upon Army force structure considerations, which varied over the time period studied. For

[7] Gregory L. Baker and James A. Blackburn, *The Pendulum: A Case Study in Physics (*Oxford: Oxford University Press, 2006.), 122-124.

example, under the Army of Excellence force structure electrical power flowed from the Army to corps, then out to divisions. Divisions could allocate power to subordinate maneuver brigades, if they chose. Under current force structure, the Army directly supplies power to each command magnet and networks them upon deployment. When networked, command magnets can divert power to subordinate command magnets as desired. Figure 1 displays the completed coupled pendulum model of Army attack aviation.

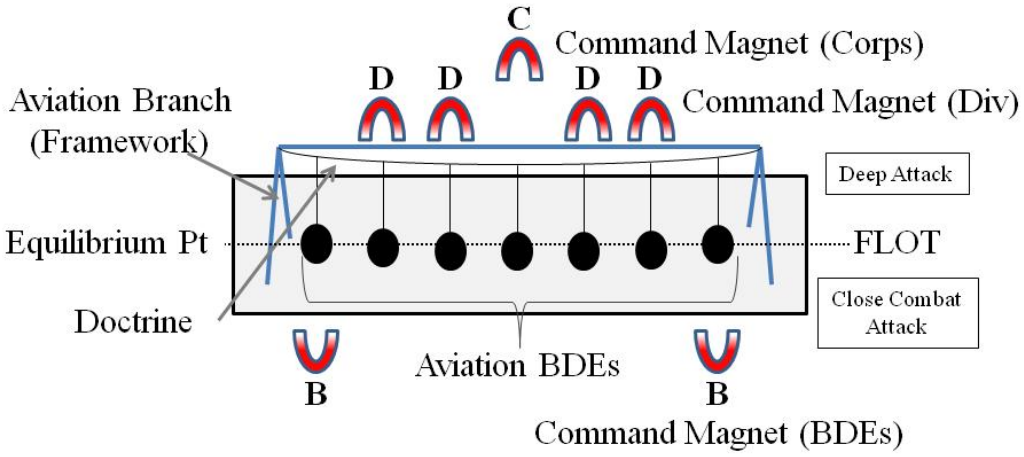

Figure 1: Coupled Pendulums at Rest (Profile View)

Source: Author

Associating the attack aviation community to a chaotic coupled pendulum model enables graphical representation of the community. Figure 2 displays the model of a single aviation brigade, considered a simple pendulum, according to the model. Physics provides a useful observation in regards to the swing of a simple pendulum: higher swings take more time to complete the oscillation.[8] Extending this observation to attack aviation, the more the community focuses solely on one tactic, either close combat attack or deep attack, the more time required to

[8] Ibid., 9.

transition back to the other tactic. If the preponderance of the community only trained for one type of mission, instilling the doctrine and training the techniques to support the opposite tactic takes time to propagate through the entire force.

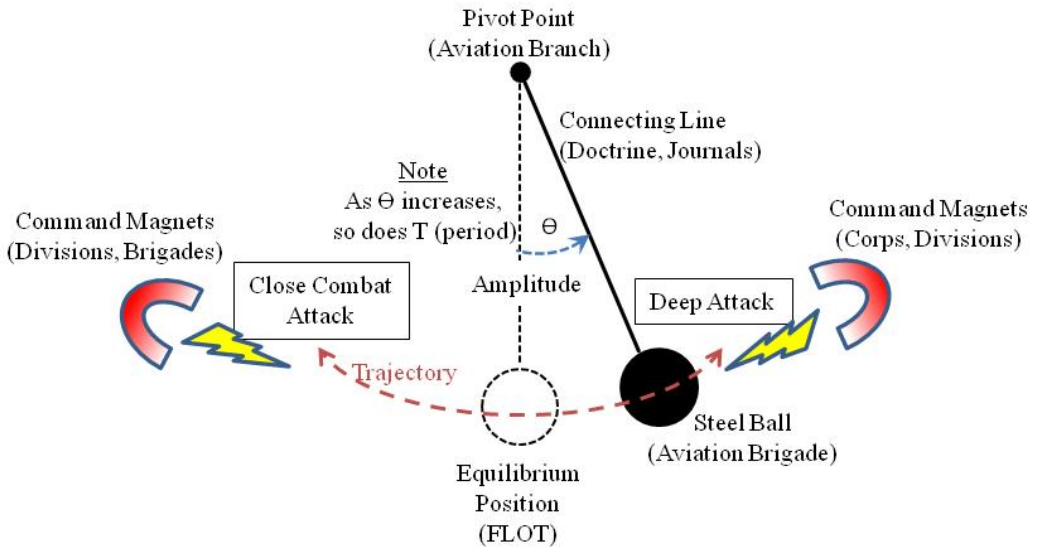

Figure 2: Simple Pendulum

Source: Author.

The chaotic motion of numerous oscillating coupled pendulums complicates graphical representation. Instead of attempting to capture this motion, the author represented the state of Army Aviation through graphical snap shots, as depicted in figure 4. Such representations also reflect the synchronicity of the community toward one realm or the other.

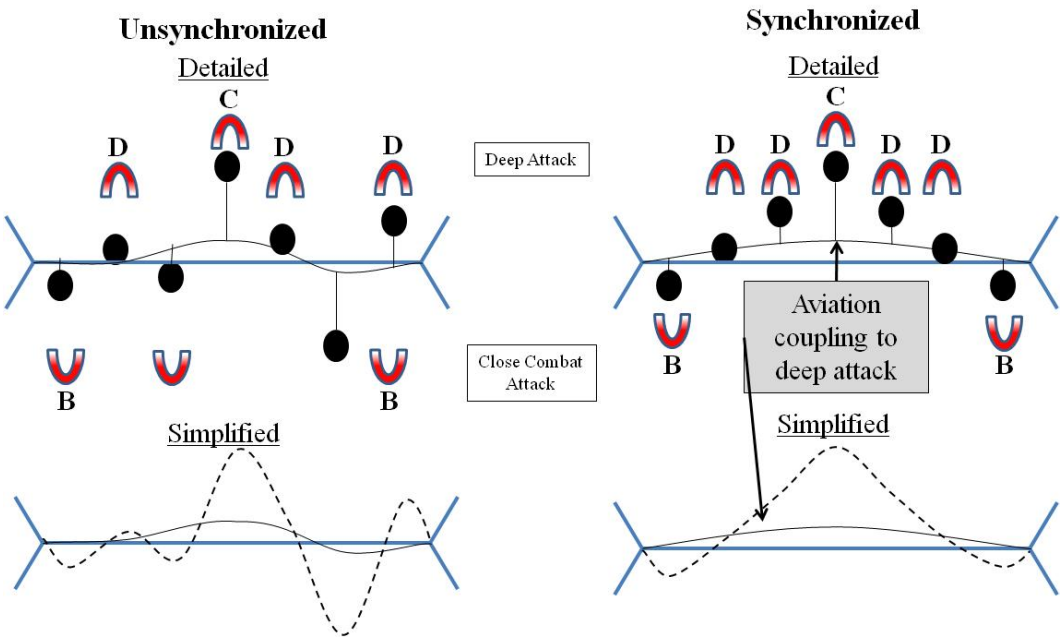

Figure 3: Coupled Pendulums (Overhead View)

Source: Author

By focusing on sample units and aviation operations in regards to close or deep operations throughout the past thirty years, this monograph demonstrates both how attack aviation shifted from deep attack to close combat attack and the interaction between the Army Aviation branch, corps and division commanders, and aviation brigades. Based upon Army doctrine, articles found in military professional journals, and combat case studies, the author represents the state of attack aviation during four periods since 1982. Each section concludes with a narrative description of the community as represented by the chaotic coupled pendulums model. Analysis begins with the Army's publication of AirLand Battle doctrine and the formation of the Army Aviation branch.

FINDING A ROLE FOR ATTACK AVIATION: 1982–1991

Throughout the 1980s, Army Aviation attempted to develop its doctrinal approaches and educate ground maneuver commanders about methods to integrate attack aviation into their schemes of maneuver. The period witnessed the U.S. Army's adoption of the AirLand Battle doctrine in 1982, the birth of Army Aviation as an independent branch in 1983, reorganization into the Army of Excellence force structure with associated fielding of the AH-64 Apache helicopter into attack aviation battalions beginning in 1986, and establishment of Combat Training Centers (CTCs). By the end of the 1980s, attack aviation demonstrated ability to operate across the Forward Line of Own Troops (FLOT) in support of division close operations or corps deep operations, but timely integration of attack aviation into the ground commanders' schemes of maneuver continued to challenge brigades and divisions.

AirLand Battle: Development of the Deep Attack

In 1982, the U.S. Army unveiled its AirLand Battle doctrine with the publication of *FM 100-5, Operations*. AirLand Battle shifted from a firepower based approach to a maneuver based approach and sought to shape the decisive battles of the close fight by attacking the enemy's uncommitted units in depth.[9] In support of operations in depth, the 1982 *FM 100-5* introduced the "deep attack" tactic as the method for delaying the enemy's arrival at the main battle area and allowing the friendly commander to gain the initiative through period of local superiority.[10] AirLand Battle initially described four purpose-based forms of deep attack in execution of the deep battle: "delay of forces to prevent reinforcement, delay of forces to allow maneuver completion, decisive deep attack," and destruction of a high value target.[11] Interdictory fires, both

[9] Department of the Army, *Field Manual 100-5, Operations* (Washington, DC: Government Printing Office, 1982), 1-5.

[10] DA, *FM 100-5, Operations* (1982), 7-14.

[11] Ibid., 7-16 – 7-17. First three terms are as labeled in *FM 100-5*, high value target is

Army artillery and Air Force Battlefield Aerial Interdiction, served as the predominant means to implement deep attacks, but ground and air maneuver forces could also interdict in depth.[12] Acting alone, firepower could delay, disrupt, or divert follow-on forces as required for the first two forms of deep attack. Decisive deep attacks, however, required coordination between fires and maneuver forces to directly engage and destroy follow-on enemy forces.[13] The Field Artillery branch championed deep battle initially, but Army Aviation began to incorporate itself into the deep attack methods.

Army Attack Aviation in AirLand Battle: An Independent Maneuver Arm

Under AirLand Battle, Army Aviation promoted its major contribution to warfighting as being an independent aerial maneuver force, centered on the attack helicopter battalion, capable of attacking enemy targets, primarily armored forces, behind enemy lines.[14] While this vision eschewed aviation's earlier foci on supporting the Infantry with air assaults or Field Artillery with aerial observation, it supported the Army's overarching concept by extending to the corps and division commanders the ability to influence the enemy in depth all the while underpinning the independent nature of the Army's newest maneuver branch, Aviation.[15] Army Aviation's contribution to deep attacks, although originally vague upon publication of AirLand Battle in

---

author's interpretation of the description in manual. High Value Target deep attack, the fourth form, is discussed in the narrative as an attack based on "target value analysis."

[12] Ibid., 7-13 – 7-14; Department of the Army, *Field Manual 100-5, Operations* (Washington, DC: Government Printing Office, 1986), 38.

[13] DA, *FM 100-5, Operations* (1982), 7-17.

[14] Allen, *Military Helicopter Doctrines*, 44-46; Rudolph Ostrovich III, "AirLand Battle–Part I: Dramatic Changes in Emerging Aviation Doctrine," *U.S. Army Aviation Digest* (November 1986): 3.

[15] Allen, *Military Helicopter Doctrines*, 48.

1982, expanded throughout the 1980s to the point that the military relied upon an aviation deep attack to initiate its next major war, Operation Desert Storm.

When the Army developed the AirLand Battle doctrine, it considered aviation, not yet an independent branch, as either a highly mobile fires platform or a mobility asset for infantry forces. Aviation's role in deep attacks, therefore, consisted mainly of air assaulting infantry into the enemy's rear area or executing a Joint Air Attack Team (JAAT) in coordination with Air Force fixed-wing aircraft, as depicted in the 1982 *FM 100-5* deep attack illustrations.[16] Infantry air assaults worked well in Infantry divisions, especially the 101st Airborne Division (Air Assault), an entire division dedicated to employing the tactic. For the more plentiful mechanized and armored divisions of the U.S. Army of Excellence during the 1980s, Aviation searched for other methods it could contribute to AirLand Battle doctrine.

The attack aviation community developed methods to conduct deep attacks throughout the decade. By the mid-1980s, Army Aviation proponents had conceptually demonstrated that attack aviation could assist in deep attacks as well as contribute to JAATs.[17] As early as 1984 aviators proposed methods for aviation maneuver units to cross into enemy territory up to 60 kilometers.[18] With the fielding of the AH-64 Apache helicopter in 1986, aviators had improved technology to penetrate enemy air defenses arrayed along the forward line of own troops and to operate at night.[19] By developing tactics using terrain that reduced helicopter exposure to enemy

---

[16] DA, *FM 100-5, Operations* (1982), 7-17.

[17] Allen, *Military Helicopter Doctrines*, 37; Craig Pearson, "Joint Army Aviation/Air Force Deep Operations at Night: Is it Tactically Feasible and If So, How?" (monograph, U.S. Army School of Advanced Military Studies, 1985), iii; Frank Cox, "Showing How It's Done," *Field Artillery Journal* (January/February 1986): 22-23.

[18] Charles L. Barry, "Planning Aviation Cross-FLOT Operations," *Military Review* (January 1984): 44-45.

[19] Allen, *Military Helicopter Doctrines*, 37-38; Kennet R. McGinty and Gregory A.

radar, attack helicopters could operate through the depths of the battlefield at a speed far greater than other maneuver units could.

Throughout the 1980s Army corps commanders turned to attack aviation to conduct operations in depth. The Army expected corps to delay, disrupt, or destroy enemy units 72 hours prior to their arrival at the FLOT; the Army expected divisions to affect enemy forces within 24 hours of direct-fire engagements.[20] Equipped under the Army of Excellence force structure with their own field artillery and aviation brigades, corps commanders encouraged the Aviation branch to discover how Army Aviation could contribute to operational maneuver and to educate the rest of the force on their methods.[21] Corps commanders and their aviation brigades explored techniques to maneuver in depth through live and virtual exercises during the latter half of the decade. In Germany, for example, corps often tasked their attack helicopter units to conduct deep attacks during the annual Return of Forces to Germany (REFORGER) exercise beginning as early as 1987.[22] Likewise, III Mobile Armored Corps promoted independent deep attack helicopter operations for its attack aviation battalion during exercises such as Certain Strike 87.[23] By the turn of the decade, several Army authors concluded that aviation brigades assigned to corps, heavy divisions, and the air assault division could conduct operational maneuver, with some

---

Brockman, "Cross FLOT With the AH-64 Apache," *U.S. Army Aviation Digest* (January 1987): 2.

[20] DA, *FM 100-5, Operations* (1982), 7-15.

[21] James J. Lindsay, "Operational Maneuver: Key to Joint Warfighting," *U.S. Army Aviation Digest* (May 1986): 6.

[22] For REFORGER 87, see Allen, *Military Helicopter Doctrines*, 38; for REFORGER 90, see Michael J. Karr, "REFORGER 90: Readiness," *U.S. Army Aviation Digest* (July/August 1990): 48-49; and Guy A. Rogers II, "REFORGER 90: Reserves," *U.S. Army Aviation Digest* (July/August 1990): 51.

[23] Crosbie E. Saint and Walter H. Yates Jr., "Attack Helicopter Operations in the AirLand Battle: Deep Operations," *Military Review* (July 1988): 4.

authors even proposing advantages of creating an aviation division.[24] Aviation integration challenges remained, however. Commonly identified deficiencies during division and corps exercises included the following: inadequate intelligence procedures resulting in late or misplaced employment of attack aviation, lack of fire support to attack aviation units, and poor logistical support to arming and refueling locations.[25]

Integrating attack aviation into the close fight challenged ground maneuver brigade and battalion commanders in similar ways. Attack aviation unit experiences at CTCs highlighted many issues on poor integration and synchronization of attack aviation and ground maneuver. Maneuver brigade and battalion commanders frequently employed attack aviation last minute and as reserve fire support assets versus integrating aviation units into the scheme of maneuver.[26] Attack aviation battalions often failed to calculate the unit's ability to destroy enough enemy equipment to meet the commander's intent.[27] Additionally, ground commanders often tried to employ attack aviation piecemeal.[28] Retaining attack aviation as an emergency fire support asset

---

[24] For corps aviation brigade and air assault division as operational maneuver, see Micheal T. Inman, "Operational Maneuver in the 90s: Is Army Aviation a Viable Option?" (Master's monograph, U.S. Army School of Advanced Military Studies, 1990), iii; for aviation division, see Edward J. Sinclair, "The Air Attack Division: AirLand Battle Future's Operational Contingency Force?" (Master's monograph, U.S. Army School of Advanced Military Studies, 1991), 39-42; William M. Jacobs, "Massing the Third Dimension in AirLand Battle-Future: The Aviation Division" (Master's monograph, U.S. Army School of Advanced Military Studies, 1990), 38-39; and James E. Simmons, "Army Aviation: Does it Provide an Answer to Operational Maneuver in the Central Region?" (Master's monograph, U.S. Army School of Advanced Military Studies, 1990), 36-39.

[25] Karr, "REFORGER 90: Readiness," 49; William E. Gagnon Jr., "Attack Mission Planning," *U.S. Army Aviation Digest* (September/October 1990): 18-19.

[26] Allen, *Military Helicopter Doctrines*, 44, 51.

[27] Shane M. Deverill and Michael S. Marlow, "Combat Training Centers," *U.S. Army Aviation Digest* (September/October 1990): 6-8.

[28] Ostrovich, "AirLand Battle–Part I," 7.

called upon at the last minute repeatedly proved unsuccessful.[29] By the end of the decade, some attack aviation units successfully demonstrated that attack aviation could achieve decisive results in the close fight, but it required training, persistence, and command support from division and corps leaders.[30] In the opinion of the Aviation community, attack aviation could support ground maneuver units in the close fight, but the ground unit must integrate aviation into the scheme of maneuver, allow the attack helicopter battalion to operate as a cohesive unit, and defer to the aviation battalion commander on how best to integrate itself.

After having developed and trained deep attacks at the corps and heavy division levels during training exercises of the 1980s, Army Aviation found itself executing these tactics in combat in the sands of Iraq. The problems identified during training, i.e. lack of aviation integration into ground commander's scheme of maneuver and tendency to treat attack aviation as a flexible reserve, surfaced during combat. Overall, though, corps and division commanders executed AirLand Battle, to include the deep attack tactic, as rehearsed during the training exercises of the 1980s leading most of the Army to conclude that deep attacks work.

Operation Desert Storm: Validation of the Deep Attack

Army attack aviation demonstrated its ability to conduct deep attacks in combat in the sands of Iraq during Operation Desert Storm in the spring of 1991. In the decade leading up to Operation Desert Storm the attack aviation community promoted its ability to the Army and to the corps and division commanders as being capable of deep independent maneuver with the ability to destroy armor and artillery. It recommended better inclusion into the corps and divisions

[29] Crosbie E. Saint and Walter H. Yates Jr., "Attack Helicopter Operations in the AirLand Battle: Close Operations," *Military Review* (June 1988): 4.

[30] Michael L. Poumade, "Apaches at the NTC: They're Here!" *U.S. Army Aviation Digest* (January/February 1991): 47-49.

scheme of maneuver from the get go rather than activation as a last minute flexible reserve force. Actual employment of attack aviation during Operation Desert Storm would see both issues demonstrated. Afterwards the Aviation community concluded that deep attacks worked and focused attack aviation units on the tactic. A detailed review of attack aviation employment at both the corps and division level identifies how Army Aviation leaders reached these conclusions in the post campaign analysis.

VII Corps Employment of the 11th Aviation Brigade (Corps)

Lieutenant General Frederick Franks, the VII Corps Commander, husbanded his two corps attack aviation battalions. In addition to conducting one cross-border attack during the air campaign, he only employed them once each during the 100-hour ground campaign.[31] All three missions consisted of offensive cross-FLOT attacks at varying depths during which the entire battalion maneuvered by companies. Aside from these dedicated deep attack missions, Franks retained his corps aviation brigade in a reserve role; he did not allocate them to augment his subordinate division aviation brigades. He first used his corps aviation brigade, as well as his corps artillery brigade, in the days preceding the ground campaign to shape the breach operations

Air Campaign: 2-6 CAV Raid, 16 February

Through a series of artillery and aviation raids during the air campaign, Franks hoped to neutralize Iraqi artillery capable of affecting the corps breach operations, to disrupt Iraqi command and control networks, and to demoralize Iraqi forces. He also intended these raids to serve as final rehearsals of the fire support system. The 2d Squadron, 6th Cavalry (2-6 CAV) of the 11th Aviation Brigade supported by the 42d Field Artillery Brigade (VII Corps Artillery)

[31] U.S. General Accounting Office, *Apache's Performance in Desert Storm, GAO/NSIAD-92-146* (Washington, DC: Government Printing Office, April 1992), 40.

conducted the deep attack on the early morning of 16 February 1991 on the right flank of the corps sector closest to the Kuwait-Iraq border, in the 1st Cavalry Division's area of operation. The attack incorporated an hour-long artillery preparation by five battalions to create a two-kilometer penetration point, through which 2-6 CAV passed two minutes after the artillery shifted to deeper targets. After penetrating five kilometers, the squadron advanced along a 15-kilometer front an additional 10 kilometers with all three troops simultaneously engaging numerous targets within their sector for five minutes. The squadron then returned across the border having been forward of the FLOT for 36 minutes.[32]

Ground Campaign: 4-229 AVN Deep Attack, 26-27 February

With the commencement of the ground campaign on 24 February 1991, the preponderance of activity shifted to the divisions as they maneuvered into Iraq and positioned to attack the Iraqi Republican Guard Forces arrayed along the Iraqi side of the Kuwait-Iraq border. On the afternoon of 26 February, as VII Corps' divisions began attacking the *Tawakalna Mechanized Division*, the strongest division of the Iraqi *Republican Guard Force*, Franks employed his corps aviation brigade to shape the current close battle as well as future operations. The Iraqi *10th Armored Division*, comprised of two armored brigades and one mechanized brigade and located 40-50 kilometers behind the *Tawakalna Mechanized Division*, blocked two roads into Kuwait. Franks wanted to prevent the *10th Armored Division* from reinforcing the *Tawakalna Division* during VII Corps' attack as well as to disrupt the *10th Armored Division's* ability to block VII Corps future operations into Kuwait. Franks tasked his 11th Aviation Brigade

[32] Stephen A. Bourque, *Jayhawk!: The VII Corps in the Persian Gulf War* (Washington, DC: Department of the Army, 2002), 311.

to conduct a deep attack on the night of 26-27 February, simultaneous to three divisions of VII Corps engaging the *Tawakalna Mechanized Division* in close operations.[33]

The 11th Aviation Brigade attacked the *10th Armored Division* at Objective Minden with its 4th Battalion, 229th Aviation (4-229 AVN). Operating out of their base in Saudi Arabia, the battalion flew 45 minutes to reach the objective and engaged multiple tanks, armored personnel carriers, and other vehicles for approximately thirty minutes. The battalion maneuvered as three companies with each company attacking in a designated sector. The battalion returned to the brigade's forward arming and refueling point, located approximately mid-way between the Iraq-Saudi Arabia border and the FLOT, in preparation for a second attack. A couple of hours later the battalion reattacked Objective Minden with two companies. The two attacks destroyed the equivalent of two heavy battalions worth of tanks and armored personnel carriers while receiving no damage to 4-229 AVN aircraft.[34]

Prior planning, training, and command involvement facilitated the successful execution of 11th Aviation Brigade's deep attack against the *10th Armored Division* on Objective Minden. The concept for the deep attack had been included as a branch plan to VII Corps original operations order. On the afternoon and evening of 25 February, 24 hours prior to execution, Franks verbally notified the 11th Aviation Brigade Commander to execute the operation the following night, and the VII Corps staff published a fragmentary order confirming execution of the previously established branch plan.[35] Prior planning and adequate notification allowed the 4-

[33] Ibid., 311

[34] Ibid., 312-314.

[35] Ibid., 280.

229 AVN battalion commander time to develop a simple plan and coordinate support with brigade and corps staff officers during the 24-hours preceding the attack.[36]

VII Corps Employment of Divisional Aviation Brigades

For the most part, the divisions of VII Corps employed their attack aviation battalions in similar manners, against rear area targets beyond the range of the ground maneuver unit's direct fire weapon systems. Divisions, however, sought immediate advantages in the current engagement versus the corps aim to set the conditions for future engagements. The 1st Infantry Division commander, for example, used his attack aviation battalion against second echelon forces and enemy rear area forces, such as artillery, command and control centers, and logistics facilities, during the division's challenging and risky night-time forward passage of lines through 2d Armored Cavalry Regiment while in contact Iraqi forces.[37] Likewise the 3d Armored Division commander used his attack aviation to support his lead brigade's attack; unlike the other division commanders, however, he passed operational control to his subordinate brigade commanders providing each of them one attack company instead of retaining control of his attack aviation battalion at division.[38] These companies still operated in a similar fashion: artillery suppressed enemy locations, friendly forces and artillery ceased fire, and the attack company crossed the FLOT minutes after the artillery preparation ceased. Once across a phase line beyond direct fire range of the FLOT, the Apache company attacked artillery and command posts with direct and indirect fire while the ground maneuver units engaged closer enemy forces.[39] Attack aviation

---

[36] Bourque, *Jayhawk!*, 313.

[37] Ibid., 333.

[38] Ibid., 338.

[39] Ibid., 338-341.

companies operated forward of the FLOT but against enabling arms of the enemy brigade which the ground maneuver units were currently fighting. This meant they did not operate as deep behind the FLOT as the corps aviation brigade, some 3-5 kilometers versus 40-50 kilometers. Division attack aviation battalions also attacked different target sets, focusing on artillery, command posts, and supply assets vice the corps attack aviation destroying armor and mechanized fighting vehicles.

The experiences of the 4th Brigade, 1st Armored Division illustrate the manner in which division commanders used their aviation assets during Operation Desert Storm. On the night prior to the ground offensive, the 3d Battalion, 1st Aviation Regiment (3-1 AVN) conducted a zone reconnaissance approximately forty-five kilometers into Iraq in preparation for the division's breach operations the following morning. Two days later the battalion conducted a daylight deep attack against an Iraqi corps logistics complex forty-four kilometers in front of the advancing division. The following night 3-1 AVN conducted company phased deep attacks against elements of the Medina and Adnan brigades withdrawing northward from their engagements with the neighboring 3d Armored Division. Upon order of the division commander, the battalion, relieved mid-day by a sister attack aviation battalion, continued to exploit their successes throughout the next day by attacking on-line 3-5 kilometers in front of the lead ground brigades. On the next morning, the final day of the ground campaign, 2d Battalion, 1st Aviation Regiment, the unit which had relieved 3-1 AVN the day prior, conducted a movement to contact up to twenty-five kilometers in advance of the division's front line to destroy remaining Iraqi forces prior to the initiation of the cease-fire.[40] The battalion suffered no injuries or damage from enemy fire or fratricide during any of these engagements.

---

[40] Daniel J. Petrosky and Marshall T. Hillard, "An Aviation Brigade Goes to War," *U.S. Army Aviation Digest* (September/October 1991): 55-63.

In the wake of Operation Desert Storm, Army Aviation surmised itself as an effective but underutilized asset in the Army's arsenal. In its official assessment, the Department of the Army's Aviation Division concluded that Operation Desert Storm "validated" Army Aviation doctrine. They observed that "Aviation was king of reconnaissance and deep operations," that "Aviation 'owned the night" and that "Aviation may have been the greatest killer of the land component."[41] They noted ground commander's appreciation of the Apache's ability to operate in poor visibility and to rapidly adjust employment plans based on the commander's need.[42] The Aviation Division recommended upgrading the Apache to the Longbow system to improve survivability, lethality, and versatility plus adjusting Army force structure.[43]

In the eyes of aviators, the most significant factor which hindered attack aviation from achieving its full potential consisted of division commander's choice not to more fully integrate attack aviation into the division's scheme of maneuver. First and foremost, Army division and corps commanders chose not to use attack aviation more than they did.[44] Lieutenant General Franks and his division commanders each chose to employ attack aviation in slightly different ways. Franks and the 1st Armored Division commander used their attack aviation to attack deep targets, whereas the 3d Armored Division commander allocated an attack company to each of his maneuver brigades to support their movement. This reflects the dual view towards attack aviation as either a maneuver force or a fires platform. The cavalry organizations, such as the 2d Armored

---

[41] "Army Aviation in Operation Desert Storm," report by Aviation Division, Office Deputy Chief of Staff for Operations, Headquarters Department of the Army, 1991, Aviation Technical Library, Fort Rucker, AL, A17.

[42] Ibid., A13.

[43] Ibid., A24.

[44] GAO, *Apache's Performance in Desert Storm* (Washington, DC: Government Printing Office, April 1992), 4.

Cavalry Regiment, took yet another approach to integrating aviation. The cavalry routinely relied on aerial scouts to find enemy forces and then attack with indirect fire assets or attack helicopters, execute a JAAT, or direct ground scouts into contact. Mostly though, all commanders considered their aviation brigade as their reserve capable of quick response, but not essential in the scheme of maneuver.[45]

Formation of the Coupled Pendulum

As evidenced by attack aviation performance during Operation Desert Storm, Army Aviation established a system over its first eight years as a separate branch resembling coupled pendulums. Under the 1980s Army of Excellence force structure, Army Aviation fielding aviation brigades at corps and division levels, the individual pendulums. These brigades included attack helicopter battalions comprised of AH-64 Apaches and AH-1 Cobra helicopters. The Aviation branch developed doctrine that coupled the various brigades towards common principles and techniques for attack aviation employment.[46] Whereas the Aviation branch coupled the multiple aviation brigade pendulums, tactical commanders influenced the deflection of the brigades towards either deep attacks or close operations.

Corps commanders, equipped with independent field artillery and aviation brigades in addition to their subordinate divisions, proved the most influential actor upon shaping attack aviation procedures. The Army's AirLand Battle doctrine promoted corps to operate in depth to affect enemy units prior to their arrival in division's battle space. Corps commanders challenged Army Aviation to become capable of operational maneuver and then exercised that capability through numerous exercises. During Operation Desert Storm, corps dedicated their attack

[45] Bourque, *Jayhawk!*, 212.

[46] Ostrovich, "AirLand Battle–Part I," 4.

aviation only for specific deep operations in support of the corps' scheme of maneuver. They did not provide corps attack aviation units to support subordinate division's schemes of maneuver.

Division commanders largely followed the suite of their corps commanders choosing to withhold their attack aviation to support the division's scheme of maneuver rather than allocating attack aviation to subordinate brigades. As evidenced during Operation Desert Storm, divisions predominantly employed their attack aviation in cross-FLOT independent attacks against enemy artillery and command posts. Although these attacks occurred forward of friendly troops, doctrinally they constituted close operations as they supported the current operations of ground maneuver brigades rather than shape future operations. Exceptions occurred, however, where divisions employed their attack aviation in either deep attacks or allocated attack companies to subordinate maneuver brigades.

Ground maneuver brigades provided the least influence upon attack aviation during this period. Attack aviation strove throughout the 1980s to educate maneuver brigades how to integrate attack helicopter units into the ground scheme of maneuver and fire support plan. Feedback from CTCs repeatedly highlighted how integration frequently challenged both ground maneuver and aviation brigades. This resulted from competing perspectives between ground maneuver units and Army Aviation. Ground maneuver units often viewed attack aviation as a fire support asset choosing to employ it piecemeal in emergencies. Army Aviation promoted employment of attack aviation as a battalion and as an independent maneuver element. Aviation leaders, as well as certain corps commanders, viewed an attack helicopter battalion similar to an armor battalion but with increased speed and flexibility.

At the end of Operation Desert Storm, then, the coupled pendulums of attack aviation existed in a desynchronized state4. Corps aviation brigades operated exclusively in the deep attack spectrum. Heavy division aviation brigades operated closer to the equilibrium point but slightly on the deep side. Although their operations supported the close fight, division aviation

brigades still conducted independent cross-FLOT operations up to fifteen kilometers necessitating representation on the deep side. Division aviation brigades supported brigade close operations in training, particularly at CTCs, and occasionally in combat, which the pendulum analogy must reflect. In the wake of Operation Desert Storm, the coupling capability of the Army Aviation branch and the noted success of deep attacks instituted synchronization throughout the 1990s toward the deep attack spectrum.

SYNCHRONIZED PULL TO THE DEEP SIDE: 1991–1999

Following Operation Desert Storm, the Army entered a period of reflection and adjustment to the realities of the post Cold War. Addressing Army operations in this new strategic environment, the 1993 version of *FM 100-5, Operations* introduced a "doctrine for the full dimensions of the battlefield in a force-projection environment."[47] This equated to a focus on deployment and inclusion of "operations other than war."[48] Much of the AirLand Battle doctrine remained, but the Army now promoted simultaneous deep, close, and rear operations instead of operating sequentially.[49] Deep operations gained increased significance as the Army now recognized that the decisive point could occur in the deep fight too.[50] The Army also recognized the complexity of synchronizing numerous deep operational maneuver and fires assets that

[47] Department of the Army, *Field Manual 100-5, Operations* (Washington, DC: Government Printing Office, 1993), vi.

[48] Ibid., 2-1.

[49] Ibid., vi.

[50] Department of the Army, *Field Manual 100-15, Corps Operations* (Washington, DC: Government Printing Office, 1996), 5-13.

effective deep operations entailed, even to the point of dedicating a battle lab to addressing the issue.[51]

Despite a recognized value of deep operations, Army capstone doctrine still suggested that attack aviation remain a supporting effort to ground maneuver, a view not shared by the Army Aviation community. According to 1993 *FM 100-5*, Army attack aviation could "favorably influence the battle when ground forces are decisively engaged." The manual recommended attack helicopters continue to serve as a rapid reaction force for ground commanders and could conduct independent operations in areas where ground maneuver forces were restricted.[52] This limited view of attack aviation, while expanded from the 1986 version of *FM 100-5*, competed against the Aviation branches view as to the importance of attack aviation. A review of aviation operational concepts, doctrine, and organizational changes during the 1990s indicates a shift in this focus from the ground commander to a centrality of attack aviation equal to ground maneuver forces, and in certain cases, such as deep operations, deployability, lethality, and versatility, even superior to ground forces.

Army Aviation Branch: Synchronizing Toward the Deep Attack

In the immediate aftermath of Operation Desert Storm, leaders of the Aviation branch shaped its members' perceptions of the branch through a series of articles in the professional journal of the U.S. Army Aviation branch, the *U.S. Army Aviation Digest*. In March 1991, Major General Rudolph Ostovich III, the Chief of Army Aviation Branch, hailed the Apache's lethality

[51] DA, *FM 100-5, Operations* (1993), 6-14; for Depth and Simultaneous Attack Battle Lab, see Donald Kerr, "Depth and Simultaneous Attack –One Battle Lab Helping to Forge the Army's Future," *Field Artillery* (April 1993): 36.

[52] DA, *FM 100-5, Operations* (1993), 2-23.

in comparison to the Iraqi's inability to engage Apaches as "not even a fair fight."[53] Subsequent issues described the experiences of a divisional aviation brigade and armed reconnaissance operations during Operation Desert Storm.[54] Even light infantry divisions, whose attack aviation battalions were equipped with older AH-1 Cobra attack helicopters vice AH-64 Apaches, "established the Aviation Brigade as the combat maneuver force staffed and equipped to execute deep operations" against the enemy's artillery system during a simulation exercise.[55] These articles highlighted to aviators the perceived value of attack aviation in support of deep attack and reconnaissance operations.

Over the same time period, a four part series entitled "Design for Tempo" set the stage for organizational and doctrinal changes to the Aviation branch. The series, written by the U.S. Army Aviation Center's Chief of Staff and coauthored with the Center's Aviation Planning Group, presented Aviation branch's view that Army Attack Aviation provided improved speed, deployability, and lethality in comparison to armor units.[56] They argued that, as a maneuver force, aviation possessed the advantage over ground maneuver in three of the five maneuver phases and "may be superior to ground-based force in the combat phase."[57] They promoted a

---

[53] Rudolph Ostovich III, "Aviation Contribution to the War in the Gulf," *U.S. Army Aviation Digest* (March/April 1991): 1.

[54] For divisional aviation brigade, see Petrosky & Hillard, "Aviation Brigade Goes to War," 44-65; for Apache armed reconnaissance operations, see William H. Bryan and Michael A. Albaneze, "Apache Armed Reconnaissance Operations: Another Technique," *U.S. Army Aviation Digest* (January/February 1992): 38-41.

[55] Kief S. Tackaberry, James A. Kelley, and Thomas M. Muir, "Deep Attack and the Counterartillery Battle," *U.S. Army Aviation Digest* (January/February 1992): 13.

[56] Patrick J. Bodelson and Kevin B. Smith, "Design for Tempo," *U.S. Army Aviation Digest* (March/April 1991): 2-16.

[57] Patrick J. Bodelson and Kevin B. Smith, "Design for Tempo, Part 2: Aviation as a Maneuver Arm," *U.S. Army Aviation Digest* (July/August 1991): 11.

high-level review board to address the mix of aviation units in the Army force structure with the implication that the combined arms mix needed more helicopters.[58]

The Aviation Warfighting Center completed such a review and implemented organizational changes beginning in 1994. The Aviation Restructure Initiative (ARI) converted aviation battalions into single airframe units, divested the forces of obsolete airframes, improved existing airframes, and sought procurement to fill capability gaps.[59] The restructuring of the 11th Aviation Brigade provides a useful example of how ARI affected aviation support to corps. While supporting VII Corps during Operation Desert Storm, the 11th Aviation Brigade consisted of three mixed battalions of eighteen AH-64A Apaches attack helicopters, thriteen x OH-58 Kiowas scout helicopters, and three x UH-60 Blackhawks utility helicopters for command and control. After restructuring in the summer of 1994 into the 11th Aviation Regiment, the unit consisted of two battalions with twenty-four AH-64A Apaches per battalion.[60] The loss of organic support aircraft required the regiment to coordinate with other aviation brigades for such assets in training and in combat, as they would have to during Operation Iraqi Freedom.[61]

At the same time that the Army Chief of Staff approved the ARI, the Army Aviation branch announced a new "U.S. Army Operational Concept for Aviation."[62] The concept

---

[58] Patrick J. Bodelson, Kevin B. Smith, and Paul G. Ebhardt, "Design for Tempo, Part 3: Aviation —Mobility and Lethality for Deployable Forces," *U.S. Army Aviation Digest* (September/October 1991): 12.

[59] Rick Scales, "Aviation Restructure Initiative—The Way of the Future," *U.S. Army Aviation Digest* (September/October 1993): 17.

[60] Douglas R. Eller, "ARI Transition—A Report from the Field," *U.S. Army Aviation Digest* (March/April 1995): 27.

[61] Ibid., 30.

[62] Charles M. Burke and Donald C. Presgraves, "U.S. Army Operational Concept for Aviation," *U.S. Army Aviation Digest* (September/October 1993): 2-11.

confirmed previous assessments that Operation Desert Storm validated the attack helicopter and the concept of aviation maneuver. In describing some general principles, the concept noted that "the role of combat aviation is to locate and destroy enemy ground forces and support elements," with a priority of commitment "against deep targets and on flanks, secondarily in support of ground maneuver elements in the close fight."[63] For increased effectiveness, the concept recommended units execute these attacks at night, in mass, and continuously against moving armor and artillery. Reconnaissance constituted a secondary mission for attack aviation. While attack helicopter units could augment division cavalry squadrons and corps armored cavalry regiments for deep reconnaissance or guard missions, air cavalry units organic to these cavalry organizations served as the primary reconnaissance assets.[64] The concept also promoted the lead role of combat aviation with other Battlefield Operating Systems, such as fire support and intelligence, in a supporting relationship to combat aviation.[65] In the "Deep Operations" edition of the *Field Artillery* journal, the Army Aviation branch chief shared this vision with the Field Artillery community, the main partner with Aviation in prosecuting corps and division deep operations.[66]

The concept stressed through several methods of employment that attack aviation operated independently from ground maneuver brigades, while remaining a member of the combined arms team. First, the Army concentrated attack aviation at the division level as divisions served as the primary integrator of units into combined arms fight in deep, close, and

---

[63] Ibid., 11.

[64] Ibid., 11-12.

[65] Ibid., 11.

[66] J. David Robinson and Charles M. Burke, "Fighting Maneuver and Fires in the Third Dimension," *Field Artillery* (April 1993): 11.

rear operations. Second, aviation brigade commanders, not infantry or armor brigade commanders, must employ combat aviation.[67] This discounted the method used by the 3d Armored Division during Operation Desert Storm of providing each maneuver brigade operational control of one attack company. Next, divisions provide combat aviation maneuver objectives not targets.[68] This highlighted that attack aviation equates to a maneuver force, not a fires capability. And lastly, combat aviation operates along separate axes and from different positions than ground maneuver brigades, even when supporting ground maneuver units in the close fight.[69]

By the mid-1990s then, Army Aviation, reflecting and capitalizing on attack aviation's effectiveness during Operation Desert Storm, established an operational construct and force structure designed to support division and corps operations in a manner similar to that which aviation operated during Operation Desert Storm. Army Aviation equated to a combat maneuver arm because of its attack helicopter capability. Aviation leaders believed that attack aviation, even at the division level, should focus on deep operations at night against moving armor and artillery, just at it had during the Gulf War. Attack aviation support to ground maneuver brigades in the close fight and support to reconnaissance was secondary to deep attacks. The U.S. Army would approve of these concepts into doctrine and rehearse them in exercises to garner acceptance.

[67] Burke and Presgraves, "Operational Concept for Aviation," 11.

[68] Ibid.

[69] Ibid.

Corps and Divisions: Refining the Deep Attack

Corps and most divisions focused their training efforts on integrating and synchronizing deep operations throughout the 1990s. Doctrinally, corps relied upon their attack aviation supported by joint and Army fires to execute deep operations.[70] To synchronize intelligence, aviation, and fires, commands adapted organizationally by creating a deep operations coordination cell (DOCC) within the command's main command post.[71] The command's artillery brigade commander, acting as the fire support coordinator, frequently led the DOCC's activities. The battle rhythm of the cell centered on supporting the command's attack aviation battalion execution of a nighttime deep attack. The command's intelligence and artillery assets supported the deep attack. V Corps and several heavy divisions operated in this manner.[72] Even a light infantry division's aviation brigade attempted deep operations, although they inversed the typical relationship having scout aircraft observe for a corps artillery deep strike.[73] Corps and divisions endeavored to perfect the deep attack throughout the 1990s.

Ground Maneuver Brigades: Attempts to Integrate in the Close Fight

While most divisions and corps focused on deep attack operations throughout the 1990s, ground maneuver brigades attempted with varied success to integrate attack aviation into the

---

[70] DA, *FM 100-15* (1996), 5-12.

[71] Ibid., 4-10 – 4-11.

[72] For V Corps, see Grady B. Garrett, "The Corps Artillery Commander and Deep Operations," *Field Artillery* (April 1993): 16; for 1st Armored Division, see Forest D. Haynes III, "Synchronizing the Divisional Deep Fight," *Field Artillery* (April 1993): 22; for 1st Infantry Division, see Henry W. Stratman and Jackson L. Flake III, "Deep Operations in the Big Red One––Winning Early, Winning Deep," *Field Artillery* (June 1995): 31; for 2d Armored Division, see Thomas E. Culling, Daniel A. Nolan III, and Mark W. Jones, "Hells Fires Deep: The DOC–An Integrated Approach," *Field Artillery* (February 1995): 14.

[73] Shannon D. Beebe, "Deep Strike MLRS DS to the Light Division Aviation Brigade," *Field Artillery* (March/April 1998): 36.

close fight. Armor and mechanized infantry brigades, for example, experienced marginal successes integrating attack aviation to support their efforts in the close fight at the National Training Center (NTC). Whereas the Army Aviation branch contested that divisions failed to integrate attack aviation into the division scheme of maneuver prior to Operation Desert Storm, company-grade and field-grade Aviation officers asserted that maneuver brigade commanders failed to integrate attack aviation into their schemes of maneuver during NTC rotations throughout the 90s. These Aviators recommended increased coordination between the aviation and ground maneuver staffs during the planning process, providing the maneuver brigade with capable aviation liaison officers, and educating maneuver leaders as to attack aviation's employment techniques and weapons effects would improve air-ground integration with heavy units.[74]

The Aviation Division at the Joint Readiness Training Center highlighted similar difficulties that attack aviation experienced in supporting infantry engaged in direct fire engagements.[75] By the mid-1990s some authors asserted that, based upon repeated unit failures at integrating aviation in support of infantry operations, the Army had forgotten the lessons of Vietnam.[76] They argued successful air-ground integration required units to develop standard operating procedures and repeatedly train together according to those procedures.[77] Aviation

---

[74] Charles Dalcourt, "Air/Ground Integration and the Combined Arms Concept," *Armor* (September-October 1997): 25; Adam W. Lange, "HELLFIRE: Getting the Most from a Lethal Missile System," *Armor* (January-February 1998): 25, 29.

[75] Davis D. Tindoll Jr. and Michael J. Negard, "Lessons Learned at the Joint Readiness Training Center: Air-Ground Coordination in the Hasty Attack," *U.S. Army Aviation Digest* (March/April 1995): 34.

[76] Eugene H. Grayson Jr., "Helicopter Support to Infantry: Dusting Off the Lessons of the Past," *Infantry* (January-February 1996): 19-20; Shaun Greene, "Using Attack Helicopters," *Infantry* (March-April 1995): 36-37.

[77] Tindoll & Negard, "Lessons Learned at JRTC," 34; Greene, "Using Attack

doctrine of the period acknowledged the ability of attack aviation to support infantry in the close fight, but it neither consolidated nor standardized techniques for attack aviation to engage dismounted personnel within small arms direct fire range of friendly forces.[78] This lack of unification by the Aviation branch resulted in various unit procedures and proficiency based upon the procedures the units devised.

Pendulums: Synchronized to the Deep Attack

The Full Dimension Operations doctrine of the 1990s further pulled attack aviation towards deep operations with the Army Aviation branch contributing by synchronizing all attack aviation towards deep attacks. Similar to developments under AirLand Battle doctrine of the 1980s, corps continued to focus on deep operations but with renewed vigor at doing such operations simultaneously. Most divisions, especially heavy divisions, pursued similar aims at simultaneous deep and close operations and relied upon their DOCC to orchestrate the deep operations. Both corps and divisions relied upon their attack aviation battalions, supported by joint fires and Army artillery fires, to attack deep at night. Through doctrinal and organizational adjustments, the Army Aviation branch synchronized all attack aviation battalions to focus on deep operations to the exclusion of close operations.

Only unit CTC rotations in support of ground maneuver brigades pulled attack aviation toward supporting the close fight. The coupling effect of the Aviation branch drowned out these calls from close operations and squarely focused attack aviation on the deep fight. By the end of the decade, grumblings within the attack aviation community would surface questioning whether the community should better support ground maneuver in the close fight. Several events around

---

Helicopters," 37-38.

[78] William G. Braun, "Attack Aviation in Dismounted Operations," (monograph, U.S. Army School of Advanced Military Studies, 1996), 41-45.

the turn of the century, some operational and some technological, broke the synchronization evident throughout the 1990s.

DESYNCHRONIZATION AND TRANSITION: 1999–2003

The coupled pendulums of Army Aviation entered a desynchronized state over these four years. Troubles surrounding Army attack aviation support to Operation Allied Force, the 1999 air campaign against Serbian military targets in Kosovo and Serbia, broke the synchronization of the 1990s while the conclusion of the maneuver phase of Operation Iraqi Freedom in March 2003 marked the beginning of another synchronized state. The Army's publication of its new capstone doctrine, Full Spectrum Operations, in 2001 constituted the only significant doctrinal update during this period; the Army Aviation branch did not publish updated doctrine in support of Full Spectrum Operations prior to Operation Iraqi Freedom. So the coupling affect of the branch waned as divisions and corps experimented incorporating the upgraded AH-64D Longbow Apache into their attack helicopter battalions and addressed the reality of improved enemy air defense systems.

Most transitions occurred due to the influence of corps and division commands. Some units remained true to the accepted deep attack doctrine while others adapted their tactics due to new anticipations of future threats, integration of new aviation technology, and lessons learned in combat. Division commanders realized an increasing need for their attack aviation units to support ground maneuver forces, but many corps commanders still directed their attack aviation units to focus on deep shaping attacks. The multiple employment methods possible in a non-synchronized state proved critical to successful attack aviation adaptation during the combat of Operation Iraqi Freedom.

Operation Allied Force: Breaking the Synchronization

In the spring of 1999, the U.S. Army's V Corps deployed its corps attack aviation regiment, the 11th Attack Helicopter Regiment, as the core of Task Force (TF) Hawk to Albania in support of Operation Allied Force, the North Atlantic Treaty Organization's air campaign against the Federal Republic of Yugoslavia for failing to permit deployment of peacekeeping forces into Kosovo. In the end, TF Hawk never conducted attacks against Serbian targets, presumably because the significant risk of Serbian air defenses shooting down a TF Hawk Apache outweighed the probability of those same Apaches significantly contributing to destruction of Serbian military targets.[79] However, despite never attacking a Serbian target, TF Hawk demonstrated an additional threat that caused Serb commanders to divert air defense assets and even commit fratricide.[80] While TF Hawk conducted a successful demonstration, the resultant challenges to the deep attack tactic by joint, Army, and Army Aviation members constitute the true success of the operation.

To some military authors, TF Hawk evidenced the ability of Army attack aviation to achieve strategic effects through deep attacks independent of ground forces. These authors supported further refinement and acceptance of the tactic. [81] Doctrine constituted one area that hindered successful employment of attack aviation in support of theater commander's strategic objectives. Two conditions of TF Hawk's employment made the mission atypical, if not non-doctrinal, for Army aviation at the time: the direct support of Army attack aviation to the air component commander without a land component, and the dispersed and hidden condition of the

---

[79] Charles E. Kirkpatrick, *"Ruck it Up!" The Post-Cold War Transformation of V Corps, 1990-2001* (Washington, DC: Department of the Army, 2006), 513-14.

[80] Ibid., 504.

[81] William G. Eldridge, "Achieving Strategic Effects with Army Attack Aviation" (master's thesis, U.S. Army Command and General Staff College, 2003), 52.

targets.[82] Army and joint doctrine broadly accepted that Army attack helicopters could support an air campaign, but Army aviation units infrequently trained to operate without a land component commander and against dispersed hidden targets.[83] The Army amended doctrine in 2001 specifying that Army forces could "support joint interdiction outside land AOs," but stressed the importance of synchronizing interdiction with ground maneuver.[84]

One of the primary lessons that Army leaders extracted from TF Hawk's experience centered on improved cooperation between Air Force and Army Aviation forces. Integration of Army aviation missions into the air component's air tasking order (ATO) challenged Task Force Hawk due to lack of procedures and training.[85] The task force relied on its own field artillery to suppress enemy air defenses instead of integrating joint fires.[86] The task force command also resisted integration of Army aviation missions in the ATO, increasing the risk of fratricide and hindering simultaneous operations.[87] Given Army helicopter's vulnerability against surface-to-air missiles, one author recommend that a "cocoon" of national, theater, and joint task force assets

---

[82] U.S. General Accounting Office, *Kosovo Air Operations: Army Resolving Lessons Learned Regarding the Apache Helicopter, GAO-01-401 (*Washington, DC: Government Printing Office, March 2001), 7; Kirkpatrick, *Ruck it Up!,* 501, 513. GAO investigators concluded the employment of TF Hawk fit within Army and joint doctrinal guidelines, but multiple U.S. Army general officers disagreed. Army Brigadier General Richard Cody, TF Hawk's Deputy Commanding General for Air and Special Operations, believed the mission not in accordance with Army doctrine, while Army General Dennis Reimer, Army Chief of Staff, thought the lack of a ground force ill advised.

[83] GAO, *Kosovo Air Operations*, 7.

[84] Department of the Army, *Field Manual 3-0, Full Spectrum Operations* (Washington, DC: Government Printing Office, 2001), 2-21.

[85] GAO, *Kosovo Air Ops*, 13.

[86] Lewis M. Jamison, "Will Army Aviation be Invited to Play in the Next War?" *Military Review* (May-June 2002): 44.

[87] Ibid.

support deep attack task forces.[88] The 101st Aviation Brigade would successfully employ this technique during two deep attacks in Operation Iraqi Freedom, while V Corps proved unable to coordinate such support in training or combat.

Corps: Continued Deep Focus

In the years between Operation Allied Force and Operation Iraqi Freedom, corps continued to focus training of their assigned attack helicopter regiments on deep attack tactics as well as integrate joint assets through their DOCC. The Europe based V Corps instituted an annual live exercise, entitled Victory Strike, to validate the proficiency of its 11th AHR through a realistic training exercise with a challenging opposing force. The opposing force consisted of an integrated air defense system with infrared man-portable surface-to-air missile teams for local area defense around the objective.[89] The aviators trained at night in low-level flight and conducted live-fire gunnery.[90] Victory Strike exercises also allowed V Corps to improve their command and control of corps deep operations by exercising its version of the DOCC, the Strike Command Post.[91] Two factors hindered the exercises ability to better prepare the 11th AHR for the realities of combat they would face in Iraq, though. First, adequate integration of Air Force assets remained a challenge over the three years of Victory Strike exercises.[92] Secondly, the

---

[88] Ibid., 43-44.

[89] Dennis Steele, "The War Against Terrorism–Be Ready: V Corp Trains to Deploy Quick and Strike Deep," *Army* (December 2001): 18.

[90] Kirkpatrick, *Ruck it Up!,* 68-69.

[91] Steele, "V Corps Trains," 19-20.

[92] For low Air Force participation during Victory Strike I, see Kirkpatrick, *Ruck it Up!,* 70; for increased participation during Victory Strike III, see Gregory Fontenot, E.J. Degen, and David Toth, *On Point: The United States Army in Operation Iraqi Freedom* (Fort Leavenworth, KS: Combat Studies Institute Press, 2004), 53-54.

exercises lacked air defense assets enroute to the objective and coordinated small arms ambushes.[93]

Other corps trained for deep operations through virtual exercises called warfighters. Third Corps, for example, refined its DOCC configuration to meet the difficulties of simultaneously planning and executing continuous deep operations during its 2002 warfighter exercise. Previously focused on the battle rhythm of the corps aviation brigade, the III Corps DOCC shifted to a field artillery and joint fire dominant system aligned with the 96-hour ATO cycle. The corps aviation brigade still focused on deep attacks, but the corps broadened their scope enabling simultaneous corps shaping operations, such as a deep attack, an air assault, joint suppressive fires, and counterfire artillery missions.[94]

Divisions: Shifting to the Close Fight

Divisions shifted over this period from focusing on deep attacks to increasingly supporting ground maneuver in the close fight. In continued pursuit of deep attacks, divisional aviation brigades searched for techniques to counter improved enemy air defense systems and integrate new technology resident in the AH-64D Longbow Apache. Simultaneously, divisions determined how best to integrate attack aviation into the close fight, often finding that neglect in that area had atrophied air-ground coordination skills. Combat operations in Afghanistan and revaluation of likely enemy threat tactics prompted most division commanders to transition their attack aviation units towards supporting the close fight.

---

[93] Michael R. Gordon and Bernard E. Trainor, *Cobra II (*New York: Pantheon Books, 2006), 281.

[94] Burwell B. Bell et al., "The New DOCC," *Military Review* (January-February 2003): 37, 41.

Some divisions continued to pursue deep operations through exercises. The 1st Cavalry Division, one of III Corps subordinate divisions, commanded Army Forces during Roving Sands 2001, an annual joint air defense live exercise. As part of the exercise, the division's 1st Battalion, 227th Aviation (Attack) (1-227 AVN) conducted a deep attack against an enemy equipped with Avenger air defense systems.[95] Similarly, 1st Infantry Division's attack aviation battalion supported the 11th AHR during its 2001 Victory Strike exercise.[96] Through the Victory Strike exercise, though, the U.S. Army in Europe and V Corps commanders came to a shared understanding "that corps aviation battalions ought to be optimized for deep attack missions and the divisional aviation battalions ought to be optimized for close in, over-the-should support of division operations."[97]

Developments in enemy air defense assets pressured divisions to dedicate their attack aviation assets to support the close fight. Following Operation Allied Force, the Army updated the opposing forces used in division and corps warfighter simulations and at the CTCs to more accurately reflect the advances in threat air defense systems. Divisions fighting this contemporary operational environment (COE) opposing force (OPFOR), such as the 3d Infantry Division and the 4th Infantry Division, discovered that the improved quality and increased quantity of the COE OPFOR often precluded cross-FLOT helicopter operations. These units adjusted their attack helicopter battalions towards supporting the close fight but found aviation doctrine lacking in standard procedures for such employment.[98] The 3d Infantry Division developed over the

---

[95] Dennis Steele, "Roving Sands 2001," *Army* (August 2001): 20-21.

[96] Steele, "V Corps Trains," 25-26.

[97] Kirkpatrick, *Ruck it Up!,* 69.

[98] For 3d Infantry Division, see Brooke H. Janney,. "Attack Aviation Fires for the Close Fight: A New Approach," *Field Artillery* (January/February 2003): 10; for 4th Infantry Division, see Richard S. Richardson, "Artillery Fires in Support of Aviation in the Close Attack," *Field*

shoulder attack techniques, similar to that recommended by the V Corps commander through the Victory Strike exercises.[99]

Some divisions, such as the 3d Infantry Division and 1st Cavalry Division, still attempted to balance attack aviation support to both division deep and brigade close operations. These commands recognized the continued value of attacking into the enemy's depth. Rather than accepting that attack aviation could only support the close fight, they sought means to penetrate the FLOT, just as tacticians under the AirLand Battle doctrine had done against the Russian threat in Europe. They proposed a campaign that leveraged the technological advances of the newly fielded AH-64D Longbow Apache attack helicopter while integrating joint suppression capabilities, long range Army artillery fires, and unmanned aerial vehicles to defeat the enemy's air defense system.[100] Even the 1st Cavalry Division shifted its attack helicopter battalion, 1-227 AVN, to a balanced approach of supporting both division deep operations and brigade close operations after focusing exclusively on deep operations between 2001 and 2003.[101]

Whereas attack aviators battled simulated air defense systems during exercises, the combat experiences of the 101st Aviation Brigade in the mountains of Afghanistan during the spring of 2002 forced attack pilots to adjust their flight techniques. Unable to hide behind terrain

---

Artillery (January/February 2003): 22.

[99] For 3d Infantry Division over the shoulder technique, see Cory Mendenhall, interview by Operational Leadership Experiences Project team with Combat Studies Institute, Fort Leavenworth, KS, 27 September 2006, transcript, Operational Leadership Experiences Collection, Combined Arms Research Library, Fort Leavenworth, KS, 6.

[100] For air defense campaign planning, see Brooke H. Janney, "Paving the Way for Air Maneuver: Defeating COE OPFOR Air Defenses," *Field Artillery* (January/February 2003): 17-21; for AH-64D Longbow Apache planning, see Janney, "Attack Aviation Fires for the Close Fight," 10-11.

[101] Henry C. Perry, Murphy A. Caine, and Joseph G. Bruhl. "Air Integration in the Heavy Division: First Attack's Lessons Learned from the NTC," *Armor* (May/June 2003): 21, 23.

and engage targets from a stationary hover, the doctrinal technique of the time, aviators learned how to conduct running fire with their 30mm cannon while under direct small arms fire.[102] Although hailed by the commander of Coalition Joint Task Force Mountain as "the most effective close air support asset" and viewed as the "most feared weapon on the battlefield" in the enemy's eyes, the Apache helicopters displayed vulnerability towards small arms fire with five of six AH-64s sustaining damage during the attack precluding continued operations.[103] The employment techniques of the 3d Battalion, 101st (Attack) Aviation Regiment in Afghanistan would influence attack aviation techniques across the Army.

Through rotations at CTCs supporting the division's infantry brigades and during combat in Afghanistan, the 101st Airborne Division developed the close combat attack (CCA) technique. The Army equipped most attack aviation battalions in light infantry divisions with OH-58D Kiowa Warrior scout helicopters instead of the AH-64 Apache. The 101st Aviation Brigade, however, provided the 101st Airborne Division (Air Assault) with three AH-64 Apache helicopter equipped battalions, one to support each infantry brigade. As the only light infantry division fielded Apache helicopters, the 101st Airborne Division possessed the most experience with integrating attack helicopters in support of infantry units. The division's standard operating procedure included the close combat attack technique. Following Operation Iraqi Freedom, the Army Aviation branch would adopt both the CCA technique and develop procedures for maneuvering flight based on combat experiences in Afghanistan and Iraq.[104] However, prior to

---

[102] Donald P. Wright et al., *A Different Kind of War: The United States Army in Operation Enduring Freedom (OEF), October 2001-September 2005* (Fort Leavenworth, KS: Combat Studies Institute, 2010), 151-152.

[103] Robert H. McElroy, "Afghanistan: Fire Support for Operation Anaconda," *Field Artillery* (September/October 2002): 5-9.

[104] For how CCA developed in Afghanistan and employed in Iraq, see John M. Curran, "Army Aviation Operations During Operation Iraqi Freedom," *Army Aviation* (October 2003),

Operation Iraqi Freedom, most attack helicopter pilots had not heard of the CCA, unless they had served with the 101st Aviation Brigade.[105]

Operation Iraqi Freedom

Operation Iraqi Freedom provides a valuable case study from which to evaluate the desynchronized state of attack aviation and from which to base the transformation of Army Aviation over the ensuing decade. Operation Iraqi Freedom marked the last deep attack in support of a corps scheme of maneuver. Although the quantity of ground and aviation forces dwindled that of Operation Desert Storm, reviewing attack aviation employment during OIF displays the multiple, but similar, approaches used by attack aviation. Attack aviators found that Iraqi forces defended in methods not predicted by U.S. forces during predeployment rehearsals. This forced units to adapt while in combat. Units that had prior combat experience or trained to support ground maneuver forces in the close fight adapted more easily than those focused exclusively on independent aviation deep attacks. Aviation leaders worried most about their unit operating in manners for which they had not trained.

V Corps Employment of the 11th Attack Helicopter Regiment

V Corps deeply integrated its attack aviation brigade, the 11th Attack Helicopter Regiment, into its scheme of maneuver. Lieutenant General Scott Wallace, the V Corps commander, intended to employ the 11th AHR during two critical phases of his corps advance towards Baghdad, prior to the initial ground attack into Iraq and prior to the corps push into the

---

under “Lessons Learned,” http://www.quad-a.org/Archives/0310.htm (accessed 11 October 2012).

[105] For 101st Airborne Division CCA technique, see Jamie Wallace, interview by Operational Leadership Experiences Project team with Combat Studies Institute, Fort Leavenworth, KS, 2 November 2005, transcript, Operational Leadership Experiences Collection, Combined Arms Research Library, Fort Leavenworth, KS, 9.

suburbs of Baghdad. Conceptually these missions served two purposes: they protected V Corps ground maneuver units during an operational pause or transition, and they shaped future 3d Infantry Division's maneuver by decrementing the armored and artillery threat of elite *Republican Guard* divisions along their axis of advance. Wallace viewed the regiment's second attack, the one against the *Medina Division,* an essential element of the corps scheme of maneuver. Because he assessed the abridged air campaign had not sufficiently weakened the *Republican Guard* divisions, Wallace believed that 11th AHR had to degrade the *Medina Division* prior to 3 ID's attack.[106] Unfortunately, Wallace's firm integration of attack aviation into his scheme of maneuver and the eagerness of 11th AHR leadership to get into the fight resulting in mission execution even though many conditions increased the risk to mission success.[107]

Both 11th AHR deep attack missions failed to achieve the stated objectives. Weather significantly influenced both operations. The squadron commander aborted the first mission after takeoff due to poor visibility, and the corps commander accelerated the second mission by 24 hours due to an approaching sandstorm.[108] The second mission, a simultaneous attack by all three battalions against the *Medina Division's 2d Brigade* in the Baghdad suburb of Karbala, inflicted minor damage to the enemy but resulted in two of the regiment's battalions combat ineffective for several days, one crew captured, and one wounded in action.[109] Numerous circumstances, categorized as the fog and friction of war and chain of errors by some authors, affected the

---

[106] Gordon & Trainor, *Cobra II*, 260-61.

[107] Gordon and Trainor, *Cobra II*, 260, 262; Fontenot, Degan, and Toth, *On Point,* 184-86.

[108] Gordon and Trainor, *Cobra II*, 262.

[109] Fontenot, Degan, and Toth, *On Point,* 189-90; Gordon and Trainor, *Cobra II*, 269.

execution of 11th AHR's attack into the Karbala Gap on 23 March 2003, but ultimately effective asymmetric tactics by the Iraqi military most influenced the mission.[110]

The Iraqi's adapted their air defense tactics in methods that the Army did not anticipate. First, the Iraqi's received early warning of the deep attack through cell phone calls and coordinated initiation of their attack by temporarily turning off the cities electricity.[111] Second, instead of using radar guided missiles and artillery, they emplaced optically sighted anti-aircraft artillery (AAA), machine guns, and rocket propelled grenade launchers along likely air routes of advance and at choke points, like power line crossing sites.[112] Third, they dispersed their equipment and weapons among the population around buildings and houses. The 11th AHR had not trained to face this threat tactic. The Victory Strike exercises prepared them neither for enroute air defense assets nor for artillery and small arms fire, only for air defense artillery at the objective.[113] Also, most of the regiment's pilots lacked combat experience and hesitated to suppress enemy positions with their on-board weapons.[114] The attack companies of the 11th AHR found themselves conducting aerial movement rather than aerial maneuver while under direct fire.

Although the 11th AHR failed to anticipate the Iraqi air defense techniques, they adequately learned from their failure and shared their lessons with the 101st Aviation Brigade. The 101st Aviation Brigade adapted their techniques and conducted a successful deep attack four

---

[110] Fontenot, Degan, and Toth, *On Point*, 179, 191; Gordon and Trainor, *Cobra II*, 280.

[111] Gordon and Trainor, *Cobra II*, 270, 280.

[112] Ibid., 270-71.

[113] Ibid., 281.

[114] Michael Barbee, interview by Operational Leadership Experiences Project team with Combat Studies Institute, Fort Leavenworth, KS, 3 April 2007, transcript, Operational Leadership Experiences Collection, Combined Arms Research Library, Fort Leavenworth, KS, 7, 10.

days later. Incorporating both lessons learned from their Afghanistan experiences and from the 11th AHR, the 101st Aviation Brigade adapted their techniques to counter the Iraqi threat tactics. They flew over the cities at higher elevations instead of along likely air routes. They maneuvered to the objective by integrating rolling preplanned fires and on-call Air Force close air support against Iraqi air defenses. The aircraft flew in teams with a wingman in overwatch position. If engaged, the team suppressed the target, deployed to cover, developed the situation, and remained constantly in motion to hinder enemy targeting.[115] Although these deep attacks destroyed insignificant amounts of enemy equipment, the deep operations adequately shaped V Corps scheme of maneuver. The attacks proved the *Republican Guard*, by disbursing itself, could not effectively hinder 3d Infantry Division's movement. [116]

While the 101st Aviation Brigade deep attacks exemplify how a divisional attack aviation unit successfully supported deep operations, the 11th AHR supported subordinate division aviation brigades in close operations. Wallace planned for some of his corps attack aviation units to augment the 3 ID aviation brigade after they attacked the Republican Guard. Wallace planned to pass operational control of one of his three attack helicopter battalions, the 2d Battalion, 6th Cavalry Regiment (2-6 CAV) to 3d Infantry Division.[117] Unaccustomed to supporting ground maneuver brigades in close operations, the 2-6 CAV trained with 3 ID brigades in Kuwait prior to crossing into Iraq to learn the division's over the shoulder technique.[118]

---

[115] Fontenot, Degan, and Toth, *On Point*, 193-95.

[116] Fontenot, Degan, and Toth, *On Point*, 195; Curran, "Aviation Ops During OIF," under "Operations."

[117] Fontenot, Degan, and Toth, *On Point*, 193-95. V Corps' 11th AHR received an additional AH-64D Longbow equipped attack battalion, 1-227 AVN from Fort Hood's 1st Cavalry Division's, because 2-6 CAV was not Longbow equipped.

[118] For 2-6 CAV training with 3 ID in Kuwait, see Fred Toti, interview by Operational Leadership Experiences Project team with Combat Studies Institute, Fort Leavenworth, KS, 13

V Corps employment of attack aviation provides, then, a perfect illustration of the desynchronization of attack aviation during this period. The 11th AHR remained focused on its primary mission of conducting deep attacks in support of corps shaping operations. One of the regiment's battalions, however, also trained and supported close operations for a subordinate division. Meanwhile, the regiment received attachment of a divisional attack helicopter battalion, one cross-trained in both deep attacks and in close combat attacks, to assist the regiment conduct deep attacks. Finally, the only successful deep attacks conducted by V Corps units were those done by a subordinate divisional aviation brigade, albeit from a division dual focused on deep operations and close operations.

V Corps Employment of Divisional Aviation Brigades

Except for the deep attacks by the 101st Aviation Brigade, divisional aviation brigades concentrated on supporting ground maneuver in the close fight through multiple techniques. Only two divisions, the 3d Infantry Division and 101st Airborne Division, participated in the maneuver phase up to Baghdad, while the 4th Infantry Division came in shortly afterward to clear north of Baghdad. The 4th Infantry Division's attack aviation battalion focused solely on close operations providing reconnaissance, security, and close combat attacks to units occupying the zone north of Baghdad and to base defense forces.[119] The 101st Aviation Brigade, due to the unique air assault focus of the division, supported multiple air assaults in addition to the two deep attacks. The brigade also supported infantry operations in urban centers providing security cordons and

---

January 2010, transcript, Operational Leadership Experiences Collection, Combined Arms Research Library, Fort Leavenworth, KS, 5.

[119] Robert M. Cassidy, "Renaissance of the Attack Helicopter in the Close Fight," *Military Review* (July/August 2003):43-44.

CCAs.[120] The 3d Infantry Division's aviation brigade, as the division's main effort and supported by division artillery, destroyed Iraqi observation posts along the Kuwait-Iraq border prior to the division's attack into Iraq.[121] Once the division began maneuvering through Iraq, the attack aviation battalion typically supported maneuver brigades. The attack battalion conducted reconnaissance by fire to an object, cleared the objective of enemy forces prior to arrival of ground forces, transferred to outer security once the ground forces arrived, and then supported ground forces with close combat attacks as required. When not under the operational control of maneuver brigades, the attack battalion maintained a company in reserve to support the division's request for reconnaissance, security, or close combat attacks within thirty minutes.[122]

Attack aviation operations in Iraq during the spring of 2003 demonstrate the dependence of corps upon Army aviation to shape division close operations and the versatility of attack aviation to rapidly transition between deep and close operations with proper training and experience. With limited assets capable of deep operations, V Corps turned to its attack helicopter regiment to shape 3d Infantry Division's movement. Although the unanticipated asymmetric Iraqi air defense tactics defeated the 11th AHR's initial attempt to destroy the *Medina Division*, attack aviators of the 101st Aviation Brigade adjusted their techniques based upon lessons learned to attack four days later. Even if the mission failed to destroy the *Medina Division*, it confirmed that no organized force blocked 3d Infantry Division's advance into Baghdad, and thus succeeding in shaping the corps scheme of maneuver.

---

[120] John M. Curran, "May-Another Successful Convention, Hardware Updates, In Praise of Army Aviation During Operation Iraqi Freedom (OIF)," *Army Aviation* (May 2003), under "Reports from the Field," http://www.quad-a.org/Archives/0305.htm (accessed 11 October 2012); Curran, "Aviation Ops During OIF," under "Operations."

[121] Curran, "Aviation Ops During OIF," under "Operations."

[122] David J. Rude and Daniel E. Williams, "The 'Warfighter Mindset' and the War in Iraq," *Army* (July 2003): 39-40.

Tactically, OIF proved the value of varied training and combat experience to facilitate rapid transitions in combat. Prior to operations, aviation leaders worried most about conducting missions for which they had not trained. Having recently operated at the team and platoon level in Afghanistan, battalion level deep attacks concerned leaders of the 101st Aviation Brigade.[123] Conversely, shifting from the battalion level deep attacks to team close combat attacks in urban terrain mentally challenged leaders of the 11th AHR.[124] As Major General John Curran, the Army Aviation branch chief at the time, stated, "facing an enemy differing from that envisioned in prewar intelligence briefings, warfighter computer exercises, or the collective experience gained during Operation Desert Storm, aviation units were forced to adapt quickly to an asymmetric battlefield."[125] Leaders with a broader experience base transitioned quicker and more easily.

The immediate aftermath of OIF found the Army and Army Aviation extracting lessons from combat that shaped the branch over the next decade. Prior to OIF, the Aviation branch focused its attack units on deep attacks, a point the branch chief reaffirmed in his initial assessment of aviation operations during OIF when he stated, "a night deep attack is the most difficult and high-risk mission attack helicopter battalions perform." [126] Multiple Army attack aviators questioned this focus in the later months of 2003.[127] Subsequent studies of Army

---

[123] Gregory Gass and John White, interview by Contemporary Operations Studies Team with Combat Studies Institute, Fort Leavenworth, KS, 31 October 2005, transcript, Operational Leadership Experiences Collection, Combined Arms Research Library, Fort Leavenworth, KS, 3-4.

[124] Toti, interview, 11.

[125] Curran, "Aviation Ops During OIF," under "Lessons Learned."

[126] Curran, "May-Successful Convention," under "Review of Aviation's Performance."

[127] Cassidy, "Renaissance of Attack Helicopter," 45; Rude and Williams, "Warfighter Mindset," 36.

Aviation eventually shifted the branch's focus from deep attacks towards reconnaissance, security, and close combat attack operations.

Pendulums: Desynchronized Success

The pendulums of attack aviation desynchronized between the 1999 Operation Allied Force and 2003 Operation Iraqi Freedom. The Aviation branch's coupling affect remained over the period, but at a reduced effectiveness. The branch no longer published a professional journal, having suspended the publication in 1995, and produced no significant doctrine updates during the time. Corps and divisions, adjusting to threats in the contemporary operational environment as learned through operations in Kosovo, increased influence over their subordinate aviation brigades.

Operation Allied Force highlighted the desire of combatant commanders to employ Army attack aviation in support of an air campaign. Adversaries adapted their air defense systems to hinder such attacks and mitigated the effects of such attacks by camouflaging and dispersing individual targets. Corps continued to focus their attack regiments on deep attacks to meet the needs of combatant commanders, but encouraged subordinate divisions to support the close fight with their attack aviation assets. Divisions began to shift towards supporting ground maneuver forces in the close fight from behind the FLOT, but still explored methods to execute deep attacks. Through division warfighter exercises and CTC rotations many divisions adjusted their attack units to support brigades in the close fight. Combat in mountainous and urban terrain suggested increasing close combat support to ground maneuver forces. Mechanized infantry divisions, like the 3d Infantry Division and V Corps divisions, employed attack aviation in over the shoulder attacks for armored vehicles, while light infantry divisions preferred close combat attack techniques to support dismounted infantry.

Colonel Russell Stinger best summarized this decade of sustained combat and continual transformation when he wrote, "Army Aviation has returned to its roots, fighting Operations Iraqi and Enduring Freedom as indispensable coequals, albeit in a supporting role that the branch embraces, with habitual relationships that improve the effectiveness of both aviation and ground units."[128] Both the Army and the Aviation branch instituted numerous doctrinal and organizational adaptations to meet the demands of combat. Attack aviation, suffering the public wounds of the 11th AHR's failed deep attack, internally redirected the branch to supporting ground maneuver units in the close fight with reconnaissance, security, and close combat attack tactics. Air-ground integration, transformation, aircraft upgrades, and doctrinal adaptation constituted the major themes of Army Aviation leaders throughout this decade. All their efforts aligned with supporting ground maneuver brigades in the close combat of Iraq and Afghanistan.

The Army: Adjusting Power of Command Magnets

In the wake of Operation Iraqi Freedom, the Army instituted major revisions to its force structure that transitioned influence away from corps towards brigades. Since the Army of Excellence force structure implemented in the 1980s, corps served as the pinnacle of the Army's tactical hierarchy commanding subordinate divisions and separate brigades.[129] Beginning in 2003, the Army implemented transformation and modularity initiatives to increase the deployability of brigades independent of corps and divisions. Corps and divisions existed, but only as headquarters.[130] Brigade combat teams evolved into "the centerpiece for Army maneuver."[131]

---

[128] Russell Stinger, "Army Aviation - Back to its Roots" (strategy research report, U.S. Army War College, 2009), 1.

[129] Department of the Army, *Field Manual 3-92, Corps Operations* (Washington, DC: U.S. Army Publishing Directorate, 2010), vii.

[130] Department of the Army, *Field Manual 3-0, Operations (*Washington, DC: U.S. Army Publishing Directorate, 2008), C-2.

Under this modular construct, the U.S. Army Forces Command (FORSCOM) pooled corps headquarters, division headquarters, and brigades under its oversight for sourcing to combatant commanders. FORSCOM guided predeployment training and post deployment reset for all units to meet Central Command's requirements. Corps and divisions influenced aviation employment upon deployment of the aviation brigade to the combat theater. The distributed stability and counterinsurgency fight necessitated corps and divisions dedicate their attack aviation to supporting battlespace owning maneuver brigades.

In concert with organization adaptations, the Army amended its capstone doctrine after five years of sustained combat in Iraq and Afghanistan further pushing attack aviation towards the close fight. The significance of the Army's 2008 capstone doctrine, *FM 3-0, Operations* lies in the rescinded terms vice those added. The manual rescinded the tenets of operations, such as depth and synchronization, claiming that the six new warfighting functions and elements of combat power, leadership and information, served those functions.[132] Additionally, the manual eliminated the deep, close, and rear battlefield organization retaining only the modified term "close combat" in lieu of the close area.[133] With both the doctrinal constructs of deep operations and the primary organizations focused on deep operations severed from influencing attack aviation, close combat attacks in support of brigades remained the only venue left.

Army Aviation Branch: Coupling to Support Close Combat

Army attack aviation learned multiple lessons in combat which the Army validated and codified through a series of Army Chief of Staff directed aviation studies. Immediately after

---

[131] Ibid., C-1.

[132] Ibid., D-3.

[133] DA, *FM 3-0, Operations* (2008), D-4.

major combat operations concluded, in April 2003, the Operations Iraqi Freedom Study Group captured the details of Army Aviation's units' performance and lessons learned from those operations.[134] In 2004, the Army Aviation Task Force recommended adaptations to "doctrine, organizations, training, material, leadership, education, personnel and facilities (DOTML-PF) to ensure Army aviation's continued role in the current and future joint warfight."[135] Five years later, the Army G3 conducted a second study to follow up on the initiatives of "Aviation Study I," the results of which directed further organizational restructuring, aircraft modernizations, and flight training expansions.[136] The findings and implemented results satisfied the desires of maneuver commanders across the spectrum of command, from battalion to Department of the Army. Major adaptations included restructuring of combat aviation brigades to increase multi-functionality, doctrinal adaptations for attack helicopter operations, and infusion of Aviation personnel into ground maneuver brigades to enable air-ground integration.

Aviation Brigade Adaptations

Based upon the Aviation Studies findings, the Army standardized aviation brigades beginning in 2004. They initially reorganized aviation brigades from aircraft specific brigades, like the corps attack helicopter regiments, into multi-functional aviation brigades according to six templates.[137] The Aviation Study II further solidified the aviation brigade around the medium

---

[134] Curran, "Aviation Operations During OIF," under "OIF Study Group."

[135] E.J. Sinclair, "Posturing Army Aviation: Aviation Task Force Initiatives," *Army Aviation* (May 2004), under "Aviation's Future," http://www.quad-a.org/Archives/0405.htm (accessed 11 October 2012).

[136] James O. Barclay III, "Army Aviation: Adapting to Provide Full Spectrum Capability," *Army Aviation* (March/April 2010): 10.

[137] For Aviation Study I results, see E.J. Sinclair, "Posturing Army Aviation," under "Organizational Changes;" for six types of aviation brigades, see Department of the Army, *Field Manual 3-04.111, Aviation Brigades* (Washington, DC: U.S. Army Publication Directorate,

combat aviation brigade (CAB) template to "balance[s] attack and recon assets and include[s] manned and unmanned capabilities."[138]

Additional efforts to provide multiple functions for ground forces occurred through aviation battalion task force efforts. In Iraq and Afghanistan, a CAB often supported multiple brigade combat teams (BCTs) distributed across numerous locations. To resolve this problem, Army Aviation authorized aviation battalion task force operations. This approach enabled each aviation battalion task force to perform all aviation missions by attaching a company or platoon of each aircraft type to the battalion.[139]

Aviation Doctrinal Adaptations

Modifications to Army Aviation doctrine indicate the branch's appreciation for the new operational environment directing a shift away from deep operations towards close operations in coordination with ground maneuver forces. Differences in appendices between the branch's 1997 and 2003 versions of the *Aviation Brigades* manual exemplify the branch's shift towards close combat operations. The 2003 version eliminated the "Deep Operations" appendix, revised the "Air-Ground Task Forces" appendix into the "Air-Ground Integration" appendix, and added appendices for "Aircraft Survivability" and "Urban Operations."[140] By 2007, sustained support to brigade combat teams conducting counterinsurgency and stability operations influenced the Aviation branch to reprioritize the aviation brigade's missions. Aviation doctrine prioritized

---

2007), 1-4.

[138] Barclay, "Adapting to Provide Full Spectrum Capability," 10.

[139] DA, *FM 3-04.111, Aviation Brigades* (2007), 4-1 – 4-3.

[140] Department of the Army, *Field Manual 1-111, Aviation Brigades* (Washington, DC: Government Printing Office, 1997), chap. Table of Contents; Department of the Army, *Field Manual 3-04.111, Aviation Brigades* (Washington, DC: Government Printing Office, 2003), ix.

aviation task force support to brigade combat teams as follows: "reconnaissance, security, CCA, air assault, air movement, and aeromedical evacuation."[141] Deep attacks, renamed interdiction attacks, remained in Aviation doctrine but at a lower priority than CCAs.[142] So aviation brigades doctrinally could conduct deep operations, but sustained combat operations necessitated a focus on close combat operations.

Changes to aviation brigade doctrine flowed into attack aviation doctrine as well. Several doctrinal changes occurred for attack battalion employment, particularly mission priority, unit size for employment, flight profile, and weapons engagement techniques. Figure 4 displays these adaptations. The difficulty in locating a dispersed paramilitary and insurgent enemy conducting improvised explosive device ambushes of ground movements drove a reprioritization of missions. Reconnaissance and security missions became increasingly important. Most deep attack missions during major combat operations actually amounted to movements to contact due to imprecise intelligence and a dispersed enemy, the updated mission priorities specifically placed movement to contact above attack operations.[143] Attack operations still had a role as close combat attacks became doctrinally approved attack missions.[144] Ground maneuver unit's demand for multiple reconnaissance and security operations throughout noncontiguous areas required attack aviation units to shift their primary employment level down to teams vice the previous battalion company or battalion mass formations. The team concept provided these ground maneuver units sustained

---

[141] DA, *FM 3-04.111, Aviation Brigades* (2007), 3-5.

[142] Ibid., 3-6.

[143] Rude & Williams, "Warfighter Mindset," 38; Curran, "Aviation Operations During OIF," under "OIF Study Group."

[144] Department of the Army, *Field Manual 3-04.126, Attack Reconnaissance Helicopter Operations* (Washington DC: Army Publishing Directorate, 2007), 3-59; Edward J. Sinclair, "Army Aviation's Progress Toward Transformation," *Army* (January 2006): 36.

aerial coverage for reconnaissance, particularly route reconnaissance, or security operations, such as convoy escort, or to conduct cordons around urban areas in support of infantry clearing missions.[145]

Attack Helicopter Operations Field Manual Comparison		
	FM 1-112 (1997)	**FM 3-04.126 (2007)**
Regulation Name	Attack Helicopter Operations	Attack Reconnaissance Helicopter Operations
Battalion Type	Attack Helicopter Battalion	Attack Reconnaissance Battalion
Mission Prioirty	Attack, Recon, Security	Recon, Security, Movement to Contact, Attack
Purpose	Complement other maneuver forces	Facilitate ground movement
Employment Level	Battalion	Teams, prepared to fight at company/battalion
Role	Aerial maneuver units characterized as highly mobile and lethal; capable of destroying armor, personnel, and material	Shaping operations; maneuver units that dominate but do not occupy

Figure 4. Attack Helicopter Doctrine Comparison (1997 and 2007)

Sources: Department of the Army, *Field Manual 1-112, Attack Helicopter Operations* (Washington DC: Government Printing Office, 1997); Department of the Army, *Field Manual 3-04.126, Attack Reconnaissance Helicopter Operations* (Washington DC: Army Publishing Directorate, 2007).

In regards to survivability techniques, attack aircrews modified their flight profile and weapon engagement techniques. Previously attack aviation flew low and fast to avoid radar threats and engaged targets from a stationary hovering position. The reliance of the enemy upon small arms, rocket propelled grenades, and shoulder-fired SAMs forced the aircrews to fly higher. Running and diving fire allowed them to temporarily descend from this altitude, more accurately

[145] Cassidy, "Renaissance of Attack Helicopter," 45; Demetrios J. Nicholson, "Max Recon Forces Forward: Air Cavalry and Attack Aviation's Role in Limiting Enemy Freedom of Movement and Maneuver," *Armor* (June-August 2010): 25.

engage targets, then return to the protection of flight above effective small arms range.[146] By 2006, the Army Aviation branch incorporated these maneuvering flight techniques into doctrine and training.[147]

Air-Ground Integration Adaptations

The Army and Army Aviation branch attempted to resolve the long-standing issue of poor integration between aviation and ground maneuver units through both doctrinal and organizational modifications. Initially, the Aviation community pursued a doctrinal solution to improve air-ground integration by including an appendix to its 2003 *Aviation Brigades* field manual. [148] Members of the branch also attempted to educate non-aviation units how to integrate aviation assets through numerous journal articles. The authors shared advantages of properly integrating aviation into ground maneuver's mission planning and advised ground forces of aviation's capabilities, requirements, and limitations. [149] The topic even warranted discussion on an online forum for company-level officers.[150] Similar methods had failed to achieve success during the preceding decades, so the Army instituted organizational reforms in conjunction with its larger transformation activities.

---

[146] Geoffrey A. McLaughlin, Steven M. Pierce, and David A. Smith, "Army Aviation's Evolution to Sustained Operations," *Army* (June 2004): 62, 64; A.C. Schilleci, "A Deadly Combination: Integration of the AH-64D M-TADS and High Altitude Tactics on the Modern Battlefield," *Infantry* (May-June 2008): 21-22.

[147] Sinclair, "Aviation's Progress Toward Transformation," 36.

[148] DA, *FM 3-04.111*, *Aviation Brigades* (2003), App. Q "Air-Ground Integration."

[149] For integration into ground maneuver plans, see McLaughlin, "Aviation's Evolution," 61; Nicholson, "Max Recon Forward," 25; Perry, "Air Integration in the Heavy Division," 21-23; for attack helicopter capabilities, see Schilleci, "Deadly Combination," 21-23.

[150] Company Commanders, "Company Command–Building Combat-Ready Teams: Air-Ground Integration," *Army* (April 2006): 71-74.

Organizationally, the problem centered on the lack of aviation experience resident in the ground maneuver brigades. Under the Army of Excellence, aviation integrated at the division level through an aviation section on the division staff. Ground maneuver brigades, however, lacked personnel authorizations for aviation personnel. Distributed brigade operations in Afghanistan and Iraq necessitated supporting brigades directly rather than through division staffs. To meet the needs of ground maneuver brigades, the Army adapted the brigade structure to include a Brigade Aviation Element (BAE). The BAE consists of Aviation officers and enlisted personnel assigned to the ground maneuver brigade staff to provide the commander organic aviation expertise.[151] Air-ground integration remains the number one "glass ball" that BAEs manage for the ground commander, but they also assist with unmanned aerial vehicle integration and airspace management.[152]

Pendulums: Synchronized Close Operations

All the pendulums of attack aviation drastically shifted towards close operations as sustained combat operations in Iraq and Afghanistan affected the entire Army. They shifted towards the close combat attack side, if for no other reason than doctrinally the Army rescinded operational concepts related to depth. Aviation also shifted towards supporting the close fight, because the Army redirected power away from corps and divisions, organizations typically focused on deep operations, and towards those responsible for close operations, brigades. Army Aviation restructured its own brigades over this period to broaden their functionality and prioritized reconnaissance and security operations over attack operations for its attack helicopter units. The Army and Aviation branch leveraged the coupling ability of doctrine and force

[151] Sinclair, "Posturing Army Aviation," under "Organizational Changes."

[152] Erick W. Sweet II, "The Glass Balls of the Brigaded Aviation Element: The Brigade Aviation Officer in Combat," *Military Review* (January-February 2010): 91.

structure to direct all attack aviation towards supporting the new tactical centerpiece of the Army, the brigade, in close combat.

CONCLUSION

Over the past three decades, the Army Aviation branch adjusted to emerging realities of combat. Under the Army of Excellence force structure, corps and divisions strongly influenced the development of attack aviation doctrine. Seeking methods to attack enemy forces in depth sequentially under the AirLand Battle doctrine of the 1980s and then simultaneously under the Full Dimension doctrine of the 1990s, corps relied upon their attack helicopter battalions to execute nighttime deep attacks with artillery support. After the success of deep attack tactics during ODS, divisions increasingly trained their attack battalions to conduct deep attacks. The Army Aviation branch encouraged and promoted this application directing all attack helicopter battalions to focus on deep attacks.

Operations Allied Force, Enduring Freedom, and Iraqi Freedom marked the transition period of attack aviation away from deep attacks towards supporting ground maneuver units in the close fight. Operation Allied Force warned of a possible mismatch between Aviation techniques and the threats' ability to adapt their air defense system and disperse their military assets to hinder deep attacks. Combat operations in Afghanistan highlighted the need for attack aviation to support ground maneuver, confirming trends observed during CTC rotations over the preceding decade. Several divisions shifted their attack helicopter battalions away from deep operations into providing close combat attack and security operations for ground maneuver brigades. Operation Iraqi Freedom validated the value of attack aviation supporting the close fight. While many authors suggested OIF invalidated the deep attack tactic, the ability of the

101st Aviation Brigade to adjust to lessons learned by the 11th AHR and conduct a deep armed reconnaissance validated the feasibility to such tactics.[153]

In the ten years since OIF I, the Army adjusted its force structure and doctrine to focus attack aviation exclusively on the close fight. Through a series of studies, the Army restructured Army Aviation units to increase brigade functionality, improve survivability, and assist ground maneuver brigades better integrate aviation into their plans. Attack aviators achieved proficiency in air-ground integration, the close combat attack, reconnaissance and security operations, and flight techniques in urban and mountainous terrain. Aviation doctrine retains a version of the deep attack, known as interdictory attacks, but aviation units rarely train to conduct these attacks as they have focused exclusively on supporting brigades in stability and counterinsurgency campaigns. In late 2011, with the end of combat operations in Iraq approaching, the Army unveiled a new capstone doctrine, Unified Land Operations and launched a major doctrinal revision to transition to a post conflict environment.

Unified Land Operations

The Army's publication of a new capstone doctrine, Unified Land Operations, promotes a shift back towards operations in depth while retaining proficiency in close combat. Whereas the 2008 version of the Army's capstone doctrine rejected the maneuver and decisive battle focus of earlier Army capstone doctrine in favor of challenges of a long war and stability operations, the 2011 version merges both versions together. The Army replaced long established tenets of operations, such as depth and synchronization, which the 2008 version of Army capstone doctrine had removed. The Army also returned the spatial aspect to the operational framework, such as

[153] Todd G. Thornburg, "Army Attack Aviation Shift of Training and Doctrine to Win the War of Tomorrow Effectively," (master's thesis, U.S. Marine Corps Command and Staff College, 2009), 19-20.

deep-close-security operations, under ULO.[154] Keys to operating in depth, according to Army doctrine, include generating simultaneous effects and targeting forces at the limit of the friendly force's operational reach, which often requires integration of joint assets.[155] Close combat and combined arms operations, however, retain a significant role in ULO as the Army seeks to conduct simultaneous operations across the depth and breadth of their area of operations.[156]

Army corps remain the primary operational headquarters under ULO, but they do so with no organic forces and limited ability to influence training for enabling brigades. Corps primarily serve as intermediate tactical headquarters focusing on extending and sustaining the operational reach of subordinate divisions. Available forces, such as divisions and separate brigades, allow corps to extend operational reach. [157] *Corps Operations* doctrine views the combat aviation brigade as capable of conducting reconnaissance and movement to contact in deep areas.[158] It also highlights the CAB's ability to integrate and digitally synchronize fire support assets to destroy and suppress enemy forces.[159] This view of corps operations resembles the focus of corps over the previous three decades; however, corps no longer oversee aviation brigades in training.[160]

---

[154] For tenets, see DA, *ADRP 3-0, Unified Land Operations*, 2-12 – 2-14; for operational framework, see DA, *ADRP 3-0, Unified Land Operations*, 1-9 – 1-13.

[155] Ibid., 2-13 – 2-14.

[156] For close combat, see Ibid., 1-8; for combined arms, see Ibid., 1-14 – 1-15; for simultaneous operations, see Ibid., 2-4.

[157] DA, *FM 3-92*, *Corps Operations*, v, 4-1 – 4-3.

[158] DA, *FM 3-92*,*Corps Operations*, 4-3 – 4-4; DA, *ADRP 3-0, Unified Land Operations*, 1-10 – 1-11. *FM 3-92* refers to unassigned areas, but *ADRP 3-0* modified this definition replacing it with deep-close-security areas.

[159] DA, *FM 3-92*, *Corps Operations*, 4-4.

[160] Ibid., 1-1.

Divisions and the Army Aviation branch must now speak for the requirements of corps with their influence over aviation brigade training.

Under ULO, the Army Aviation branch acknowledges a dual focus of supporting simultaneous aviation operations in the deep and close areas integrated into the joint community. The Army's concept for Army Aviation in the years 2015-2024 highlights the necessity for Army Aviation to fully integrate into the larger joint framework in order to "contribute to integrated, tempo-controlling actions in multiple domains concurrently to dominate any adversary and help control any situation."[161] The concept envisions attack aviation leveraging manned/unmanned teaming to conduct deep interdiction shaping attacks, integrating networked joint fires and reconnaissance assets, and supporting close combat decisive operations with CCAs.[162] Since there only exists one type of aviation brigade, this concept requires every brigade to operate across a range of missions during the same operation.

Recommendations

The Army Aviation community and the military commands it supports should pursue innovative methods to employ attack aviation in the deep fight while retaining proficiency in supporting close operations. In their review of military revolutions and revolutions in military affairs, former military officers Williamson Murray and MacGregor Knox concluded that "the most successful organizations avoided wild leaps into the future; their innovations remained tied to past experience, derived from conceptually sophisticated and honestly assessed experiment,

[161] Department of the Army, *Training and Doctrine Command Pamphlet 525-7-15, The United States Army Concept Capability Plan for Army Aviation Operations 2015-2024* (Fort Monroe, VA: U.S. Army Training and Doctrine Command, 2008), i.

[162] Ibid., 27-28, 128.

and depended on the ability to learn from both success and failure."[163] With this guidance in mind, commanders of corps, divisions, and aviation brigades should pursue three lines of effort to prepare attack aviation to operate under the Army's Unified Land Operations construct: adaptability, experimentation, and shared learning.

Adaptability becomes critical with every CAB required to operate throughout the depth of the battlefield in various types of missions. Major General Anthony Crutchfield, the recent Army Aviation branch chief, noted the necessity of Army Aviation to have adaptable organizations equipped with multi-mission aircraft and manned by adaptable, innovative professional aviators.[164] Broad exposure to the multiple mission sets in training paves the way for rapid adaptations in combat. As evidenced by Army Aviation experiences during OIF, predictions of enemy tactics often prove wrong and aviators worry most about conducting missions for which they have not trained. Rather than perfecting a single mission set, such as the deep attack during the 1990s or the close combat attack during the past decade, attack aviation units should practice these tactics as well as deep reconnaissance, security missions, and JAATs to a lesser degree of proficiency. While such an approach sacrifices mastery in any one tactic, it enables attack aviation to adjust rapidly when facing unanticipated enemy tactics. Simple pendulum theory, which states the time to complete an oscillation increases nonlinearly as the height of the swing increases, supports this approach.[165]

Corps, divisions, and aviation brigades must experiment to learn combined arms maneuver in depth given the new adversarial countermeasures and the modular structure of the

---

[163] Murray and Knox, "Future Behind Us," 185.

[164] Anthony Crutchfield, "Aviation Enterprise Teamwork – Laying the Groundwork for Future Success," *Army Aviation* (May 2012): 9.

[165] Baker and Blackburn, *The Pendulum*, 9.

Army Brigade Combat Teams. Experiments and exercises should test systems to failure rather than validate theories.[166] These organizations proved adept at learning though experimentation in the past discovering how to penetrate air defenses along the FLOT in the 1980s, coordinating simultaneous deep and close operations in the 1990s, defeating integrated air defense systems through simulation around the turn of the century, and mastering air-ground integration through a decade of combat. Now these same organizations must experiment and train in live, virtual, and constructive domains against a today's hybrid threat and in a joint environment to operate in depth. Exercise designers should strive to realistically replicate the capabilities and limitations of attack aircraft, an error that affected OIF exercises.[167] These exercises and training events must incorporate the entire divisional and corps combined arms teams as well as joint enablers. Pulling together these realistic joint and combined training exercises will challenge Army leadership, as it did V Corps to garner joint support for their Victory Strike exercises, especially given looming fiscal reductions.[168]

To operate in depth aviators must train to fight against complex layered air defense systems, which incorporate the gamut from radar guided missiles to anti-aircraft artillery ambushes to aerial improvised explosive devices.[169] Maneuvering with fire support, a lesson the 11th AHR relearned during Operation Iraqi Freedom, permits aviation to operate in depth, as evidenced by the 101st Aviation Brigade's successful deep attacks days after the 11th AHR's

---

[166] Murray and Knox, "Future Behind Us," 188.

[167] Rude, "Warfighter Mindset," 36.

[168] Chuck Harrison, "How Joint Are We and Can We Be Better?" *Joint Force Quarterly 38* (Third Quarter 2005): 16-19.

[169] For aerial IEDs, see Guy Ben-Ari and Shawn Brimley, "Aerial IEDs Show Adaptive, Resilient Enemy," (30 January 2006), http://csis.org/publication/aerial-ieds-show-adaptive-and-resilient-enemy (accessed 25 March 2013).

failed deep attack during Operation Iraqi Freedom. Several technological advances to the Army Aviation inventory over the past decade support a reevaluation of the ability for attack aviation to operate in depth. Fielding technology such as the Common Infrared Countermeasures, Block III Longbow Apache, and the Global Hawk Unmanned Aerial System (UAS), improved the survivability, surveillance, reconnaissance, and target acquisition capabilities of attack aviation units.[170] The capability to team manned Apache helicopters and unmanned armed Global Hawk UASs extends the range and duration of attack aviation operations.

As aviators learn techniques and procedures to operate in today's battlefield, they must share their lessons with the larger Aviation community to generate shared experience. The Army Aviation branch encourages collaboration and information sharing among its own ranks and recently improved means to do so. Prior to 1995, the Army Aviation community shared techniques and lessons through the *Aviation Digest.* Recently, the Aviation branch revitalized information sharing opportunities and reinstituted the *Aviation Digest*.[171] These venues allow aviators to share experiences and lessons learned with the rest of the Aviation community. Aviators should actively read and contribute to these venues for the greater good of the community.

In addition to the internal audiences of the Aviation community, maneuver and aviation commanders must share lessons learned with the larger community through professional journals

---

[170] For infrared countermeasures, see Scott R. Gourley, "Soldier Armed: Common Infrared Countermeasures," *Army* (August 2012): 59-60; for Block III Apache, see Anthony G Crutchfield, "Apache Block III Achieves a Critical Milestone," *Army Aviation* (31 December 2010): 8-9; for unmanned aircraft developments, see Scott R. Gourley, "U.S. Army UAS Programs," *Army* (January 2012): 31; for improvements in aircraft survivability, see Michael S Kelley, "The Future of Aviation Combat Survivability Training," *Army Aviation* (31 October 2012): 15.

[171] Charles R. Bowery, Jr., "Editor's Note," *U.S. Army Aviation Digest* (January–March 2013): 2.

and collaboration forums. Since the mid-1980s, corps commanders and Army Aviation branch chiefs used professional journals to share their vision and lessons learned employing aviation with the larger Army community or specific communities within the Army, such as the Infantry, Armor, or Field Artillery branches. Since Operation Iraqi Freedom, Aviation branch chiefs targeted industry and legislative supporters of Army Aviation through annual updates in the Association of the United States Army's *Army* magazine informing them about transformation initiatives. As Army Aviation recognizes its role in the joint arena, corps commanders and Aviation branch chiefs should expand their writings into joint publications to educate the joint audience about Army Aviation employment principles and considerations and to encourage participation in joint exercises.

Army Aviation successfully adapted to the realities and requirements of today's battlefield during past decade of conflict. The challenge becomes increasingly harder as the Army transitions to an interwar period. As surmised by Murray and Knox, "if adapting to wartime conditions is desperately difficult, those involved in peacetime innovation confront almost insoluble problems: it is here that the leaders of military institutions earn their pay."[172] Sharing lessons learned through exercises and experimentation based upon lessons learned over the past thirty years will earn Army Aviators their paycheck.

[172] Williamson Murray and MacGregor Knox, "Thinking About Revolutions in Warfare," in *The Dynamics of Military Revolution: 1300-2050*, ed. MacGregor Knox and Williamson Murray (Cambridge, UK: Cambridge University Press, 2001), 14.

BIBLIOGRAPHY

Allen, Matthew. *Military Helicopter Doctrines of the Major Powers, 1945-1992: Making Decisions About Air-Land Warfare.* Westport, CT: Greenwood Press, 1993.

Ancker, Clinton J. III, and Michael A. Scully. "Army Doctrine Publication 3-0: An Opportunity to Meet the Challenges of the Future." *Military Review* (January/February 2013): 38-42.

"Army Aviation in Operation Desert Storm." Report by Aviation Division, Office Deputy Chief of Staff for Operations, Headquarters Department of the Army, 1991. Aviation Technical Library, Fort Rucker, AL,

Baker, Gregory L., and James A. Blackburn. *The Pendulum: A Case Study in Physics.* Oxford: Oxford University Press, 2006. Ebrary e-book.

Barclay, James O. III. "Army Aviation: Adapting to Provide Full Spectrum Capability." *Army Aviation* (March/April 2010): 10, 12.

Barry, Charles L. "Planning Aviation Cross-FLOT Operations." *Military Review* (January 1984): 34-45.

Beebe, Shannon D. "Deep Strike MLRS DS to the Light Division Aviation Brigade." *Field Artillery* (March/April 1998): 36-37.

Bell, Burwell B., Guy M. Bourn, Nathan K. Slake, and David D. Haught. "The New DOCC." *Military Review* (January-February 2003): 37-41.

Ben-Ari, Guy, and Shawn Brimley. "Aerial IEDs Show Adaptive, Resilient Enemy." (30 January 2006). http://csis.org/publication/aerial-ieds-show-adaptive-and-resilient-enemy (accessed 25 March 2013).

Bodelson, Patrick J. and Kevin B. Smith. "Design for Tempo." *U.S. Army Aviation Digest* (March/April 1991): 2-16.

———. "Design for Tempo, Part 2: Aviation as a Maneuver Arm." *U.S. Army Aviation Digest* (July/August 1991): 2-11.

Bodelson, Patrick J., Kevin B. Smith, and Paul G. Ebhardt. "Design for Tempo, Part 3: Aviation —Mobility and Lethality for Deployable Forces." *U.S. Army Aviation Digest* (September/October 1991): 2-12.

Bourque, Stephen A. *Jayhawk!: The VII Corps in the Persian Gulf War.* Washington, DC: Department of the Army, 2002.

Bowery, Charles R. Jr. "Editor's Note." *U.S. Army Aviation Digest* (January–March 2013): 2.

Braun, William G. "Attack Aviation in Dismounted Operations." Master's monograph, U.S. Army School of Advanced Military Studies, 1996.

Bryan, William H. and Michael A. Albaneze. “Apache Armed Reconnaissance Operations: Another Technique.” *U.S. Army Aviation Digest* (January/February 1992): 38-41.

Burke, Charles M. and Donald C. Presgraves. “U.S. Army Operational Concept for Aviation.” *U.S. Army Aviation Digest* (September/October 1993): 7-13.

Cassidy, Robert M. “Renaissance of the Attack Helicopter in the Close Fight.” *Military Review* (July/August 2003): 38-45.

Company Commanders. “Company Command–Building Combat-Ready Teams: Air-Ground Integration.” *Army* (April 2006): 71-74.

Cox, Frank. “Showing How It’s Done.” *Field Artillery Journal* (January/February 1986): 22-23.

Crutchfield, Anthony G. “Apache Block III Achieves a Critical Milestone.” *Army Aviation* (31 December 2010): 8-9.

———. “Aviation Enterprise Teamwork – Laying the Groundwork for Future Success.” *Army Aviation* (May 2012): 8-9.

Culling, Thomas E., Daniel A. Nolan III, and Mark W. Jones. “Hells Fires Deep: The DOC–An Integrated Approach.” *Field Artillery* (February 1995): 14-19

Curran, John M. “Army Aviation Operations During Operation Iraqi Freedom.” *Army Aviation* (October 2003). http://www.quad-a.org/Archives/0310.htm (accessed 11 October 2012).

———. “May-Another Successful Convention, Hardware Updates, In Praise of Army Aviation During Operation Iraqi Freedom (OIF).” *Army Aviation* (May 2003). http://www.quad-a.org/Archives/0305.htm (accessed 11 October 2012).

Dalcourt, Charles. “Air/Ground Integration and the Combined Arms Concept.” *Armor* (September-October 1997): 22-25.

Department of the Army. *Army Doctrinal Publication No. 3-0, Unified Land Operations*. Washington, DC: Army Publication Directorate, 2011.

———. *Army Doctrine Reference Publication No. 3-0, Unified Land Operations*. Washington, DC: Army Publication Directorate, 2012.

———. *Field Manual 1-100, Army Aviation in Combat Operations*. Washington, DC: U.S. Army Aviation Center, 1989.

———. *Field Manual 1-100, Combat Aviation Operations*. Washinton, DC: U.S. Government Printing Office, 1984.

———. *Field Manual 1-111, Aviation Brigades*. Washington, DC: Government Printing Office, 1997.

———. *Field Manual 1-112, Attack Helicopter Operations*. Washington, DC: Government Printing Office, 1997.

———. *Field Manual 3-0, Operations*. Washington, DC: U.S. Army Publication Directorate, 2008.

———. *Field Manual 3-0, Operations, Change 1*. Washington, DC: U.S. Army Publication Directorate, 2011.

———. *Field Manual 3-04.111, Aviation Brigades*. Washington, DC: Government Printing Office, 2003.

———. *Field Manual 3-04.111, Aviation Brigades*. Washington, DC: U.S. Army Publication Directorate, 2007.

———. *Field Manual 3-04.112, Attack Reconnaissance Helicopter Operations*. Washington, DC: U.S. Army Publication Directorate, 2007.

———. *Field Manual 3-92, Corps Operations*. Washington, DC: U.S. Army Publication Directorate, 2010.

———. *Field Manual 100-5, Operations*. Washington, DC: Government Printing Office, 1982.

———. *Field Manual 100-5, Operations*. Washington, DC: Government Printing Office, 1986.

———. *Field Manual 100-5, Operations*. Washington, DC: Government Printing Office, 1993.

———. *Field Manual 100-15, Corps Operations*. Washington, DC: Government Printing Office, 1996.

———. *Training and Doctrine Command Pamphlet 525-7-15, The United States Army Concept Capability Plan for Army Aviation Operations 2015-2024*. Fort Monroe, VA: U.S. Army Training and Doctrine Command, 2008.

———. *Training Circular 7-100, Hybrid Threat*. Washington, DC: U.S. Army Publication Directorate, 2010.

Deverill, Shane M. and Michael S. Marlow. “Combat Training Centers.” *U.S. Army Aviation Digest* (September/October 1990): 2-14.

Eldridge, William G. “Achieving Strategic Effects with Army Attack Aviation.” Master’s thesis, U.S. Army Command and General Staff College, 2003.

Eller, Douglas R. “ARI Transition—A Report from the Field.” *U.S. Army Aviation Digest* (March/April 1995): 26-30.

Fontenot, Gregory, E.J. Degen, and David Toth. *On Point: The United States Army in Operation Iraqi Freedom*. Fort Leavenworth, KS: Combat Studies Institute Press, 2004.

Gagnon, William E. Jr. “Attack Mission Planning.” *U.S. Army Aviation Digest* (September/October 1990): 15-19.

Garrett, Grady B. “The Corps Artillery Commander and Deep Operations.” *Field Artillery* (April 1993): 15-21.

Gordon, Michael R., and Bernard E. Trainor. *Cobra II*. New York: Pantheon Books, 2006.

Gourley, Scott R. "Soldier Armed: Common Infrared Countermeasures." *Army* (August 2012): 59-60.

———. "U.S. Army UAS Programs." *Army* (January 2012): 29-31.

Grayson, Eugene H. Jr. "Helicopter Support to Infantry: Dusting Off the Lessons of the Past." *Infantry* (January-February 1996): 19-20.

Greene, Shaun. "Using Attack Helicopters." *Infantry* (March-April 1995): 36-38.

Harrison, Chuck. "How Joint Are We and Can We Be Better?" *Joint Force Quarterly 38* (Third Quarter 2005): 14-19.

Haynes, Forest D., III. "Synchronizing the Divisional Deep Fight." *Field Artillery* (April 1993): 21-25.

Inman, Micheal T. "Operational Maneuver in the 90s: Is Army Aviation a Viable Option?" Master's monograph, U.S. Army School of Advanced Military Studies, 1990.

Jacobs, William M. "Massing the Third Dimension in AirLand Battle-Future: The Aviation Division." Master's monograph, U.S. Army School of Advanced Military Studies, 1990.

Jamison, Lewis M. "Will Army Aviation be Invited to Play in the Next War?" *Military Review* (May-June 2002): 40-45.

Janney, Brooke H. "Attack Aviation Fires for the Close Fight: A New Approach." *Field Artillery* (January/February 2003): 10-13.

———. "Paving the Way for Air Maneuver: Defeating COE OPFOR Air Defenses." *Field Artillery* (January/February 2003): 14-21.

Karr, Michael J. "REFORGER 90: Readiness." *U.S. Army Aviation Digest* (July/August 1990): 48-49.

Keaney, Thomas A., and Eliot A. Cohen. *Gulf War Air Power Survey Summary Report*. Washington, DC: Government Printing Office, 1993.

Kelley, Michael S. "The Future of Aviation Combat Survivability Training." *Army Aviation* (31 October 2012): 12-15.

Kerr, Donald. "Depth and Simultaneous Attack –One Battle Lab Helping to Forge the Army's Future." *Field Artillery* (April 1993): 36-38.

Kirkpatrick, Charles E. *"Ruck it Up!" The Post-Cold War Transformation of V Corps, 1990-2001*. Washington, DC: Department of the Army, 2006.

Lange, Adam W. "HELLFIRE: Getting the Most from a Lethal Missile System." *Armor* (January-February 1998): 25-30.

Lindsay, James J. “Operational Maneuver: The Key to Joint Warfighting.” *U.S. Army Aviation Digest* (May 1986): 2-6.

McElroy, Robert H. “Afghanistan: Fire Support for Operation Anaconda.” *Field Artillery* (September/October 2002): 5-9.

McGinty, Kenneth R., and Gregory A. Brockman. “Cross FLOT With the AH-64 Apache.” *U.S. Army Aviation Digest* (January 1987): 2-5.

McLaughlin, Geoffrey A., Steven M. Pierce, and David A. Smith. “Army Aviation’s Evolution to Sustained Operations.” *Army* (June 2004): 59-62, 64.

Murray, Williamson and MacGregor Knox. “The Future Behind Us.” In *The Dynamics of Military Revolution: 1300-2050,* edited by MacGregor Knox and Williamson Murray, 175-194. Cambridge, UK: Cambridge University Press, 2001.

———. “Thinking About Revolutions in Warfare.” In *The Dynamics of Military Revolution: 1300-2050,* edited by MacGregor Knox and Williamson Murray, 1-14. Cambridge, UK: Cambridge University Press, 2001.

Nicholson, Demetrios J. “Max Recon Forces Forward: Air Cavalry and Attack Aviation’s Role in Limiting Enemy Freedom of Movement and Maneuver.” *Armor* (June-August 2010): 22-25.

Odierno, Raymond T. Forward to *Army Doctrinal Publication No. 3-0, Unified Land Operations,* by Department of the Army. Washington, DC: Army Publication Directorate, 2011.

Ostrovich, Rudolph III. “AirLand Battle–Part I: Dramatic Changes in Emerging Aviation Doctrine.” *U.S. Army Aviation Digest* (November 1986): 2-9.

———. “Aviation Contribution to the War in the Gulf.” *U.S. Army Aviation Digest* (March/April 1991): 1.

Pearson, Craig. “Joint Army Aviation/Air Force Deep Operations at Night: Is it Tactically Feasible and If So, How?” Master’s monograph, U.S. Army School of Advanced Military Studies, 1985.

Perry, Henry C., Murphy A. Caine, and Joseph G. Bruhl. “Air Integration in the Heavy Division: First Attack’s Lessons Learned from the NTC.” *Armor* (May/June 2003): 21-25, 48.

Petrosky, Daniel J. and Marshall T. Hillard. “An Aviation Brigade Goes to War.” *U.S. Army Aviation Digest* (September/October 1991): 44-65.

Poumade, Michael L. “Apaches at the NTC: They’re Here!” *U.S. Army Aviation Digest* (January/February 1991): 46-51.

Richardson, Richard S. “Artillery Fires in Support of Aviation in the Close Attack.” *Field Artillery* (January/February 2003): 22-24.

Robinson, J. David and Charles M. Burke. “Fighting Maneuver and Fires in the Third Dimension.” *Field Artillery* (April 1993): 11-14.

Rogers, Guy A. II. “REFORGER 90: Reserves.” *U.S. Army Aviation Digest* (July/August 1990): 50-51.

Rude, David J., and Daniel E. Williams. “The ‘Warfighter Mindset’ and the War in Iraq.” *Army* (July 2003): 35-40.

Saint, Crosbie E., and Walter H. Yates Jr. “Attack Helicopter Operations in the AirLand Battle: Deep Operations.” *Military Review* (July 1988): 2-9.

———. “Attack Helicopter Operations in the AirLand Battle: Close Operations.” *Military Review* (June 1988): 2-15.

Scales, Rick. “Aviation Restructure Initiative—The Way of the Future.” *U.S. Army Aviation Digest* (September/October 1993): 14-17.

Schilleci, A.C. “A Deadly Combination: Integration of the AH-64D M-TADS and High Altitude Tactics on the Modern Battlefield.” *Infantry* (May-June 2008): 21-23.

Simmons, James E. “Army Aviation: Does it Provide an Answer to Operational Maneuver in the Central Region?” Master’s monograph, U.S. Army School of Advanced Military Studies, 1990.

Sinclair, Edward J. “The Air Attack Division: AirLand Battle Future’s Operational Contingency Force?” Master’s monograph, U.S. Army School of Advanced Military Studies, 1991.

———. “Army Aviation’s Progress Toward Transformation.” *Army* (January 2006): 32-37.

———. “Posturing Army Aviation: Aviation Task Force Initiatives.” *Army Aviation* (May 2004). http://www.quad-a.org/Archives/0405.htm (accessed 11 October 2012).

Steele, Dennis. “Roving Sands 2001.” *Army* (August 2001): 18-21.

———. “The War Against Terrorism–Be Ready: V Corp Trains to Deploy Quick and Strike Deep.” *Army* (December 2001): 16-26.

Stinger, Russell. “Army Aviation - Back to its Roots.” Strategy research report, U.S. Army War College, 2009.

Stratman, Henry W., and Jackson L. Flake III. “Deep Operations in the Big Red One–Winning Early, Winning Deep.” *Field Artillery* (June 1995): 31-35.

Sweet, Erick W. II. “The Glass Balls of the Brigaded Aviation Element: The Brigade Aviation Officer in Combat.” *Military Review* (January-February 2010): 91-100.

Tackaberry, Kief S., James A. Kelley, and Thomas M. Muir. “Deep Attack and the Counterartillery Battle.” *U.S. Army Aviation Digest* (January/February 1992): 6-13.

Thornburg, Todd G. “Army Attack Aviation Shift of Training and Doctrine to Win the War of Tomorrow Effectively.” Master’s thesis, U.S. Marine Corps Command and Staff College, 2009.

Tindoll, Davis D. Jr., and Michael J. Negard. “Lessons Learned at the Joint Readiness Training Center: Air-Ground Coordination in the Hasty Attack.” *U.S. Army Aviation Digest* (March/April 1995): 34-39.

U.S. General Accounting Office. *Apache’s Performance in Desert Storm, GAO/NSIAD-92-146.* Washington, DC: Government Printing Office, April 1992.

———. *Kosovo Air Operations: Army Resolving Lessons Learned Regarding the Apache Helicopter, GAO-01-401.* Washington, DC: Government Printing Office, March 2001.

Wright, Donald P., James R. Bird, Steven E. Clay, Peter W. Connors, Scott C. Farquhar, Chandler Garcia, and Dennis F. Van Wey. *A Different Kind of War: The United States Army in Operation Enduring Freedom (OEF), October 2001-September 2005,* (Fort Leavenworth, KS: Combat Studies Institute, 2010).