REPORT DOCUMENTATION PAGE

AD-A255 138

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	5 June 1992	Master's Thesis, 1 Aug 91- 5 Jun 92

4. TITLE AND SUBTITLE

CLOSE AIR SUPPORT FOR THE FUTURE

5. FUNDING NUMBERS

6. AUTHOR(S)

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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

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8. PERFORMING ORGANIZATION REPORT NUMBER

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

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

This thesis investigates the question: Will Close Air Support (CAS) in the year 2000 be as close as CAS today? Today's CAS is dependent upon the ground commander's perception of the situation, and focuses primarily on forces beyond the commander's direct fire weapons' range, but if the situation dictates, CAS is employed right next to his forces. The thesis discusses the possible effects doctrinal and technological changes will have on CAS employment. Doctrinal changes include: increased focus on Joint operations, smaller forces on a less linear battlefield, changing Air Force doctrine and force structure, and changing Army doctrine. Technological changes include: fratricide reduc ion, digital communications, advanced navigation systems, target acquisition, weapons delivery improvements, and night fighting enhancements. These changes will take place while the Air Force is transitioning from the A-10 to the F-16 as the primary CAS aircraft. The conclusions are: (1) Doctrinally CAS will continue to be important. (2) Lighter, more maneuvarable forces will require closer and more accurate CAS than today. (3) Technological advances will make closer and more accurate CAS available. (4) Less CAS will be employed, because fewer assets will be available, and the Joint commander will focus most of his assets on higher payoff interdiction targets.

14. SUBJECT TERMS	15. NUMBER OF PAGES
CLOSE AIR SUPPORT, FIRE SUPPORT COORDINATION LINE, AIR INTERDICTION, BATTLEFIELD AIR INTERDICTION	121
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED

CLOSE AIR SUPPORT FOR THE FUTURE

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

MASTER OF MILITARY ART AND SCIENCE

by

STEVEN E. BELL, MAJ, USAF
B.S., United States Air Force Academy, Colorado, 1979

Fort Leavenworth, Kansas
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THESIS APPROVAL PAGE

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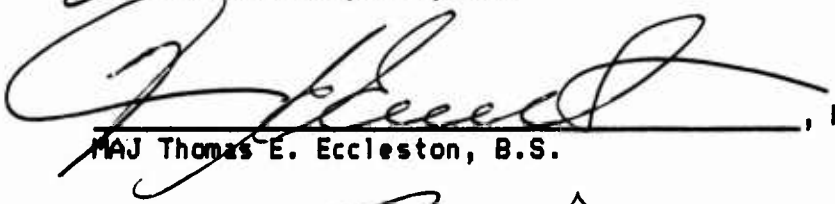

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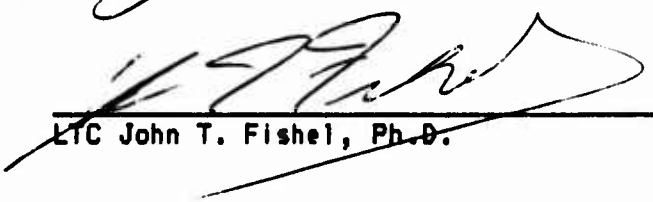

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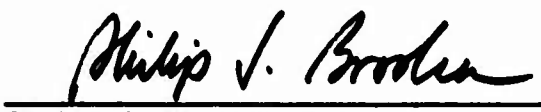

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the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

ABSTRACT

CLOSE AIR SUPPORT FOR THE FUTURE by Maj Steven E. Bell, USAF, 120 pages.

This thesis investigates the question: Will Close Air Support (CAS) in the year 2000 be as close as CAS today? Today's CAS is dependent upon the ground commander's perception of the situation, and focuses primarily on forces beyond the commander's direct fire weapons' range, but if the situation dictates, CAS is employed right next to his forces. The thesis discusses the possible effects doctrinal and technological changes will have on CAS employment. Doctrinal changes include: increased focus on Joint operations, smaller forces on a less linear battlefield, changing Air Force doctrine and force structure, and changing Army doctrine. Technological changes include: fratricide reduction, digital communications, advanced navigation systems, target acquisition, weapons delivery improvements, and night fighting enhancements. These changes will take place while the Air Force is transitioning from the A-10 to the F-16 as the primary CAS aircraft.

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ACKNOWLEDGEMENTS

Thank you to all those individuals who took the time to help me find and gather the information I needed for this thesis. From sitting for interviews, to providing guidance, to locating and sending information, you all made this work happen, and I owe you a great deal.

But most of all, thank you to my wife, [redacted] my daughter, [redacted] and my son, [redacted] Your love, patience, and understanding made it possible for me to complete this year. Thanks for putting up with my long hours and moody behavior, and most importantly for caring. I could never have done it without you.

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LIST OF ABBREVIATIONS

AI	Air Interdiction
ALO	Air Liaison Officer
ATACMS	Army Tactical Missile System
ATHS	Automatic Target Handoff System
BAI	Battlefield Air Interdiction
CAS	Close Air Support
DTS	Digital Terrain System
FAC	Forward Air Controller
FEBA	Forward Edge of the Battle Area
FLIR	Forward Looking Infrared Radar
FLOT	Front Line Of Troops
FSCL	Fire Support Coordination Line
GPS	Global Positioning System
IDM	Improved Data Modem
JFACC	Joint Force Air Component Commander
NTC	National Training Center
LASTE	Low Altitude Safety and Targeting Enhancement
LCC	Land Component Commander
NVG	Night Vision Goggles

CHAPTER 1

INTRODUCTION

Close Air Support (CAS) has traditionally been extra firepower the Army called for when it was in trouble and needed help, or when it wanted help applying pressure in a particular battle. The Air Force has been supporting the Army in this way since man tamed the air. "Close air support has been around since the early days of the aircraft in World War I."[1] CAS has been the Army's "ace in the hole" to be employed when it would do the most good. However, CAS is not the primary mission of the Air Force--air superiority is.

Army doctrine recognizes the need for air superiority, as this passage from its Field Manual (FM) 100-5, Operations, states:

> The first consideration in employing air forces is gaining and maintaining the freedom of action to conduct operations against the enemy. Control of the air environment gives commanders the freedom to conduct successful attacks which can neutralize or destroy an enemy's warfighting potential.[2]

Even so, Army officers at all levels have worried that the Air Force will be concerned solely with air superiority and disregard the Army's needs. This is not a new concern. In

his article, "Airpower: Historical Perspective," Major Mark Skattum, USAF, indicates the War Department had trouble writing its modified air doctrine in 1943.

> The basic principles... were: air and ground forces were co-equal partners; air supremacy was the most important mission, followed by ground support; and 'out of sight' did not mean 'out of mind'. This latter point was added to convince Army ground commanders that airpower did not need to be directly overhead to support their forces.... The Army perception was the Air Force was not giving CAS the proper emphasis.[3]

The same concerns can still be heard. Especially worrisome is the fact that the Air Force and Congress have decided to make the F-16 the CAS aircraft of tomorrow. The A-10 was designed for the CAS role and has maintained CAS as its primary mission. But, the F-16 was designed as a multi-role fighter that has just recently been assigned a CAS mission. Compounding this concern, is the many turns the F-16 CAS upgrade has taken. Initially, the F-16 CAS program was designed to be developmental for the A-16 (a new version of the F-16 with specialized equipment for the CAS role). It would have replaced the A-10 in the early 90s. However, the shrinking budget cancelled any plans for a new aircraft, and instead the future CAS aircraft will be an older model F-16 with equipment modifications (its final designation could be FA-16, A-16, or F-16A). Adding this confusion over the airframe to the fact that the aircraft will continue to be a multi-role fighter, there is little wonder why: "Critics of the F-16 in the close air support role contend that the Air Force is more interested in the air-to-air battle than the

air-to-ground one."[4] Service parochialism and their fight for Congressional funding have continued to fuel this debate. At the same time however, the Department of Defense is trying to smear the lines between the different services, and develop a "joint" team.

The military establishment as a whole is concentrating more and more on the integration of all assets under one joint doctrine. The "foreword" of the Army's Training and Doctrine Command Pamphlet (TRADOC PAM) 525-5, Airland Operations, acknowledges this consideration with an agreement between the Army and the Air Force to support each other.

> AirLand Operations has been accepted by the Tactical Air Command for the development of joint operational procedures, Army and Tactical Air Forces doctrine, and the Army and Air Force air attack action plan for joint warfighting on future battlefields.[5]

So, the battle lines between Army and Air Force doctrine appear to be disappearing. Though there will always be some "chest pounding" from all services on their respective capabilities, contributions and needs, the leadership from within and without the Department of Defense have set their sights on a more cooperative team. The success enjoyed by a truly "joint" war in Desert Storm helped ease the tension, and the march for teamwork is continuing. But now, "peace is breaking out all over," and Congress is cutting the

military budget drastically as a "peace dividend." These cuts will have a tremendous impact on the capabilities of all services.

The Air Force is being reduced from the almost-attained goal of 40 fighter wings to 26 (the press rumors even deeper cuts), and the only strictly CAS aircraft in the inventory, the A-10, is facing the scrap heap. Where will this "peace dividend" leave the Army when it needs help during the next conflict or the one after that? Will there still be CAS available on tomorrow's battlefield, or will the few remaining Air Force assets be used in a strictly air superiority role? The answer from Tactical Air Command's Requirements Division (TAC/DRFG) is: "Yes, close air support will still be there."[6] With current Congressional and DOD emphasis on joint operations, planners are working hard to ensure the Air Force and the Army will be there to complement each other in the AirLand battle of tomorrow. The question of whether or not CAS will be available appears moot. What is uncertain is what tomorrow's CAS will look like.

THESIS QUESTION

This thesis will attempt to answer the question: "Will CAS in the year 2000 be as close as CAS today?" A lot of changes are expected to take place in this decade and the face of CAS could be one of the many. Thirteen years ago the Tactical Air Command put this statement in their

Tactical Air Operations manual (TACM) 2-1: "On the modern battlefield, close air support will be complex and difficult...."[7] The changes in technology and doctrine that have taken place since that line was written, make it the "mother of all" understatements. Will tomorrow's "close" air support mean surgically removing threat forces while they are engaged in a knife-fight at the forward edge of the battle area (FEBA), or will it mean engaging assets further back in the enemy's rear area, like today's battlefield air interdiction (BAI)? Before this question can be answered, the stage must be set.

OVERVIEW

In order to understand what the future holds, a common reference for CAS, as we know it today, must be identified. To work towards this common reference, the second chapter of this thesis will be a literature review. This review will emphasize the problem of delineating CAS from other air support missions. This chapter will also define other important terms. Together, the literature review and definitions will provide a brief synopsis of the work done to date, and help establish a common reference for further research. Chapter three will look at how close, "close" is today--both in theory and in practice. Concerning CAS, what we say we can do and what we actually do can be quite different. The next step will be to examine doctrine, and the changes expected in the way future battles

will be fought. Changing doctrine can affect the need for CAS, and the way it is utilized. Next, will be a look at what technology holds in store. The integration of improved avionics, communications, and weaponry could have a significant impact on how close CAS is employed. The conclusion will tie tomorrow's doctrine to technology and forecast the changes to CAS employment.

ASSUMPTION

This thesis makes one critical assumption. That assumption is that the Air Force will continue to maintain a close air support role. This assumption is necessary, because there have been those that have questioned its validity. Comments have been made about the Army providing its own CAS using rotary wing aircraft, or even getting the A-10s the Air Force is scrapping. The decisions by military and civilian leadership to proceed with operational testing, modification, and funding for the F-16 in the CAS role validates the assumption that the Air Force will maintain a CAS mission. This does not mean that the Air Force will be the "only" provider, but that CAS will remain a primary mission in Air Force doctrine.

DELIMITATIONS

To maintain an appropriate scope for this thesis some limitations are necessary. First, all information will be unclassified. This is important to allow the widest

dissemination possible. Second, it will concentrate primarily on daytime high threat tactics. CAS in a high threat scenario is readily accepted as the most dangerous and difficult situation to orchestrate and accomplish safely. With the current proliferation of sophisticated weapon systems, it is not hard to believe that the third world threat in the year 2000 could be as heavily protected, as the Russian army is today. The discussion will also be limited to fighter aircraft. Though aircraft such as conventional bombers and gunships have and probably will be used effectively in CAS roles, they are not as likely to be used in a threat intensive environment. So, the overall focus of discussion will be on fighter aircraft, on a daylight mission, in a high threat scenario.

SIGNIFICANCE OF THE STUDY

This study will help clarify the usefulness and limitations of fixed wing assets in the CAS role. The reader should have a better understanding of how to incorporate these assets into his battle plan, or in support of someone else's plan. He should also gain an understanding of the tradeoffs associated with using the limited numbers of aircraft and pilots available for this particular role.

Technology and philosophies change, but war remains a political tool, and CAS remains an integral part of that

tool. The future is unclear and skeptics may be saying classic CAS is a thing of the past. This thesis will attempt to assess the validity of that remark.

ENDNOTES

[1]John A. Warden III, The Air Campaign: Planning for Combat, (Washington, D.C.: National Defense University Press, 1988), 86.

[2]U.S. Army, FM 100-5, Operations, (Washington, D.C.: Department of the Army, 1986), 47.

[3]Major Mark Skattum, "Air Power: Historical Perspective," Air Land Bulletin 89-3, (30 September 1989): 8-9.

[4]David Hughes, "Syracuse Wing Finds F-16A Effective in Close Air Support," Aviation Week and Space Technology, 18 June 1990, 37.

[5]U.S. Army, TRADOC PAM 525-5, Airland Operations, (Washington, D.C.: Department of the Army, 1991), Foreword.

[6]Lieutenant Colonel Fred Offutt and Major Henry Fisher, TAC/DRFG Langley AFB, Virginia, telephone interview by author, 3 January 1992.

[7]U.S. Air Force, TACM 2-1, Tactical Air Operations, (Washington, D.C.: Department of the Air Force, 1978), p. 1-3.

CHAPTER 2

LITERATURE REVIEW

Close Air Support has been a fairly hot topic in literature. From other research papers to articles in magazines and military journals, the mission and its aircraft have been discussed. Most of the discussions deal with what aircraft can best perform the mission. Others cover CAS at night, in low intensity conflicts, or in high threat Central European scenarios. Some deal with the question of who should perform the role: the Army or the Air Force; while, others deal with future mission changes. All are useful for establishing a basis for further research.

OTHER STUDIES

To complete this thesis, other research projects conducted at the Army Command and General Staff College, Army War College, Air Command and Staff College, and the Air War College were reviewed. These projects provided historical data and a wide variety of viewpoints on the CAS mission, equipment, and doctrine. The most common thread throughout these theses is the difficulty experienced in defining CAS and the other terms associated with it.

Definitions in relation to this thesis are discussed later in this chapter. The other projects are an excellent start towards developing a foundation for continued study, but there is much more information available.

SERVICE MANUALS

The list of manuals, regulations, and pamphlets dealing with CAS is almost endless, but of particular note are the Army's FM 100-5, Operations, and Air Force Manual (AFM) 1-1, Basic Aerospace Doctrine. These two manuals espouse the doctrine of the respective services. Both define CAS and include brief discussions of how it fits into the doctrinal framework. Other manuals of interest include the North Atlantic Treaty Organization's (NATO) Allied Tactical Pamphlet (ATP) 27(B), Offensive Air Support Operations, and Tactical Air Command's TACM 2-1, Tactical Air Operations. The first describes NATO's procedures and guidance for using all types of offensive air support including CAS, and Battlefield Air Interdiction (BAI). TACM 2-1 describes procedures for employment of tactical aircraft missions. These missions include air superiority, Air Interdiction (AI), and CAS among others. These manuals along with other service manuals are useful in researching the doctrine behind why assets are employed and the procedures for how to obtain and use these assets. The next step in the research trail involves the tests used in developing technology and doctrine.

GOVERNMENT TESTS

Perhaps the most important set of recent tests are those concerning the F-16 and its role in CAS. In the late 80s, the Air Force began demonstration flights and equipment tests. These tests took place at Nellis AFB, Nevada and in Tucson, Arizona at the Air National Guard and Air Force Reserve Testing Center. The tests continue; however, some information is available from the F-16 Operational Test and Evaluation (OT&E) squadron. The written information available includes current test results and future plans. Of course some of the next generation equipment plans are classified, but information is available on the Automatic Target Handoff System (ATHS), Forward Looking Infrared (FLIR) system, and many other planned modifications. Together these test results and planning guidelines provide an insight to the expected capabilities of tomorrow's airframes.

INTERVIEWS

Interviews and discussions with the OT&E squadron pilots can also provide some valuable insight. The OT&E squadrons are not only responsible for testing new technology, but they also develop and test employment techniques and procedures. The A-10 OT&E squadron acknowledged that, because of the aircraft's excellent performance in Desert Storm, and its first place finish in the Air Force weapons delivery competition (Gunsmoke), the

A-10 will not be decommissioned as soon as originally projected. According to Maj John Keutman, "The A-10 will remain operational until 2010."[1] He added that they are testing significant technology improvements on the aircraft to enhance its capabilities even more. These facts were confirmed by officers in the Pentagon and at Headquarters Tactical Air Command. These same sources provided a lot of information on force requirements, technology improvements and doctrine.

Other interviews used in support of this thesis include those of former Air Liaison Officers (ALOs), USAF Fighter Weapons School Graduates, former OT&E pilots, and former ground maneuver commanders. These interviews provided insight on the actual employment of CAS in war or in the closest simulation at one of the training centers, like the National Training Center, at Ft. Irwin, California. These training centers are designed to put units into a realistic scenario fighting against a realistic opposing force. This is our best tool available for simulating the stress and conditions expected in real combat. This collection of interviews was important for establishing how close CAS is actually being employed today.

PERIODICALS

Periodicals on military power, plans, and tactics are perhaps the most abundant form of CAS-related publication available today. Aviation Week and Space

Technology, International Defense Review, and Air Force Magazine are just a few of the sources available. Of particular note for this thesis is an article in the June 18, 1990 issue of Aviation Week and Space Technology. The article titled, "Aviation Week Flight Report: F-16A in Close Air Support" provides a look at the first unit dedicated to flying the F-16 in a CAS role, the 174th Tactical Fighter Wing, Air National Guard, from Syracuse New York.[2] This article provides a look at a CAS mission the reporter was allowed to participate in, and looks at some of the training, maintenance, and employment plans. Another article of note is the three part "Gulf War in Review" found in the May, July, and September 1991, issues of International Defense Review. This article provides a synopsis of the tactics and considerations of the air, land, and sea campaigns. Another publication of particular interest is The Airland Bulletin. This bulletin is published by Headquarters Tactical Air Command/Headquarters Training and Doctrine Command Air Land Forces Application (TAC-TRADOC ALFA). It contains articles written by military members and civilian employees of the Department of Defense. These articles deal with many facets of the airland battle, but most discuss firepower assets and their employment and coordination requirements. These articles provide some excellent insight on the views of the man doing the job. As

mentioned earlier, these are just a few of the many periodicals and articles available on the subject of CAS.

CLOSE AIR SUPPORT DEFINED

Defining close air support and how it relates to other missions, specifically battlefield air interdiction (BAI) has occupied large sections of most of the material written to date. The major question is where does CAS end and BAI begin. The NATO publication ATP-27(B), Offensive Air Operations defines them this way:

> Close Air Support (CAS). Close Air Support is air action against hostile targets which are in close proximity to friendly forces and which requires detailed integration of each air mission with the fire and movement of those forces (ATP-33). This means that the aircraft is under positive or procedural control.
>
> Battlefield Air Interdiction (BAI). BAI is air action against hostile surface targets which are in a position to directly affect friendly forces and which requires joint planning and co-ordination. While BAI missions require co-ordination in joint planning they may not require continuous co-ordination during the execution stage.[3]

The difference between the two is targets in "close proximity" vice "in a position to directly affect friendly forces" (that is a tough difference to call), and "positive or procedural control" versus "may not require continuous co-ordination during the execution stage." Both these definitions leave some awfully big room for interpretation.

In his book, The Air Campaign Planning for Combat, John A. Warden III discussed the problem identifying the difference between missions when he wrote: "Close air

support can look like interdiction, and vice versa."[4] After a discussion of the problem, he defines close air support this way:

> Let us define close air support as any air operation that theoretically could and would be done by ground forces on their own, if sufficient troops or artillery were available.[5]

This definition is extremely different and extremely open as it explores the "unlimited resource" scenario. But, it does bring into the discussion the capability of friendly fire to take out the threat. This sounds like it is approaching the Army's area of "close operations."

In FM 100-5, the Army defines close operations (in the ground war) as:

> Close operations involve the fight between the committed forces and the readily available tactical reserves of both combatants.[6]

So, to the Army "close" in operational maneuver terms is the fight between engaged forces and their reserves. They define "close air support" in exactly the same way the Air Force defines it in AFM 1-1:

> Close air support objectives are to support surface operations by attacking hostile targets in close proximity to friendly surface forces....can support offensive, counter-offensive, and defensive surface force operations...require detailed coordination and integration with the fire and maneuver plans of friendly surface forces....[7]

Once again the definition hinges on "close proximity" and "detailed coordination." These definitions vary not only worldwide, but within the Air Force and the Department of Defense. Maj Kelley Bishop, in his thesis: The Follow On

Close Air Support Aircraft - Should it be a Single Role or Multi-Role Aircraft, provides an excellent discussion of the definition incongruities between Joint Chiefs of Staff Pub 1, Air Force Manual 1-1, and Tactical Air Command Manual 2-1. After reviewing the differences, he finally settled on this definition:

> ... CAS aircraft carry and employ the necessary munitions to kill targets up to 25 kilometers behind the forward edge of the battle area (FEBA). This distance equates to at least the brigade rear of any opposition force.[8]

This definition begins to narrow the field, but does it keep "close proximity" to friendly troops tight enough? Tying the common strands of "close proximity" and "detailed coordination" together requires defining the limits to a smaller fighting unit, like a battalion.

CAS FOR THIS THESIS

For the purposes of this paper close air support will be defined as:

> attacking forces that can be visually acquired by an observer along the FLOT (airborne or on the ground) and requiring positive or procedural final control.

This definition gives close proximity more definable limits, yet still allows for fire support of enemy elements not within range of friendly direct fire weapons. By tying the definition to a forward observer along the FLOT, the effect is immediate, and relates closer to a maneuver battalion in contact than to a brigade. Also, a battalion is normally the smallest Army unit to have an Air Force tactical air

control party (TACP) assigned. This party is designed to coordinate for CAS and to provide final control, if necessary. The fact that the forward observer can be either airborne or on the ground, provides flexibility to the ground commander. The forward observer is often his eyes out front, and sometimes the view is many miles, but other times it is just the next ridge. This also allows a Forward Air Controller (FAC) to participate in the process. More often than not, a FAC will be airborne (in either a plane or a helicopter) near the FLOT. He will coordinate with the ground units for target priority, and will also act as another observer for the pilots and the ground commander. The distance associated with this definition can still vary, but by keeping the observer tied to the FLOT, the attacks stay focused on the near-term concerns of the ground commander.

There are nearly as many definitions for CAS as there are people discussing the issue. There are exceptions to every rule, and for every finely resolved definition someone can point out a situation that is not covered, but probably should be. The definition provided here is not perfect, but it does encompass the vast majority of what are generally considered CAS missions. It definitely encompasses the missions surrounding the purpose of this thesis; how "close" will CAS continue to be, and it helps put definable limits on the discussion.

AIR INTERDICTION (AI):

Another important term involved in discussions of air support for the ground campaign is air interdiction. In AFM 1-1, BAI is not listed as one of the Air Force missions. Instead, it discusses BAI as being a subset of AI. The manual defines AI in terms of its objectives and level of integration:

> Objectives are to delay, disrupt, divert, or destroy an enemy's military potential before it can be brought to bear effectively against friendly forces. These combat operations are performed at such distances from friendly surface forces that detailed integration of specific actions with the fire and movement of friendly forces is normally not required.[9]

The limits of integration and deconfliction of air and ground resources are normally defined by the Fire Support Coordination Line (FSCL). This line normally equates to the limits of a ground commander's organic firepower assets. Missions flown between the FSCL and FLOT require coordination with ground forces to prevent destroying aircraft with friendly fire. So, according to Air Force doctrine, missions flown as air support (not in a counter air role), but not in direct support of friendly troops in close proximity, will by definition, be air interdiction missions. BAI missions are those flown "against targets which are in a position to have a near term effect on friendly land forces."[10] This means normally BAI missions are those flown between the CAS arena and the FSCL, and plain AI missions are those flown beyond the FSCL. It is

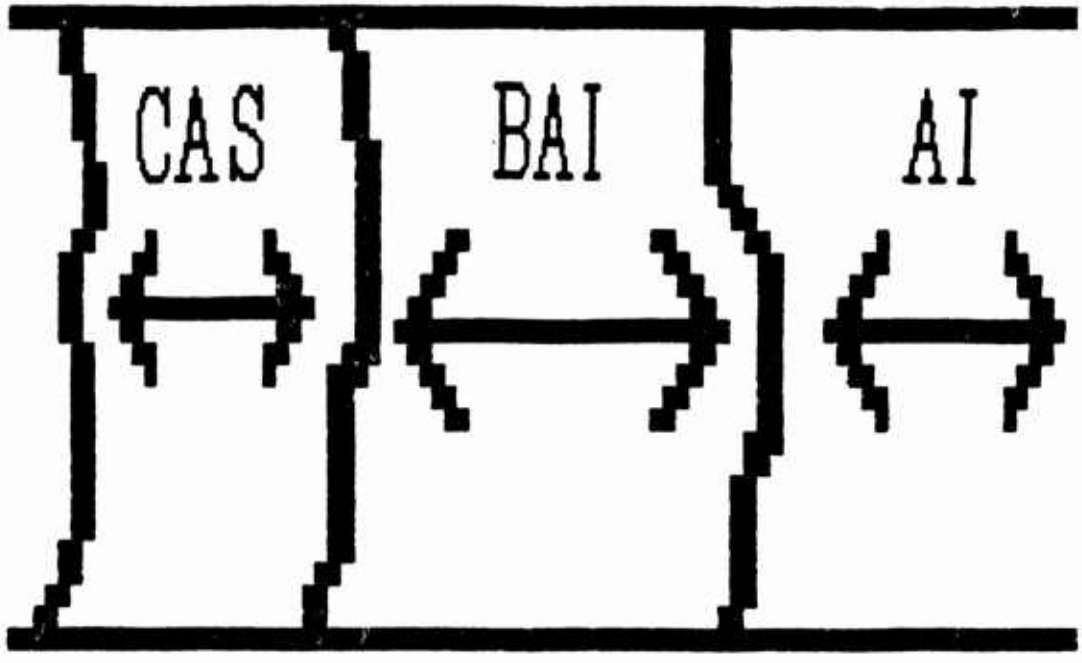
possible for BAI missions to be beyond the FSCL based on the target's near term effect on friendly forces. This leads to another possible gray area, but defining these limits are not critical to this thesis.

For the purpose of this thesis:

> BAI will be defined as missions flown between CAS and the FSCL, and AI will be those missions flown beyond the FSCL.

Figure 1 pictorially depicts the three missions in respect to the FLOT and FSCL. The definitions delineated here simplify the descriptions, and eliminate some of the fog and confusion that have surrounded previous mission discussions. Now that the foundation for discussion as been laid, it is time to discuss CAS in practice.

CAS RELATIVE TO BAI AND AI



FLOT - Forward Line of Troops

VIS RANGE - Distance a Forward Observer (ground or airborne) can visually acquire a target

FSCL - Fire Support Coordination Line (Distance is established by Corps. Varies based on terrain, artillery capability, and speed of battle.) For Desert Storm was "50-60 Km/80 Km max"11

Figure 1

ENDNOTES

[1]Major John Keutman, Pilot in 422 OTES Nellis AFB, Nevada, telephone interview by author, November 1991.

[2]David Hughes, "Syracuse Wing Finds F-16A Effective in Close Air Support," Aviation Week and Space Technology, 18 June 1990, 37.

[3]North Atlantic Treaty Organization, ATP-27(B), Offensive Air Support Operations, (1980), p. 1-2.

[4]John A. Warden III, The Air Campaign: Planning for Combat, (Washington, D.C.: National Defense University Press, Ft Lesley J. McNair, 1988), 86.

[5]Ibid., 87.

[62]U.S. Army, FM 100-5, Operations, (Washington, D.C.: Department of the Army, 1986), 36.

[7]U.S. Air Force, AFM 1-1, Basic Aerospace Doctrine of the United States Air Force, (Washington, D.C.: Department of the Air Force, 1984), p. 3-4.

[8]Kelley B. Bishop, "The Follow-on Close Air Support Aircraft - Should it be a Single Role or Multi-Role Aircraft" (MMAS Thesis, U.S. Army Command and General Staff College, Ft Leavenworth, 1988), 33.

[9]AFM 1-1, p. 3-3.

[10]Ibid., p. 3-4.

[11]Major Terry L. New, "Excerpts from Interview with Lt Gen Franks," in "Trip Report from Joint Doctrine Center (JDC) visit to Desert Storm Locations," (Office Letter, Washington, D.C.: Department of the Air Force, 1991).

CHAPTER 3

CLOSE AIR SUPPORT TODAY

To find out if tomorrow's CAS will be different from today's, a standard reference for the average CAS mission of today must be established. In the last chapter, a definition for CAS was provided, but the definition does not demonstrate how close our forces are actually being employed. Often, utilization differs from theory. This chapter is dedicated to identifying how "close" CAS is employed today. The discussion will begin with a look at how close CAS can theoretically be employed based on the established doctrinal standards for minimum safe distances. Next will be a look at employment during actual conflict, or as close to combat conditions as possible. This discussion will primarily be based on interviews with maneuver commanders that have requested CAS, Air Liaison Officers (ALOs) that have controlled CAS and advised ground commanders on its use, and pilots that have flown CAS. By comparing theory and reality a reference for CAS today will be established.

THEORY

Today's CAS aircrews train to provide support as close as possible to friendly forces. To determine how close "as close as possible" is, the Department of Defense established minimum risk clearance limits. These limits are designed to reduce, to an acceptable standard, the risk of friendly casualties during weapons employment. The limits are based on weapon effects testing, and the fragmentation patterns associated with each type of weapon. The limits are found in the Multi-Service Procedures for the Joint Application of Firepower, or J-Fire manual. A table of selected munitions from that manual is located at Figure 2. The risk estimates are broken down into probability of incapacitation (PI) values of 1 in 10 soldiers incapacitated (10% PI) and 1 in 1,000 (.1% PI). The estimations are based on prone soldiers in winter clothing and helmets. Also, the aircraft flight path for delivery of the ordnance is parallel to the line of troops. The incapacitation criterion is based on a soldier being able to execute an assault within five minutes of the attack. The figures for .1% are considered safe distances for any wartime mission. However, if the ground commander determines he needs the munitions delivered closer to the troops, then he must accept the increased risk and relay that decision to the pilots. Acknowledgement is normally done by passing the commanders initials with the execution clearance.[1]

RISK-ESTIMATE DISTANCES FOR AIRCRAFT DELIVERED ORDNANCE

MUNITION	DESCRIPTION	RISK-ESTIMATE 10% PI (Distance from troops in meters)	RISK-ESTIMATE .1% PI
MK-82 LD	500 LB Bomb	250	425
MK-82 HD	500 LB Bomb (Retarded)	100	425
MK-84 HD/LD	2,000 LB Bomb	325	500
MK-20*	Cluster Bomb (Anti-Armor)	150	225
CBU-52*	Cluster Bomb (All Types)	275	450
CBU-58*	Cluster Bomb (All Types)	350	525
CBU-87*	Cluster Bomb (All Types)	175	275
CBU-89*	Cluster Bomb (Anti-Tank & Anti-Pers Mines)	175	275
2.75 FFAR	Rocket (Various Warheads)	160	200
GPU-5A/GAU-8	30-MM Gatling Gun	100	150
AGM-65	Maverick Missile (TV, Infrared, & Laser-Guided)	25	100

* Not recommended for use near troops in contact

Assumptions:
1. All attacks are parallel to the FLOT.
2. PI means a soldier is physically unable to function in an assault within 5 minutes.
3. Criterion is based on a prone soldier in winter clothing and helmet.
4. Ground commander must accept responsibility for friendly risk when targets are inside .1% PI.

Fig. 2. Extracts from Multi-Service Procedures for the Joint Application of Firepower (J-FIRE).

Looking at figure 2, one can see that an A-10 employing its 30mm cannon (GAU-8) can safely strafe a target 150 meters away from friendly troops. However, if the commander needs the pilot to employ closer to his troops, then the pilot can shoot as close as 100 meters while putting 10% of the friendly soldiers at risk. Also, notice that a precision guided munition, like the AGM-65, can be employed a lot closer than a general purpose bomb, like the MK-82 LD. These are approved planning factors, but that does not mean these munitions are actually employed this close.

HOW CLOSE IS CLOSE IN REALITY? - THE USERS SPEAK

Doctrine, planning factors, and textbooks are all fine in an academic study, but to find out how an asset is really used--one must go to the horse's mouth--the people that have actually employed it. To get a feel for actual employment, it is important to take a look at the real world and a real high threat war. Fortunately, the United States has not been involved in a high threat war--one where the intense radar threat forces pilots to fly as low as possible to avoid radar detection as long as possible. Initially it was thought Desert Storm would be such a war, but the allied ability to render the Iraqi radar guided missile systems virtually unusable proved otherwise. Since none of our forces have been faced with this high threat challenge, it was important to get information based on the next best

thing. To do this, information was gathered from users based on their experiences in actual combat, or on their experiences at one of the specialized training centers like the National Training Center (NTC) at Fort Irwin, California. The goal for obtaining this information was to find out how the CAS assets were actually used in a stressful situation when lives were at stake, or in the case of the training centers, in as close to combat conditions as possible. This is what the users had to say about employing CAS.2

THE ALOs

Air Liaison Officers are Air Force pilots and navigators assigned to Army combat units. These officers are responsible for advising the maneuver commanders on CAS utilization, are usually responsible for requesting CAS on the air request net, and often are responsible for controlling the fighters in the target area. The individuals interviewed for this thesis were either currently on ALO status, or had previous ALO experience. They worked with a variety of Army units including light and heavy forces. The units they were/are assigned to are the Second Brigade of the First Armored Division, the Third Ranger Battalion, the Eighteenth Airborne Corps, the Fourth Infantry Division (Mechanized) and the NTC. All are fighter pilots, and most of them have flown the A-10 for at least one tour. Other flying experience includes tours in the

F-16, F-15, F-117, and F-18 (Marine Corps exchange). Each ALO has been to one of the training centers or in battle with their units. Additionally, many of them have flown CAS missions at one of the training centers or in major exercises such as the Reforger exercise in Europe. The variety of experience these individuals have makes them an excellent source for actual CAS employment information and as such a legitimate knowledge base for the purposes of this thesis. When asked about CAS utilization, to a man, each ALO said the Army will request support at or inside the limits depicted in the J-FIRE tables.

When discussing CAS with the ALOs they all said how close, "close" really was, depended on the situation. Several factors led to this conclusion, but the primary consideration was how well the unit was doing on its own. "If the commander could deal with the threat with his direct fire weapons, then he would."[3] The coordination required to bring CAS in close is not always worth the effort to the commander. Deconflicting artillery fire just to utilize CAS assets is not always the smartest thing to do. So, if the commander did not need the CAS up close, he would use it beyond the range of his direct fire weapons (normally about 2-3 km). Or as one ALO put it: "I never got called when things were going well."[4] But, when the situation changed and the unit needed some help, then the commanders asked the ALOs for everything they could get. Another ALO remembers

directing a strafing pass well within rifle range, because his light infantry unit was being overrun.[5] Even if the situation meant possibly losing folks to friendly fire, commanders were willing to take that risk if they were being overpowered by the opposing force. "I told him (the commander) he might be risking some friendly losses, and he said go ahead."[6] Generally, the ALOs' commanders preferred to use CAS assets beyond direct fire range, but there were times the situation dictated employing it practically on top of their position. But, the ALOs brought up another important consideration. Controlling combat assets (of which CAS is just one of many) is an important consideration for the ground commander. The allocation process being used today, normally gives control of CAS sorties to the Division commander. "You have to understand that these are the only sorties he can control. He has to nominate targets to corps for BAI sorties."[7] To the commander that has been allocated CAS sorties this means <u>some</u> extra flexibility. If he thinks the assets are not necessarily needed at the front, he will use the sorties in more of a BAI role. In this same light, the ALOs at division and corps level would normally try to prevent sending CAS assets to the battalions unless the added fire support was definitely needed. This added flexibility meant that often times the commanders redirected missions that were planned as CAS sorties and utilized them in a BAI role. One of the brigade ALOs indicated that he

made it clear to his division and corps ALOs that: "I would not request CAS missions unless I really needed them."[8] Maneuver commanders are willing to use the extra firepower CAS can provide as close as necessary, but they may be reluctant to use it within range of theirs organic weapons. In conjunction with this reluctance on the part of the maneuver commanders, the NTC ALOs emphasize in their debriefs, that close CAS is not always the best option. One of the NTC objectives is "zero fratricide", and much emphasis is placed on this goal.[9] Using CAS as close to the friendlies as some of the ALOs have discussed risks that goal. This doesn't mean that it is still not used in close, but NTC is emphasizing other means whenever possible. The ALOs' comments indicate that preferably CAS missions are employed beyond direct fire range, and they are often converted into BAI-type sorties. But, when the situation dictated, they all saw CAS called in practically on top of the friendlies. It is now time to look at what the ground commanders actually think.

THE GROUND COMMANDERS

The men responsible for incorporating CAS into the battlefield plans are the ground maneuver commanders. They are the ones who decide how close is acceptable based on the circumstances. So, it is important to examine their concept of how close is close. Once again it was important to look at CAS as it was utilized in actual combat or in realistic

training conditions. The commanders chosen have experience in Viet Nam, Desert Storm, and the training centers as either maneuver commanders or senior staff members, such as corps G-3 (operations officer) in Desert Storm, cavalry troop commanders in Viet Nam, battalion and brigade commanders. Once again the members represent a realistic cross section of Army maneuver unit commanders and staff officers. As such, they comprise a legitimate data base for this thesis. They have provided some excellent insight on a soldier's view of CAS.

Many books and stories have been written or told about close air support in Viet Nam, and how there were times when commanders had to call for air strikes practically on top of their heads. The commanders with experience in Viet Nam indicated that there were times when "we backed up 500 feet to bring the air in" or "we could feel the heat from the napalm."[10] They used CAS a lot because it was easy to get, and yes, at times they did bring it in extremely close. Normally they would use it about 3-5 kilometers away, beyond direct fire range. But, like the ALOs, if they found themselves in trouble they would bring it in as close as it had to be. Lieutenant Colonel James Willbanks was an Army advisor to the Viet Namese Army, and was involved with the defense of An Loc in April 1972. His unit was held down in what he called a "Tactical Emergency for 45 days."[11] During this time, his unit received CAS

from: "everything we could get, as fast as we could."[12] They received support from B-52s, gunships, A-37s, and more. At times, munitions, like the gunships' guns, were delivered within "15 meters of their position."[13] In Viet Nam, the Army used CAS, and used it up very close if need be. The concept of close CAS continued beyond Viet Nam, and on to field exercises and the training centers. All the commanders continued to display a willingness to use CAS up close if they needed to.

As previously mentioned, the commanders preferred to utilize CAS assets beyond their own direct fire range, so the next question was: what would cue them that they needed close CAS? It was normally the "bail out mechanism" if they found themselves "surprised, forced into a hasty defense, or outmaneuvered while on the offensive."[14] In these instances, they found themselves facing two choices: extreme losses of life to enemy forces, or surviving the battle, but maybe losing some lives to friendly fire in the process. In these cases, it was better to accept the lesser of the two risks, and bring the CAS in close. This is not to say that these cues stood in isolation or that they were absolute indicators. On the contrary, they were merely a piece of the overall picture, and indicators that the plan may not be working. The maneuver commanders all felt CAS was an asset to be used to complement their own organic systems. Because of its capabilities to extend their reach

in the close battle and the possibilities of friendly losses, they prefer to employ it further out. But, when they felt the situation dictated extra firepower up close--they used it.

THE CAS PILOTS VIEW

The CAS picture could not be complete without a view from the air. To get a solid perception of CAS employment according to the pilot, emphasis was placed on Fighter Weapons School graduates. These pilots are responsible for training other pilots in tactics, and in most cases they have had several opportunities to perform CAS in realistic, if not actual combat situations.

These pilots were basically in agreement with the ALOs and the ground commanders. The general consensus is that when things on the ground are going well, then the Army normally will not take the time to incorporate CAS into their fire plans. Often, this leads to frustrated peacetime pilots, because the training they are looking for is not always available. However, "When they need us (CAS) they'll bring us right on top of them."[15] Once again the guidelines for employing CAS are to use it, when it is available, to help the ground forces get out of trouble. When the ground plan is working, there are usually higher payoff targets outside of direct fire range, and it is usually much easier to coordinate deconfliction requirements in this area. As Major Condon puts it: "If the plan is working they (ground

commanders) will use us on tomorrow's forces or against enemy artillery."[16] Flying missions beyond direct fire range definitely makes it easier to separate the good guys from the bad.

TARGET IDENTIFICATION

A ground commander's hesitation to employ CAS is influenced by the pilot's difficulty in acquiring the correct target, and the potential fratricide associated with misidentification. Target identification is one of the most difficult problems pilots have, and the ground commanders know this. Today's era of maneuver warfare makes identifying the good guys from the bad especially difficult. Distinguishing friendly from enemy tanks, when they are intermingled on the battlefield, is nearly impossible from the air. This helps explain why CAS assets tend not to be used up close when the plan is working. When things are going well, it usually means our forces are on the move, and mixing it up with the enemy. The last thing a commander needs in this situation is to lose his advantage due to "friendly-fire" losses. But, when things are not working right, friendly units are normally forced into defensive operations. When this happens, friendly positions can often be identified more easily, and the ground commander is usually ready to accept more risk. In Viet Nam instances like An Loc, "the friendly perimeter was easy to see,"[17] and the pilots knew anything beyond the perimeter was hostile.

At other times, colored smoke was used to identify friendly positions, especially when "pinned down" by enemy fire. This normally worked well, but not always. "Charlie had radios too, and often the new lieutenants would call out their smoke and its color, and the pilots would end up seeing two sets of smoke."[18] In any event, all those interviewed agreed it normally is much easier to identify and separate static forces. When the ground plan is not working right, then CAS will be employed right on the doorstep.

DESERT STORM

Though Desert Storm was not the high threat war expected, it would be a mistake not to examine what CAS looked like in the biggest war the U.S. has recently fought. In Desert Storm, very little close CAS was performed. Because the ground war was able to continue at an even faster pace than expected, there was no need for CAS right at the FLOT. The Seventh Corps G-3 described the Third Armored Division's advance as having the ground component of the cavalry out front on a screening mission with the air component 4-5 kilometers in front of them. A Forward Air Controller (FAC) would fly 5-15 kilometers in front of the air cavalry, and would direct CAS missions in his vicinity.[19] So, because of the reduced threat and the speed of the ground war, close air support in Desert Storm seldom got closer than about 10 kilometers. The A-10 pilots that

flew in the war said they flew extremely little CAS. Major Condon was involved with a couple of missions the last day of the war, but "they never got closer than 4 to 5 kilometers to friendly forces."[20] But, this distance was not set in stone, and there were missions flown closer. In fact, some cases of CAS were flown so close to the friendlies that some fratricide occurred. Though very few casualties resulted, these incidents received extraordinarily high visibility due to the overall low casualty rate experienced by coalition forces. So, as in Viet Nam, when conditions dictated, CAS was once again employed at extremely close range to friendly forces.

THE AUTHOR'S VIEWPOINT

Prior to conducting these interviews it had been the author's opinion based on peacetime training exercises, that the pilots practiced, in isolation from Army assets, for CAS only as close to the friendlies as J-FIRE allowed. The author also believed that the Army would not employ CAS assets as close as the pilots were capable. This opinion was based on many frustrating sorties over the North German plains, in Korea, and in Alaska when ground contacts would often not be in place and ready to work. Many times when the ground forces were contacted, the fighters were either called in on targets of opportunity in an unrealistic battle setting, directed towards target areas well beyond friendly lines, or called in <u>on</u> the friendlies just to show them CAS

was available. However, after conducting these interviews it is obvious that the Army will use CAS right up to the friendly lines if the situation dictates. The author's misconceptions were based on peacetime training limitations that in and of themselves could be another excellent thesis topic.

HOW CLOSE IS CLOSE TODAY?

Based on the information presented, CAS will ideally be flown beyond the tactical range of direct fire weapons, but if the Army is in trouble, or needs the extra punch to break a stalemate, "close" will be at least as close as J-FIRE allows, and perhaps even closer. The question now remains: "How close will it be in the year 2000?" The next step toward an answer involves examining the changes in store that could possibly affect today's criteria.

ENDNOTES

[1]Department of Defense, J-Fire, Multi-Service Procedures for the Joint Application of Firepower, (1989), 28-29, 44-45.

[2]I used a key informant interview technique to gather information on actual CAS employment today. I used an informal interview schedule, and the interviews were iterative. Comments from one interview were incorporated as questions in subsequent interviews with officers in different critical roles.

[3]Major David S. Brackett, previous ALO, 4th ID (Mech), interview by author, Ft Leavenworth, KS, 13 January 1992.

[4]Major John W. Day, previous ALO, 2nd Brig/1st AD, interview by author, Ft Leavenworth, KS, 9 January 1992.

[5]Major Steven C. Anderson, previous ALO, 3rd Ranger BN, interview by author, Ft Leavenworth, KS, 9 January 1992.

[6]Major Brackett interview.

[7]Ibid.

[8]Major Day interview.

[9]Captain Steve Donald, ALO, National Training Center, telephone interview by author, December 1992.

[10]Colonel Stanley F. Cherrie, Director Center for Army Tactics, interview by author, Ft Leavenworth, KS, 7 January 1992.

[11]Lieutenant Colonel James Willbanks, Center for Army Tactics, interview by author, Ft Leavenworth, KS, 3 February 1992.

[12]Ibid.

[13]Ibid.

[14]Colonel Cherrie interview.

[15]Major Jerry Leatherman, previous pilot A-10 Operational Test and Evaluation Squadron, interview by author, Ft Leavenworth, KS, 9 January 1992.

[16]Major John Condon, A-10 pilot, TAC/IGIO (Inspector General Inspection Operations) Langley AFB, VA, telephone interview by author, 7 February 1992.

[17]Lieutenant Colonel Willbanks interview.

[18]Colonel James R. McDonough, Director of School for Advanced Military Studies, interview by author, Ft Leavenworth, KS, 5 March 1992.

[19]Colonel Cherrie interview.

[20]Major Condon interview.

CHAPTER 4

THE CHANGING FACE OF THE MILITARY AND DOCTRINE

The written word of "warfighting doctrine" has continued to evolve since the dawn of man. And though parts of it tend to look the same throughout the ages, a constant refinement process has taken place as people and technology change. To be useful, according to FM 100-5:

> It (doctrine) must be rooted in time-tested theories and principles, yet forward looking and adaptable to changing technologies, threats, and missions. It must be definitive enough to guide operations, yet versatile enough to accommodate a wide variety of worldwide situations.[1]

U.S. doctrine is currently undergoing significant changes. The Army is working hard on the initial draft of its revised doctrine, and published TRADOC PAM 525-5, Airland Operations, as a "think-piece"[2] to stimulate the flow of thought and input. The Air Force has distributed a draft copy of its new AFM 1-1, Basic Aerospace Doctrine, and official publication is expected very soon. At the same time, the world of "joint" or as the Chairman of the Joint Chiefs of Staff, General Colen Powell, puts it "team warfare"[3] is

driving ahead at a frenzied pace. Leading the doctrine race is the continued emphasis on joint (more than one branch of service) warfare. The first "Joint," publication discussing doctrine, Joint Pub 1, Joint Warfare of the US Armed Forces, was published in November, 1991, with a promise for more to come. Other "test" publications and working drafts have also been produced under a Joint Chiefs of Staff (JCS) heading. For example: JCS PUB 3-0, Doctrine for Unified and Joint Operations (Test Pub), and JCS PUB 5-0, Doctrine for Planning Joint Operations (Working Copy of Initial Full Draft). So, the world of warfare doctrine is about to take on a new shape for the U.S. This chapter will look at the doctrinal changes, service re-organizing, and senior level discussions taking place, and their implications for Close Air Support.

AN ANALOGY OF DOCTRINE

Doctrine can be a difficult concept to understand. How detailed should it be? Should it tell the reader exactly how to employ assets, or just broad brush stroke the surface? In order to help the readers of this thesis better understand the levels of doctrine and how they apply to the concept of CAS, the author has compared doctrine to building a house. It begins with Joint doctrine, and progresses through individual

service doctrine, finishing with how CAS fits into the picture.

Joint doctrine is the conceptual bedrock upon which the house is built. It encompasses the laws of nature, like gravity, that will affect the house. Joint doctrine is not the building plans, it is the basis for developing those plans.

In this analogy, Service Doctrine would equate to the laws of plumbing, carpentry, and electricity. Service doctrine is designed to explain the capabilities and limitations of each facet, and provide a rough idea on how best to employ each asset. None of these doctrines tell the builder to place brick "A" in slot "B". On the contrary, planning to this detail is left to the architect (unified commander) with advice from his builder, electrician , and plumber (land component, air component, and sea component commanders).

This analogy helps explain the macro look doctrine must take, and the lack of explicit detail it must present in order to allow a flexible, tailorable force that allows commanders to use their initiative to adapt to each situation. In this analogy, CAS would be similar to a light switch. The electrician can tell you what it can and cannot do, and make recommendations

for the amount necessary, and where they might be employed. But, the actual placement and usage is up to the unified commander.

One should not expect to see CAS explicitly discussed in joint doctrine, but should see how it might fit into the overall scheme. It is reasonable however, to expect CAS to be discussed conceptually in Air Force Doctrine, but not to the level of specific employment procedures. Specific procedures are discussed in operations manuals, much like an electrician would look for specific tasks in a mechanical service manual or trouble shooting guide.

FUTURE: SLIMMER FORCES, REGIONAL CONFLICT & JOINT TEAM

Discussions of the sudden change in the world order, have by now become boring at best. The fact is: the major threat of the past four decades, the Eastern Bloc is no longer an immediate threat, but the threat of war and conflict is still real. In fact, it can be argued that the world is even less stable now than it was with two superpowers. The threat of more regional conflicts like Desert Storm remains likely. But, because the immediate threat has been reduced, the U.S. military force available to face potential threats will also be reduced. The question of how the U.S. will be prepared to face the changing threats is the driving force behind tomorrow's doctrine. The National

Security Strategy of the United States states the problem this way:

> In the realm of military strategy, we confront dangers more ambiguous than those we previously faced. What type and distribution of forces are needed to combat not a particular, poised enemy but the nascent threats of power vacuums and regional instabilities? How do we reduce our conventional capabilities in ways that ensure we could rebuild them faster than an enemy could build a devastating new threat against us? How does the proliferation of advanced weaponry affect our traditional problem of deterrence? How should we think about these new military challenges and what capabilities and forces should we develop to secure ourselves against them.4

The nation's response to these questions is a military of separate actors, but working together more efficiently than ever before. The "Goldwaters-Nichols DOD Reorganization Act of 1986" forced the Department of Defense to accelerate its steps in this direction. Today's service schools spend an enormous amount of time discussing joint warfare, joint doctrine, and processes involved in developing a joint military team. The directions from the Chairman of the Joint Chiefs of Staff (CJCS), and his civilian superiors is to continue. They expect the services to develop and maintain their individual capabilities: "But they all must believe they are part of a team, a joint team, that fights together to win."5 This team development is the basis for joint doctrine and permeates the service doctrines.

The emphasis in strategy and doctrine is to form contingency teams, lead by a unified commander, with supporting component commanders. These teams can either be formed from existing unified theater staffs, like the CENTCOM staff in Desert Shield, or a Joint Task Force (JTF) can be formed. In either case, all facets of the campaign are guided by the unified commander. So, whether close air support, special operations, amphibious assault, or an airborne insertion all activities are melded to meet the unified commanders objectives. This concept is important to CAS, because the amount of Air Force delivered CAS available is a decision the unified commander makes, and in most cases he is a ground service (Army or Marine) commander. The unified commander makes his decision, with advice from his Joint Force Air Component Commander (JFACC), based on his assets available. The JFACC is responsible for employing all air forces.[6] Desert Storm proved the viability of this system, and even demonstrated how well it can be used to combine coalition forces. When discussing his duties as CENTCOM JFACC Lieutenant General Charles Horner put it this way:

> He expected allies to get nervous & be his biggest problem, but they never did. JFACC is the CINC's air expert and responsible to CINC for air operations. He goes to CINC & says this is the way I recommend employing your air forces.... Problems could have occurred in life or death situation

> where there wasn't enough air to go around. In this case, he didn't think there would be any resistance from component commanders to use air where it's most needed.7

Close air support is just another piece of the joint air pie. But, when the pie is small, assets used in one arena will mean smaller pieces for the others. More discussion of CAS in doctrine will follow, but for now it is important to remember that DOD wide the focus for the future is a smaller team able to deploy worldwide to maintain regional stability.

Before proceeding into individual service doctrine, it is important to take a good look at how the team views the land war of tomorrow. In the last chapter, the difficulty pilots have separating the good guys from the bad was discussed. The 100 hour land battle of Desert Storm provided some insight as to how fast and variable the land war can be. The next section will discuss the picture expected in future wars.

MANEUVER WARFARE

In chapter 2, Figure 1 showed a graphic representation of CAS, BAI and AI in relation to each other, as well as their relation to some standardized ground control measures the Forward Line of Troops (FLOT) and the Fire Support Coordination Line (FSCL). The representation showed a nice two dimensional battlefield with basically unbroken lines and

relatively square corners. The picture is easy, and the lines between the good guys and the bad are fairly easy to see and understand. The only problem is that the picture, as it represents a theater of operations, is more representative of the trench warfare of World War I than the maneuver warfare of today. The battlefields of today are built around terms that FM 100-5 calls "forms of maneuver."[8] The terms it lists include: "envelopment, turning movement, infiltration, penetration, (and the old familiar) frontal attack."[9]

What this means in comparison to Figure 1 is that the lines may not be so clear, and may even be converging onto one another. One now must consider situations like putting a unit "deep" beyond the FSCL, and having them fight back toward the other friendly units. In this situation, the new unit would have a FLOT and a FSCL, or some other form of coordination measure such as a Coordinated Fire Line (CFL) or a Restricted Fire Line (RFL), of its own. These lines could possibly mirror the original lines. Figure 1, allowed for a basically infinite distance for AI missions to fly beyond the FSCL. In this new example however, as the two units approach each other, a narrow channel could form between the two coordination lines. This channel would form the Air Interdiction (AI) boundaries, and thus would be more restrictive to the pilot than in the previous depiction. Another option

might be, a small unit air-assaulted or air-dropped deep for intelligence collection, sabotage, etc. This unit's coordination requirements may be no farther than the direct fire weapons they carry, but they still have one, and they may still have the need for Close Air Support. In fact, on 10 March, 1992, Air Force Major Jay Lindell was awarded the Silver Star for providing:

> Close Air Support to a special operations team, being overrun by Iraqi soldiers, over 150 miles beyond the Iraq border.[10]

In this situation, the next nearest ground unit was over 100 miles away, and the team's plot on a map would have looked extremely small in comparison. This is a specialized case, but the concept is real and the possibilities of more of the same are not unfounded. "Smaller forces will make the battlefield more fluid and nonlinear than ever."[11] The lines are not going to be any easier for the big units either.

> The regiments are continually moving and attacking. Their areas of operations are not static. This gives the battlefield an amoeba-like appearance; that is always changing.[12]

In the continuing evolution of warfare, movement on the battlefield will take various forms, and the possibilities are limitless. The ability to outmaneuver the enemy will be more paramount than ever before.

This high speed maneuver warfare trend will continue, thanks in part, to the fact that the

shrinking military budget and the will of the American people will not allow a war of attrition. The refinements in doctrine and technology are keeping this thought in the forefront. The concept of outmaneuvering your enemy is not new, but the increased speed and maneuverability of today's, and tomorrow's, forces places agility in the forefront of every service's doctrine. And, according to Joint Pub 1, this agility will continue to be an exploitation of all assets available to the joint commander.

> The interaction of air, land, and sea forces contributes powerfully to operational agility.... The ability to integrate and exploit the various capabilities of a joint force can disorient an enemy who is weak in one or more of the dimensions of warfare, helping to create a mismatch between what the foe anticipates and what occurs. This mismatch can lead to shock, panic, and demoralization, especially in the minds of the enemy leadership.[13]

The concept of outmaneuvering the enemy requires thorough integration and synchronization of all the assets available. Integrating these assets on a fluid battlefield will be no easy chore, but effective performance will depend on a puzzle with all the right pieces in place. Close Air Support is just a small piece of this integrated puzzle, but it is a piece, and in the fluid battlefield of tomorrow it will not be easy to employ.

AIR FORCE DOCTRINE

As mentioned earlier, AFM 1-1: Basic Aerospace Doctrine of the United States Air Force is about to be replaced with a new, updated version. The latest draft, dated September 1991, is expected to be extremely close to the final version. AFM 1-1 has been undergoing revision for many years and staff members at both the Air Staff and the major command staffs feel the final version should be released this year. This new manual is split into two volumes. Volume one is the basic doctrine, and volume two contains articles that support and expand upon the ideas presented in volume one.

The new doctrine separates air power into a set of four different roles, each supported by its own subset of missions.

> Aerospace forces perform four basic roles: Aerospace control, force application, force enhancement, and force support. Roles define the broad purposes or functions of aerospace forces. Missions define specific tasks, not capabilities or organizations. The roles and missions are, in turn, defined by objectives, not by the platform or weapon used. Most aerospace forces can perform multiple roles and missions....14

So with this new version of Air Force Doctrine, we now have a truly flexible Air Force designed to excel at four primary roles, with a variety of aircraft and missions capable of fulfilling these roles. The old manual did not discuss wide-ranging roles, it stepped directly from tenants and principles of air power right

into specific missions and tasks. This change in breadth highlights the multi-role capability that is permeating throughout the Department of Defense. However, this delineation of roles did not remove the CAS mission. On the contrary, CAS is part of the Force Application role. "Force application brings aerospace power to bear directly against surface targets."[15] Force application is also equated to applying combat power and has three missions associated with it: "Strategic Attack, Interdiction, and Close Air Support."[16] Comparing the missions discussed in the force application role of the new manual with the missions in the old manual, some significant differences exist between the two.

NO BAI

One major difference between the two doctrines is the removal of any discussion of battlefield air interdiction. The old manual discussed BAI as a subset of the air interdiction mission. This was most likely due to the specialized nature of aircraft and missions. The primary role of air interdiction had been an operational level strike against targets beyond the range of the ground commander's weapons. Aircraft like the F-111 were expected to perform the majority of these missions. Little coordination with ground forces was required. The mission was primarily the gap filler between CAS and strategic bombardment. But, as ground

artillery capabilities improved, the FSCL began to extend further away from the FLOT, and another gap developed between CAS and the FSCL. This gap was filled by BAI. The basic mission of: "delay, disrupt divert, or destroy an enemy's military potential before it can be brought to bear effectively against friendly forces"[17] was the same for both BAI and AI. The point of contention between the two was how involved the ground commander got in the planning, and the fact that BAI would be executed within the FSCL and required deconfliction with friendly fire.

> The primary difference between battlefield air interdiction and the remainder of the air interdiction effort is the level of interest and emphasis the land commander places on the process of identifying, selecting, and attacking certain targets.[18]

However, as discussed in chapter two, the lines between CAS, BAI and AI have become more and more difficult to ascertain. Also, the variety of aircraft performing these missions made it more difficult to hang a particular job on a specific asset.

In keeping with the importance of aerospace power as part of the joint team, the new manual expresses the need for all interdiction to be coordinated with surface operations.

> Interdiction and surface operations should be planned and executed to complement and reinforce each other.

> To achieve efficiencies and enhance effectiveness, the air component commander should control all forces performing interdiction and integrate interdiction with surface force operations to achieve the theater commander's objectives.
>
> Complementary employment of interdiction and surface maneuver should be designed to present the enemy with a dilemma.19

So now, target selection is receiving joint emphasis at all levels of the operation, from strategic to tactical. Desert Storm accentuated the need for this improvement. Lieutenant General Horner was the CENTAF Commander and the Joint Forces Air Component Commander (JFACC). The following excerpts are from his interview with the Joint Doctrine Center.

> Apportionment (a predetermined decision as to what percentage of the air support assets will be assigned AI, BAI, or CAS missions) is a myth.
>
> Everything is target driven. You decided what targets you wanted to hit & where they fell in relation to FSCL determined apportionment.
>
> He would run the JFCs(Joint Force Commander) counter air but needed LCC (Land Component Commander) to ID ground targets. JFACC didn't want to prioritize target lists from multiple ground commanders...
>
> CENTCOM DCINC (Lt Gen Waller) was eventually given responsibility for coming up with 1 list (for KTO [Kuwaiti Theater of Operations]) 20

The increased emphasis on joint coordination, under the guidance of the unified commander, combined with the multi-role aircraft made the delineation between BAI and AI unnecessary. The question now is how well will the new manual clarify the separation between AI and CAS.

CAS REDEFINED

The new version of AFM 1-1 has expanded upon the discussion of close air support found in the old manual, and it has clarified the definitior The old manual defined CAS as:

> objectives are to support surface operations by attacking hostile targets in close proximity to friendly surface forces.21

As discussed in chapter two, this definition left a lot to interpretation. The definition of how close, "close" was being the biggest problem. But, the new manual made substantial strides towards clearing the water.

> Close air support is the application of aerospace forces in support of the land component commander's objectives. Since it provides direct support to friendly forces in contact, close air support requires close coordination from the theater and component levels to the tactical level of operations.22

The clarifying terms are "direct support" to forces "in contact." These specifications tie CAS directly to the guy getting shot at. And, chances are that means attacking something he can see or that is shooting at him. "Direct support" means CAS is like having more artillery in the ground commander's arsenal. It is still up to the ground commander to determine how to use this firepower, but this definition clearly ties the mission to the troops on the firing line more than the old doctrine did.

The new manual also explains in much more detail the capabilities and limitations of CAS. It points out the fact that CAS seldom has a long lasting effect on the outcome of the war. Its effects are near-term and tactical, and seldom enhance the operational or strategic outcomes that AI and strategic bombardment are aimed at. However, there are times when the here and now is more important.

> Close air support produces the most focused and briefest effects of any force application mission.... Although close air support is the least efficient application of aerospace forces, at times it may be the most critical by ensuring the success or survival of surface forces.[23]

Not only does the new manual highlight the tradeoffs associated with dedicating assets to CAS missions, but it continues to stress the importance of supporting the team effort. The new doctrine emphasizes the air component commander's responsibility to inform the theater commander of the risks associated with all missions including CAS.

> An air commander must ensure these operational limitations are fully appreciated so that close air support will be performed in a way that best supports the combatant commander's intent.[24]

The discussion of CAS also includes discussions on how to employ it most effectively. It discusses the advantages of concentrating CAS efforts in one area, and how CAS, like the other factors of air power, should be planned to complement the ground campaign.

> Close air support should create opportunities. Close air support should prepare the conditions for success or reinforce successful attacks of surface forces.25

Probably the biggest addition to this guidance, is the discussion on fratricide. The fact that the Air Force has taken the time to discuss the risks of friendly losses, emphasizes the sincerity of the Air Force to the CAS mission. Not only will the Air Force continue to support the ground commander, but air power will get as close as the commander feels is necessary to do the job.

The new doctrine the Air Force is preparing to publish has made some tremendous strides forward. The entire publication is filled with constant reminders of the Air Force's role in the team effort, and not just the Air Force as a separate entity. It has also helped clear the confusion associated with various missions, and it has provided more guidance on employment concerns of these missions. Most importantly for this thesis, it has confirmed the Air Force's commitment to provide as much CAS as the unified commander decides, and to provide it as close as the ground commander in contact wants. The effects of this new doctrine can also be seen in other changes taking place.

THE NEW AIR FORCE STRUCTURE

The tremendous cuts facing the Air Force combined with upgraded doctrine and lessons learned

from Desert Storm convinced Air Force leadership that a major restructuring is called for. The new Air Force will have a streamlined staff, with more control in the hands of commanders at the wing level. Also, three of the major commands are being combined into two. Strategic Air Command (SAC), Military Airlift Command (MAC), and Tactical Air Command (TAC) are combining to form Air Mobility Command and Air Combat Command. These and the other changes taking place are designed to improve Air Force capabilities in "the strategic planning framework of Global Reach - Global Power."[26] According to a recent "White Paper" titled Air Force Restructure, this new strategic planning framework will:

> ... implement the new National Security Strategy of the United States, with its emphasis on potential regional contingencies such as the Gulf War, while maintaining the nations nuclear deterrent and its traditional security commitments in the Pacific and Europe.[27]

As mentioned earlier, the National Security Strategy is clearly focusing on a downsized military, with less forward basing, and more emphasis on contingency forces able to deploy worldwide. The objective is to help maintain regional stability anywhere, anytime. The implications of this new focus and restructuring provide some insight on Air Force commitment to close air support.

As shown earlier, CAS continues to be an important Air Force mission. It is now time to look at how the Air Force plans to fulfill that commitment. In the past, Air Force tactical aircraft have been based according to aircraft type under the primary supervision of Tactical Air Command. Tactical aircraft were those aircraft designed to primarily attack tactical targets. Those aircraft designed to complement these missions such as tactical reconnaissance aircraft, electronic warfare assets, and command and control aircraft also fell under the TAC umbrella. The strategic bombers, missiles, and tanker forces fell under the Strategic Air Command umbrella, and their primary mission was to strike strategic targets. Desert Storm clearly pointed out that the difference between the missions was based on the targets and where they were, and that any of the aircraft could be used in a tactical or strategic role. The Air Force restructure "White Paper" highlighted the confusion this way:

> ... the line between strategic and tactical air power has become blurred. The Air Force has always contended that air power should be treated as a unified whole in order to bring its full capability to bear. Desert Storm validated that basic doctrinal tenet. Targets may have tactical or strategic value. Airplanes have both tactical and strategic capability and should not be constrained by artificial distinctions.... F-117s hit key strategic nodes in Baghdad while F-15Es and F-16s attacked biological and nuclear weapons facilities. And A-10s hit Scud launch facilities. Conversely,

> B-52s were highly effective against Iraqi ground forces in tactical positions.[28]

General Merrill A. McPeak, the Chief of Staff of the Air Force, points at the Air Force's command structure as part of the reason why the confusion between tactical and strategic assets and missions has existed.

> Every actual combat application of air power since World War II has shown us that air power must be employed as a coherent whole. But, while our problem is to integrate air power capabilities, we are organized in a command structure that disintegrates these capabilities.[29]

To overcome these structural problems:

> ... what may be thought of as the "shooters" -- will be in one command, along with reconnaissance aircraft, and command, control, communication and intelligence platforms. This command has been designated "Air Combat Command." "Air Mobility Command" will include the bulk of the airlift assets as well as a considerable portion of the tanker force.[30]

This change in command structure now gives a variety of aircraft, within Air Combat Command, the possibility of being assigned tactical missions like CAS and AI. This in itself is not a major change, but with the blurring of mission and aircraft lines comes the continued emphasis on multi-role aircraft, and a departure from mission specific aircraft (like the A-10 was designed to be). But, along with the command restructuring comes a composite wing concept that will provide opportunities for closer relationships between air and ground forces.

COMPOSITE WINGS

Until recently, tactical fighter wings have been organized primarily upon one type of aircraft -- F-16 wings, A-10 wings, F-15 wings etc. One of the facets of the Air Force restructuring plan is the development of multi-aircraft teams. These teams are designed to train and deploy together, and to perform specific roles on a come-as-you-are basis. These multi-aircraft teams will be called composite wings. "Training like you plan to fight" has always been a goal of the services, but it is often easier to say than do. Combined arms is as important for the Air Force as it is for the Army. Aircraft and aircrew survival depends on developing the right force mix, and the right procedures, to ensure optimal utilization of all the assets. When the different aircraft are stationed at different corners of the earth, it is difficult to allow for much interaction between them. Composite wings will combine the various aircraft needed to maximize doctrinal roles, under one commander and staff. These wings will allow deployment of a trained, cohesive package in a very short time. Some of these wings will combine assets that have long been in place, but under separate commanders, and some will be built from the ground up.

> We are building two new composite wings from the ground up. One such wing will be at Mountain Home,

> where F-15s, F-15Es, F-16s, tankers, and AWACS (Airborne Warning and Control System) will form a unit designed for quick air intervention anywhere in the world. At Pope Air Force Base, we will assemble a wing of A-10s, F-16s, and C-130s, and build an air-land team with the 82nd Airborne Division.31

This last wing is especially important when considering CAS employment in the future.

With the emphasis being placed throughout the DOD on regional conflict, it is important to note that the 82nd (Airborne) Division, as part of the XVIII (Airborne) Corps, is expected to be one of the first ground units deployed to any theater. This was true in Just Cause and Desert Shield, and is expected to continue into the 21st century. It is also important to note that by forming this "air-land team," the 82nd can expect to have CAS assets available when it deploys. Of all the interviews conducted for this thesis, the author found light units especially willing to call for CAS, and to use it close. It only makes sense, since they have very little organic firepower compared to heavy units. And, in a contingency operation they could face nearly any kind of threat while waiting for the heavy units to arrive. This team concept should also make more joint training possible, and hence develop an even better relationship between the forces. More composite wings are expected to develop as the Air Force consolidates for the 90s,

and with these wings there will probably be more air-land teams developed.

Between doctrine development and a complete restructuring job, the Air Force appears to be preparing to provide CAS, as part of the joint team. The next step in the equation is to look at the directions Army doctrine is taking.

ARMY DOCTRINE: AIRLAND OPERATIONS

The Army, like the Air Force is facing some major changes in the way it does business. The changing threat, cutbacks, and increasing emphasis on joint operations resonate throughout its doctrinal building block TRADOC Pam 525-5, Airland Operations: A Concept for the Evolution of Airland Battle for the Strategic Army of the 1990s and Beyond. This pamphlet highlights many of the concerns facing Army operations, and is being used to fuel the discussion for development of the next revision to Army doctrine. The similarities between the Joint, Air Force, and Army revisions are striking. The primary focus once again being on integration with each other, and the shift from forward presence to a deployable CONUS based force.

> The Army's role in war is to deploy rapidly; to apply maximum combat power against the enemy center of gravity; and, through swift, synchronized unified, joint, and combined action, to destroy the enemy's critical elements and will to resist.32

The new focus also emphasizes maneuver and the nonlinear battlefield, as discussed earlier in this chapter. However, it does recognize the fact that close battles will still have to be fought, and portions of the battlefield will still appear linear to the units involved. These close battles and linear engagements are necessary to set up the commander's capability to employ his operational maneuver forces in a decisive manner.

> "Commanders will seek to create nonlinear opportunities at the lowest possible echelon, but realize that battalions and even brigades may fight linear battles to create the opportunity for divisions and corps to conduct operational maneuver."[33]

> "Close combat at some level will be necessary in order to defeat the enemy. The operational commander places his force in a position of advantage over the enemy which provides the most favorable opportunity to force a decision."[34]

However, the concept behind nonlinear battle depends on attacking an enemy in depth, and denying him the opportunity to seize the initiative. As discussed in chapter three, this means the ground commander prefers to utilize the air assets available, in coordination with his own deep fire weapons, to attack targets beyond the range of his direct fire weapons. This discussion complements the CAS tradeoffs discussed in the new Air Force doctrine.

> In coordination with tactical air and supporting fires, they (air cavalry and attack helicopters) destroy enemy forces well forward to attrit, segregate and defeat major enemy formations.[35]

Though the preference is to employ air assets deep, the Army recognizes the need for close air support during the close battles. And, it recognizes how air power fits into the campaign plan.

> The major focus of air operations is establishing early local air superiority over the battlefield and staging operations while providing interdiction and close air support.36

So CAS is still part of the integrated force.

The Army's revised doctrine also focuses on a four stage development of any operation. The four stages are: "Detection/Preparation, Establishing Conditions for Decisive Operations, Decisive Operations, and Force Reconstitution."37 These stages establish a cycle for all operations to follow. The time involved with each stage will vary depending on the operation, but some of the contingencies being considered will definitely involve the use of CAS. Of particular note, are the possibilities of a forced entry during the detection/preparation phase. Depending on the region, and the level of conflict already involved, an airborne insertion or an assault landing may be required to secure a lodgement. As discussed earlier, such a maneuver would require a relatively light force with very little organic firepower. These forces would require the added firepower available through CAS. All of the phases will require Air Force integration, and CAS will

continue to be a piece of the force. And, as the man charged with publishing the Army's new doctrine, Colonel James R. McDonough, puts it, "The commander likes the added insurance CAS provides."[38] As discussed earlier, things do not always go as planned, and CAS could help stop a bad situation from getting worse.

So the Army, Air Force and JCS are all singing fairly complementary tunes. (1) The military is going to continue to develop a joint team approach. (2) The size of the force will be smaller and must be able to deploy rapidly to areas of regional conflict. (3) The battlefield will be nonlinear, and can change at a very rapid pace. (4) Unified airpower is important, and though CAS has its tradeoffs, it will still be necessary. Are there no points of contention?

WHERE SHOULD THE FSCL BE DRAWN?

One of the biggest stumbling blocks between the Army and the Air Force right now is how far from the FLOT the FSCL should be drawn. This line is important in terms of who has control of the assets on either side. Earlier discussions on AI and BAI indicated that the Air Force had to coordinate with the Army when it flew missions on the friendly side of the FSCL. For most of history, the Army could not reach beyond the FSCL with its weapons, so it did not have to deal with

what happened beyond. But, along came ground artillery weapons like the Army Tactical Missile System (ATACMS), and now the Army can reach well beyond the typical FSCL placement. Add to this, the ground commander's increased desire to influence the enemy deeper in his own territory, and it is easy to understand how there just might be some debate. Some of the problem lies in the pilot's concern over the possibility of being shot down, well behind enemy lines by friendly munitions. The idea of flying in a big sky with little chance of being hit by a small bullet aimed at something else is fine, as long as it works. There have been rumors of ATACMS flying through air refueling tracks during Desert Storm, and understandably causing some apprehension for the pilots. Whether these rumors are true or not, the JFACC was concerned about the Army shooting beyond the FSCL.

> Any strikes beyond FSCL must be coordinated with JFACC. It is not an approval issue. We coordinated ATACMS & it worked very well. Same would apply with Helos. Just as JFACC doesn't attack short of FSCL without coordination, Army shouldn't go beyond FSCL without coordinating with JFACC.39

Coordinating assets beyond the FSCL was apparently solved for Desert Shield, but there is still some question about future conflicts. However, what is happening beyond the FSCL is not the biggest concern. The biggest worry is the differing viewpoints of the advantages and disadvantages of a deeper FSCL. Army

leaders feel a deeper FSCL will put more air assets in their area of concern, but the Air Force disagrees. The same team from the Joint Doctrine Center that interviewed the Desert Storm JFACC, Lieutenant General Charles Horner, also interviewed the VII Corps Commanding General, Lieutenant General Frederick Franks. Here is what both Generals had to say about the FSCL and its relation to airpower.

> General Horner: Ground guys think pushing FSCL further will result in them getting more air when just the opposite is true. Natural tendency is for air to go where there are less control restrictions. Push FSCL out & get less air coverage because of bigger area.[40]

> General Franks: FSCL placement was Army call. To get lot of air push it way out, but then wouldn't get precision stuff like F-111. Tended to keep it close. Reasonable distance was 50-60 km/80 km max.[41]

So there was obviously some disagreement in Desert Storm, and the disagreement continues today. Several comments similar to General Franks' were made during the Army's Senior Leader Warfighting Conference in November 1991. The reason this is important to the CAS debate is exactly what General Horner said, "get less air coverage because of bigger area." With the disappearance of the single role CAS aircraft, the aircraft available to fly CAS, will also be the same ones available to fly AI on the friendly side of the FSCL. Compound this by the fact that the force will be even smaller, and the air assets available to strike

targets on this side of the FSCL will be spread even thinner. They obviously came up with a workable solution was for Desert Storm, but what will the mind set be next time? This is a critical question for future wars, and one that will continue to be debated. Further discussion in this thesis is not warranted, but it would make an excellent topic for another thesis.

DOCTRINE VS CAS

By comparing the changes in doctrine presented in this chapter, with the description of CAS today as presented in chapter three, one can ascertain that CAS will potentially be as close tomorrow as it was yesterday. The doctrinal focus for airpower is to use it against higher value targets with longer term effects. The return on investment for interdiction in a highly fluid maneuver war is normally better, but the need for CAS will still be there, and the Air Force will be prepared to fly whatever mission the unified commander calls for. However, the assets will be limited, and as a result, there will likely be less CAS employed. But, if the situation calls for utilizing the assets for CAS missions, then it will likely dictate delivering the munitions right at the soldiers' feet. The next question is whether or not the Air Force will still be capable of putting the ordnance that close to the friendlies.

ENDNOTES

[1]U.S. Army, FM 100-5, Operations, (Washington, D.C.: Department of the Army, 1986), 6.

[2]Colonel James R. McDonough, Director of School for Advanced Military Studies, interview by author, Ft Leavenworth, KS, 5 March 1992.

[3]General Colin L. Powell, "Message from the Chairman," in Joint Pub 1, Joint Warfare of the US Armed Forces, (Washington, D.C.: National Defense University Press, 1991).

[4]U.S. Government, National Security Strategy of the United States, (Washington, D.C.: Government Printing Office, 1991), 1-2.

[5]General Powell.

[6]Major Terry L. New, "Excerpts from Interview with Lt Gen Horner," in "Trip Report from Joint Doctrine Center (JDC) visit to Desert Storm Locations," (Office Letter, Washington, D.C.: Department of the Air Force, 1991).

[7]Ibid.

[8]FM 100-5, 101.

[9]Ibid., 101-105.

[10]Major Jay H. Lindell, F-16 pilot and Silver Star Recipient, interview by author, Ft Leavenworth, KS, 24 March 1992.

[11]Captain Richard D. Hooker Jr., "Redefining Maneuver Warfare," Military Review, vol LXXII-NO 2, (February 1992): 58.

[12]U.S. Department of the Army, "Army 21," draft (1984): 2, quoted in Colonel Wallace P. Franz, "Airmechanization: The Next Generation," Military Review, vol LXXII-NO 2, (February 1992): 59-60.

[13]U.S. Armed Forces, Joint Pub 1, Joint Warfare of the US Armed Forces, (Washington, D.C.: National Defense University Press, 1991), 24.

[14]U.S. Air Force, "AFM 1-1, Basic Aerospace Doctrine of the United States Air Force," Draft, For

Instructional Purposes Only, (Washington, D.C.: Department of the Air Force, 1991), 6.

[15]Ibid.

[16]Ibid., 7.

[17]U.S. Air Force, AFM 1-1, Basic Aerospace Doctrine of the United States Air Force, (Washington, D.C.: Department of the Air Force, 1984), p. 3-3.

[18]Ibid., p. 3-4.

[19]"AFM 1-1," Draft, 12.

[20]Major New, "Excerpts from Interview with Lt Gen Horner."

[21]AFM 1-1, p. 3-4.

[22]"AFM 1-1," Draft, 13.

[23]Ibid.

[24]Ibid.

[25]Ibid.

[26]U.S. Air Force, "White Paper: Air Force Restructure," (Washington, D.C.: Department of the Air Force, 1991), 1.

[27]Ibid., 2.

[28]Ibid., 6.

[29]General Merrill A. McPeak, "Organize, Train, and Equip," Lecture Delivered at Air Force Association National Convention, 18 September 1991, (Washington, D.C.: Department of the Air Force, 1991), 13.

[30]"White Paper," 6.

[31]General McPeak, 10.

[32]U.S. Army, TRADOC PAM 525-5, Airland Operations, (Washington, D.C.: Department of the Army, 1991), 10.

[33]Ibid., 13.

[34]Ibid., 22.

[35]Ibid., 23.

[36]Ibid., 11.

[37]Ibid., 16.

[38]Colonel McDonough interview.

[39]Major New, "Excerpts from Interview with Lt Gen Horner."

[40]Ibid.

[41]Major Terry L. New, "Excerpts from Interview with Lt Gen Franks," in "Trip Report from Joint Doctrine Center (JDC) visit to Desert Storm Locations," (Office Letter, Washington, D.C.: Department of the Air Force, 1991).

CHAPTER 5

TECHNOLOGY

The last chapter revealed that doctrinally the need for close air support will continue well into the future, and that the Air Force will continue to support the CAS mission. This chapter will examine the role technology will play in determining whether or not the Air Force will be capable of providing that support on tomorrow's battlefield, and if so, will "close" still mean right next to friendly forces. The primary risk associated with "close" CAS is fratricide, and that is where the technology discussion will begin.

FRATRICIDE REDUCTION

As discussed in chapter three, fratricide is a primary concern for pilots and soldiers alike. Ground commanders have to consider the risks associated with employing CAS and their own improved firepower assets, and compare these risks to the advantages gained.

> Fratricide hinders joint and combined operations essential to success on the Airland Operations battlefield. In addition to the loss of life and materiel, fratricide can have a devastating effect on operational effectiveness and troop morale. The advent of continuous operations of highly mobile

forces, extended range of operations, and weapon systems of greatly increased range, lethality and autonomy exacerbates fratricide.[1]

If CAS is going to continue to be employed very close to friendly forces, then technology must continue to reduce the risk of fratricide. Fratricide will be reduced through two primary means: positive target identification, and improved situational awareness. Technological developments, as related to CAS, can help reduce fratricide by focusing on six major areas: positive friendly identification, communications, navigation, target acquisition, weapons delivery, and enhanced capabilities at night. Friendly identification and target acquisition will obviously increase the pilot's capability to positively identify his targets. The other four areas will increase his situational awareness and capabilities to perform in each situation. Improvements in each of the areas will enhance the pilot's chances of finding and destroying enemy forces in close contact with friendly troops, even on tomorrow's fast paced, maneuver oriented battlefield. Each of the six areas of technology deserve elaboration.

FRIENDLY IDENTIFICATION

Aircraft have had Identification Friend or Foe (IFF) equipment for many years. This equipment allows ground stations and other aircraft to positively

identify friendly aircraft. The secure mode of the IFF sends a codified response to likewise codified interrogations by outside sources, and has become the primary discriminator for friendly Surface-to-Air Missile (SAM) sites and early warning and control facilities. This system, combined with specific air routes and communications procedures, provides pilots a fairly reasonable sense of security. It greatly reduces the likelihood of attack by friendly air defense batteries or interceptors. Though the system is not perfect, "an air defender in VII Corps observed a 20% negative response rate of Army aviation assets during Desert Storm,"[2] at least a system is in place for surface identification of air assets. The opposite cannot be said. Pilots have had to depend primarily on visual acquisition of ground assets in order to separate the friendlies from the foes. And, fratricide is not just an air-to-ground and ground-to-air problem.

> Friendly fire emerged as a major concern in the desert, in part because Army gunners were able to acquire targets at longer ranges than they were able to positively identify targets as friend or enemy. According to the Army, 23 Abrams were destroyed or damaged in the Persian Gulf area. Of the nine Abrams destroyed, seven were due to friendly fire, and two were intentionally destroyed to prevent capture after they became disabled. Similarly, of the 28 Bradleys destroyed or damaged, 20 were due to friendly fire.[3]

In May of 1991, a General Officer Steering Committee (GOSC) was formed as part of a task force "to provide

extraordinary management of the combat identification initiative."[4] This task force was charged with the mission of providing near and long term recommendations for combat identification of friendly forces both from the air and ground. In the realms of positive identification the GOSC is looking for:

> "accurate, dependable, through-sight discrimination between friend and foe.... out to the maximum range of weapon and target acquisition systems...."[5]

The overall idea is to come up with systems that allow the shooters to use their weapons at maximum range. At the same time the system must allow him to maintain his normal pace or routine while positively identifying the target. In other words, he should be looking through his sights for the enemy, not looking at some other piece of equipment or display for friendly identification. The long range objective is to develop a system that requires no interrogation from the shooter, and no response is required from the target. In other words, the system "provides positive ID of friends and foes based on target's unique signature."[6] A system like this is labeled a "passive noncooperative" system, as opposed to an "active cooperative" system like an aircraft IFF. The second type of system requires the shooter to query the target, and the target must respond with a friendly identification. In either case, the earliest expected

date for fielding such a program is 1999 or later. In the meantime, some quick fix solutions are being sought.

A variety of quick fix solutions have been proposed and tested with varying success. Some examples are thermal tape and two types of infrared strobe lights (Budd Light and Darpa Light). These systems have some problems such as distance limitations, night time only (the lights), and requirements for the shooter to be looking through the right kind of sensor (thermal imagery system, like an imaging infrared Maverick air-to-ground missile display for the thermal tape, or Night Vision goggles for the lights). In any event, these systems are going to help some, but no system is going to completely eliminate the problem. "You can minimize it, you cannot prevent it. War is not a zero defect operation."7 War is a risky business, and like deaths in automobile accidents, fratricide will never be totally eliminated. Improvements like seat belts, air bags and anti-lock brakes are designed to reduce the risk of automobile accident fatalities. Likewise, the steps taken with this friendly identification program, combined with technology updates for the aircraft flying the CAS mission, will make it possible to lower the risk of fratricide.

F-16 CAS MODIFICATIONS

As noted earlier, the Air Force began testing the F/A-16 aircraft for the CAS role in the late 80s. The tests were performed using operational F-16s with a few modifications, and a General Dynamics test bed aircraft with several modifications. These tests not only validated the capabilities of the F/A-16 in a CAS role, but highlighted several technological advancements necessary to improve any aircraft's CAS capability, compatibility, and survivability. Some of these improvements are available today, and some are expected to be available in the mid 90s. The decision has been made not to produce an F/A-16. Instead the Air Force will modify some of its current fleet of F-16s and A-10s. Following is a review of the modifications that will make any aircraft more effective in the CAS mission and more compatible with the other CAS players. One must remember however, when it comes to aircraft modifications, expected system upgrades do not always get funded. There are many proposed modifications identified in this thesis, but as budget cuts appear the modifications planned to begin five to seven years from now may not actually get funded.

COMMUNICATIONS ENHANCEMENTS

Communications are key to successful CAS employment. From the time a CAS target is identified, until the CAS fighter destroys it and returns home, there are a multitude of transmissions involved, and currently the vast majority of these transmissions are verbal discussions over a radio net. The Automatic Target Handoff System (ATHS) or its counterpart the Improved Data Modem (IDM) are highly improved communications systems that allow information to be digitally transmitted and received. A typical CAS mission requires coordination with several agencies from the E-3A Airborne Warning and Control System (AWACS), to the Air Support Operations Center (ASOC), to the Forward Air Controller (FAC). Each of these agencies or personnel can provide target and situation updates, and could possibly divert the flight to an area of higher priority. The FAC or perhaps an ALO will provide target information (type, coordinates, known threats in the area, etc.), establish final attack clearance requirements, identify friendly positions, and perhaps more if able. These verbal communications take time, and are seldom completely received and understood on the first transmission. When the flight lead finally obtains all the data (and has copied it all down), he then takes time to plot the

information and develops an attack plan. After completing these actions, he passes the information and attack plan to the rest of his flight. If the flight was not redirected in flight, and was able to study a map of the preplanned target area prior to takeoff, then this attack development phase may take only a few minutes. However, if this is an immediate CAS request with no preflight target area study possible, then this process could take substantially longer (perhaps 10-15 minutes or more). This delay seems an eternity to the soldier waiting for support. During this time, the pilots are writing information, studying their maps, inputting coordinates into navigation equipment, and selecting weapons requirements, while simultaneously flying their aircraft and remaining vigilant for potential threats. Add communications jamming, static, or radio line of sight problems, and the system can be agonizingly slow and cumbersome. Figure 3 is a good depiction of how a typical immediate CAS request would take place, and the communications associated with it. Pay particular attention to the number of voice relays, and imagine how confusing, slow, and subject to interruption the situation could become. One should not be concerned with the various agencies identified by their acronyms, to explain them all is beyond the scope of this thesis. The purpose of Figure 3 is just

IMMEDIATE CAS REQUEST - TODAY

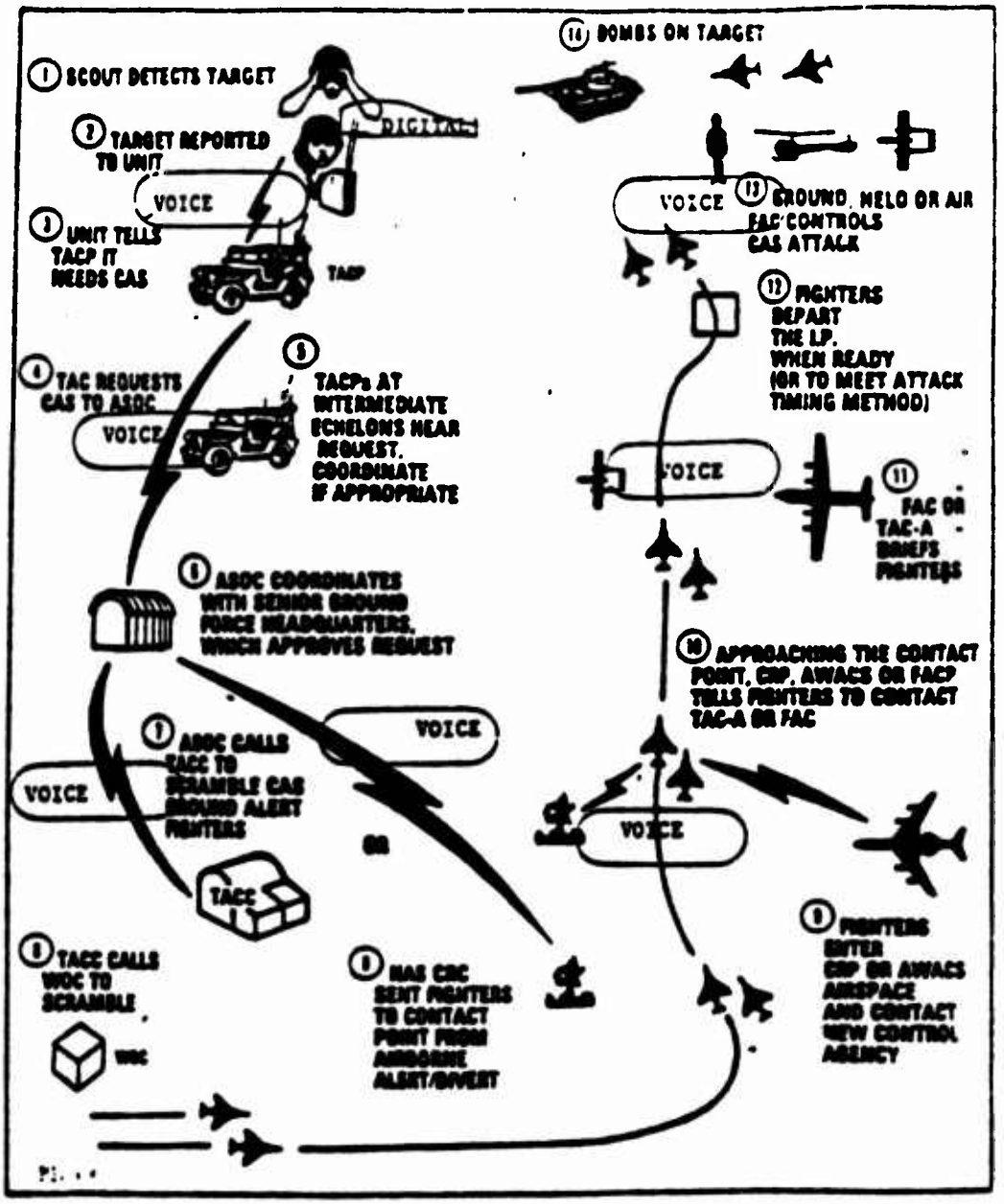


Fig. 3. Extracted from 1989 Tactical Fighter/Recce Symposium paper written by Major Albert L. Phillips, "The Integration of the A-16 into the Close Air Support Environment"

to make one aware of how many potential radio communications a CAS mission may require.

DIGITAL COMMUNICATIONS

The Automatic Target Handoff System (ATHS) or its counterpart the Improved Data Modem (IDM) are digital computers capable of receiving all the information previously described, in short data bursts that take only seconds rather than minutes. Not only is the information transmitted faster, it is also more likely to be received and understood on the first attempt, and less likely to be jammed. The systems use the same radios, but since the transmission time is so short (1-2 sec), it is unlikely a radio jammer could capture the frequency quickly enough to affect the transmissions. These systems are also compatible with the jam resistant and secure voice radios available today.[8] Not only do these systems eliminate the need for most voice communications, but they also provide direct links to the other aircraft systems such as navigation, fire control, and Heads Up Display (HUD). With this system the pilot can concentrate on flying his aircraft and spend much less time "heads down" in the cockpit trying to copy and input data. Once the aircraft receives a data transmission from the FAC, ALO, or another aircraft, it will automatically update the aircraft's navigation and fire control systems.

The data will then be displayed in the pilot's HUD. Together, the updates and displays will make it much easier to find the target on the first pass. Figure 4 shows another typical immediate CAS request, but this time using digital transmissions for communication rather than voice. One should now pay particular attention to how little voice communication is required, thus reducing the time problem, and eliminating many of the other problems previously identified. This figure graphically displays how efficiently a digital communications net can work. The system is extremely capable, but has the limitation of requiring someone to receive and transmit the data to the pilot.

THE GROUND LINK

Currently, the Air Force has some problems getting Army requests into the Air Force air request net. Lieutenant Colonel Albert Phillips discussed the problem in his 1989 Tactical Fighter/Recce Symposium Paper.

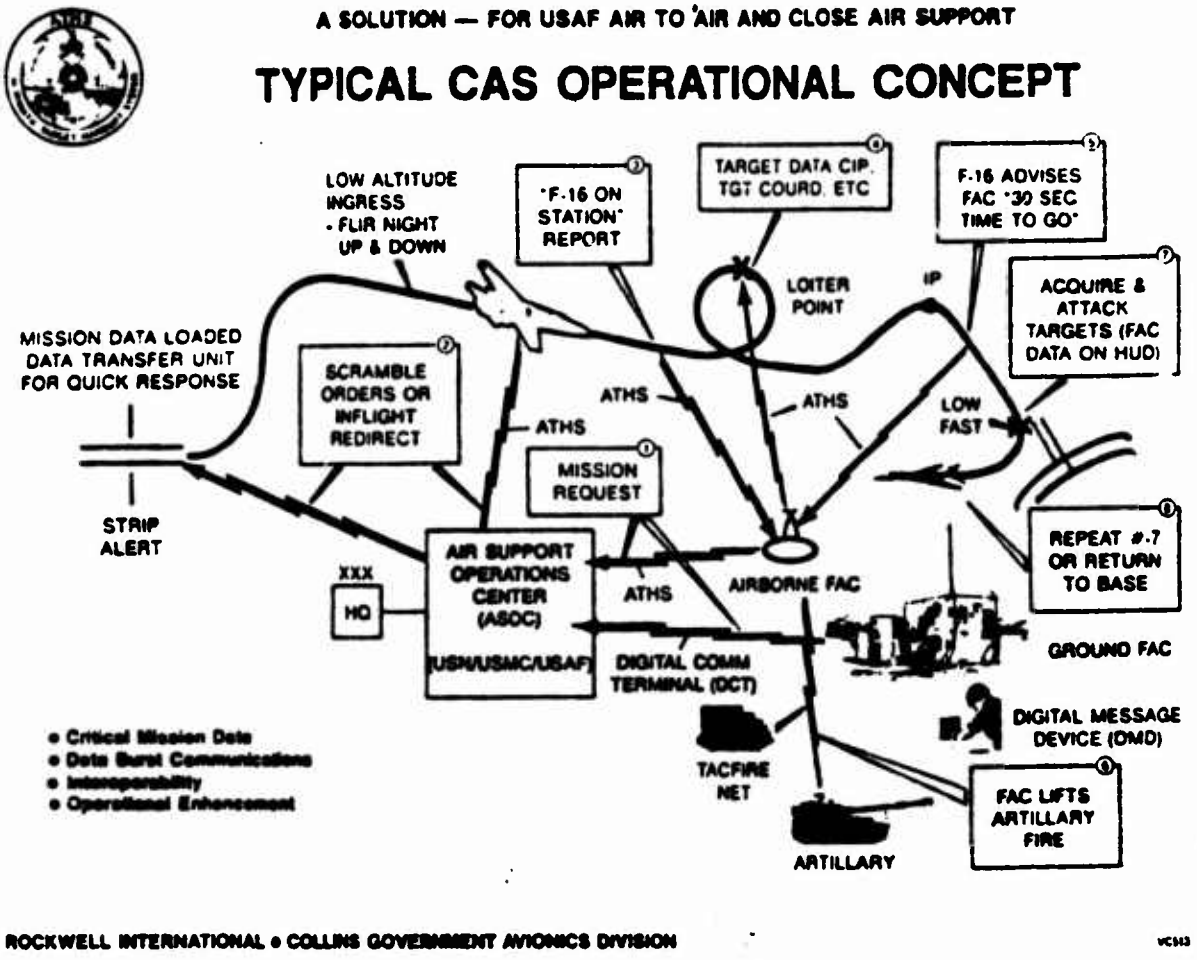


Fig. 4. Extracted from Lt Col Albert L. Phillips' collection of material concerning the F-16 in the CAS role, Air National Guard/Air Force Reserve Test Center, Tucson, AZ.

> The Army's TACFIRE net is digital and fully secure, extends down the chain of command to the company level, and is compatible with ATHS and DMD used by Fire Support Teams (FIST), observers and company commanders. The Air Forces Tactical Air Request Net (TARN) parallels the Army's TACFIRE net. It is presently voice only, but will be updated with Digital Communications Terminals (DCT). The bad news is that the DCT is not compatible with the Army's digital TACFIRE net.9

According to Lt Col Phillips, the pilot has little problem communicating on either system because, the ATHS system is compatible with both nets, through a cockpit selectable switch.[10] However, Army and Air Force ground to ground communication is a problem that continues to bog down the coordination process. The Army (TACFIRE)/Air Force (DCT) compatibility problem is being worked however, and a fix is expected to be in place in this decade. As discussed in chapter 4, Joint operations are going to be the standard, and communications compatiblity has plagued the services in the past. Communications problems have surfaced in recent U.S. conflicts from supporting fire requests in Grenada, to getting the Air Tasking Order (ATO) to the Navy during Desert Storm. The JCS has emphasized the problem and is currently studying communications interface requirements and fixes. This problem will continue to receive high emphasis for some time.

The Automatic Target Handoff System (ATHS) or Improved Data Modem (IDM) are expected to be fielded on F-16s and A-10s/OA-10s by the end of the decade. The

enhancements these systems bring to communications combined with their internal aircraft systems interface, will definitely increase CAS responsiveness and reliability. Combine a good navigation system with the ATHS/IDM, and positive identification of friendly and target positions will greatly improve compared to the capabilities of today.

NAVIGATION SYSTEM UPGRADES

A major goal of any pilot flying a CAS mission is to find the target and destroy it on the first pass. To do this he must be able to accurately navigate his way through friendly defense zones, and be able to fly his aircraft to the precise spot where he can acquire the target in time to bring ordnance to bear. Low level flying is a precise art that takes a lot of practice and has many fatal distractors--the ground for one. To increase his chances of getting to the target alive, the pilot is looking for any means to reduce his "heads down" cockpit workload, and increase his time concentrating outside the cockpit. An excellent navigation system can do just that.

GLOBAL POSITIONING SYSTEM (GPS)

The Global Positioning System is a greatly enhanced navigation system that received critical acclaim in Desert Storm. The aircraft's GPS equipment

receives positioning data from geosynchronous GPS satellites and automatically updates the aircraft's Internal Navigation Systems (INS). These satellites eliminate the aircraft position "drift" problems associated with older INS systems. INS drift can typically create target miss distances of 200 meters or more, but when assisted by GPS, the error is reduced to 30 meters.[11] These distances are highly significant when attacking a 20 ft tank in close proximity to friendly forces. Having a system this reliable is extremely important when the pilot is trying to make a surgeon's cut, on a fluid battlefield, on his first pass. But, more important than the accuracy it provides the aircraft and pilot, is the fact that GPS orients all the friendlies to a common position.

Without the GPS, positional information (friendly or target) given to the pilot was based on where the sender, or CAS requester, thought he was. In most cases, this meant he was looking at a map and trying to pinpoint his position on that map. He would then try to pinpoint where all the friendlies, threats or targets were located relative to his perceived position. Since the requester's position plot was liable to be less than exact, his triangulated target information was also subject to error. These errors were not necessarily large, but as mentioned earlier a

few feet can mean the difference between finding the target or missing it. So, no matter how good the CAS pilot's navigation system was, his target coordinates were likely to be less than accurate. The GPS system helps eliminate these errors, because all the players are oriented from the same highly accurate, geosunchronous satellite system. The GPS proved its worth in Desert Storm, because not only were the maps available outdated, but the terrain lacked much definition. Without occasional fixed terrain features with which to update, it is very easy to become extremely lost, extremely fast. According to several participants in Desert Storm, the Iraqis were surprised by the fact that coalition forces were able to navigate their way through the open desert. The reliability and preciseness of the GPS makes pinpoint accuracy a real possibility. GPS is available in some aircraft today, and all aircraft should be retrofitted by the year 2000. The next technological advancement in CAS navigation is a good map.

DIGITAL TERRAIN SYSTEM (DTS)

A pilot flying CAS today typically relies on paper maps. To encompass the proper region many maps are painstakingly glued together, with his route and other important data annotated. The map is then folded in a manner that allows a constant flow along his

planned route of flight. However, even the best prepared maps can come up short. There often comes a time when the pilot gets diverted and his map does not cover the new area, or he gets to the Contact Point (CP) and finds out the target the FAC just relayed is right on the fold of his map, or has been obliterated from sight. A Digital Terrain System can fix this problem. The DTS that General Dynamics proposed for the CAS version of the F-16 would work in conjunction with the GPS and radar altimeter. Together, they would fine tune the aircraft's position, and provide a digital map display of present position, target, threat and friendly locations, and could depict lethality rings around the threats. The data base for the system would be large enough to easily cover the entire region the fighter might possibly be diverted to. In addition, the elevation updates provided by the system would feed into the fire control system to further refine that system's accuracy. This elevation data would also augment the ground collision warning system by anticipating the aircraft's flight path in comparison to known terrain features. The system would provide warnings not to turn into terrain the pilot might not be aware of, due to poor visibility or task saturation. The system would also advise the pilot to pull up if it sensed a possible ground collision.12

Most ground warning systems employed today strictly read how close the aircraft is to the terrain immediatly below or slightly in front of it, and whether or not the gap between the aircraft and the ground is getting smaller. These systems are unable to tell how high the terrain is on either side of the aircraft or well out front. The DTS on the other hand, will be able to compare the aircraft's three dimensional position to known terrain features in all directions. This 360 degree comparison capability makes the ground collision warning improvements possible. The DTS will augment the GPS and IDM to provide the pilot a higher level of situational awareness, enhanced night capability, and even more accurate fire control. This system may be funded for the F-16 before the year 2000.

TARGET ACQUISITION - PAVE PENNY

Another cog in the system to separate the friendlies from the foes, is to have a friendly laser designating the targets to be destroyed. The Army has a variety of laser designators available. There are man portable, truck mounted, and helicopter systems that can all be used to pinpoint specific targets with a codified laser. The shooter however needs a system capable of seeing the laser energy that is being reflected off the targets. For the Air Force, the

system could either be a Laser Guided Bomb (LGB) or a Pave Penny Target Identification Set, Laser (TISL). The LGB allows the bomb to follow the reflected energy all the way to the target. The Pave Penny system combines positive identification with the on board fire control system, to allow precise weapons delivery without having to overfly the threat (standoff capability). To use the Pave Penny, the pilot directs the system to scan the horizon for a particular (coded) energy, as advised by the ALO, FAC or Army FIST team. When the Pave Penny acquires the laser energy, it identifies the location by displaying a symbol in the pilot's Heads Up Display (HUD). The pilot can then visually acquire the target, say for a strafing run; or he can align his standoff weapons, like a Maverick missile, to the symbology, find the target, and fire. The A-10 has been equipped with a Pave Penny for many years, but the Low Altitude Safety and Targeting Enhancement (LASTE) modification (discussed later) makes tying the weapon to the designated spot much easier.[13] The F-16 is being fit for the pave penny when in the CAS mode, and its fire control system can be set up to automatically align with the laser spot designated. The Pave Penny's ability to acquire a designated target allows the pilot to positively identify enemy targets from friendlies. The system

also improves the pilot's chances for survival, by enabling him to employ his weapons at maximum range.

WEAPONS DELIVERY

The improvements in weapons delivery capabilities over the last decade have been astonishing. First and foremost has been the development and fine tuning of precision guided munitions. The Maverick missile has evolved from an optically guided missile that could see only slightly farther than the human eye, to an infrared guided missile able to see and kill tank size targets many miles down range. Precision guided bombs have improved in accuracy and firepower to the point they can now be guided into air shafts, and thoroughly destroy hardened shelters. The awesome performance of these weapons during Desert Storm has been highly publicized, and could not possibly be improved upon in this thesis. So, suffice it to say, they are tremendously precise and will only get better. The only real risk to their employment is target identification as discussed earlier. However, precision munitions are not the only weapons delivery improvements being pursued.

THE A-10'S LASTE MODIFICATION

Since its inception the F-16 has always had one of the finest fire control systems available in the

world. The A-10 however, had one of the oldest and most basic systems. This is no longer the case. The A-10s are currently undergoing an impressive modification to their fire control system called the Low Altitude Safety and Targeting Enhancement (LASTE) modification. This modification improves many of the aircraft's systems, but one of the biggest changes is the addition of a radar altimeter, and its interface with the fire control system. Prior to this modification, the only aiming assistance the pilot received was a crosswind drift correction provided through the INS. Other than that, the aiming system for both bombs and gun was strictly manual adjustment by the pilot. The addition of a radar altimeter, and the improved fire control system that accompanies it, allows the computer to triangulate the aircraft's position and flight path, and to adjust the aiming device, the reticle, accordingly. This improvement is like transitioning from iron sights on a rifle to a variable powered scope. The siginificance of the improvements became obvious during the last Gunsmoke competition. F-16s have dominated the competition since they came on line, but this time a LASTE supported A-10 pilot won. Another LASTE modified A-10 unit took the team honors. This modification obviously improved the aircraft's ability to precisely deliver

its ordnance, and as a result, it has lessened the risk to friendly troops in the vicinity. With this modification, both aircraft slated to perform the CAS role into the next century have extremely precise weapons delivery systems.

IMPROVED CAPABILITY AT NIGHT

As mentioned in the beginning of the thesis, this study is focusing primarily on daytime, high threat capabilities. But, the Air Force is expected to spend a lot of time and money in the next decade modifying its CAS aircraft to provide the same capabilities 24 hours a day. It would be a mistake not to take a brief look at the ongoing improvements in this area

FORWARD LOOKING INFRARED (FLIR)

Three different systems are currently available in this arena. Two of these systems are Low Altitude Navigation and Targeting Infrared Night (Lantirn) and Pathfinder. These external pod mounted systems are basically fixed at this time, that is they only look straight ahead throughout the flight with very limited off-axis capability. However, their manufacturers, "Martin Marietta and Westinghouse both have assured TAC (now Air Combat Command) that head-steered Flir capabilities can be incorporated into their

proposals...."[14] The Lantirn System is currently operational in at least one squadron of F-16s, but this unit is not slated for the CAS mission. The system consists of two pods, one for navigation and one for targeting. Unfortunately, the same mounts used for these pods are used to mount the Pave Penny pod, and this could create problems for future CAS employment. The Pathfinder system is a single pod mounted near the engine intake. Both of these systems were designed primarily for AI type missions and project their imagery into the aircraft HUD.

The third system, the Falcon Eye, is a head steerable Flir mounted in the nose of the aircraft with the sensor eyeball protruding up about six inches immediately in front of the canopy, and slightly left of center. This system projects the images into a helmet mounted display. It allows for more situational awareness in a fluid CAS type environment, because it allows the pilot to scan from wingtip to wingtip as well as up and down. According to an Aviation Week & Space Technology reporter that flew with the system, "The helmet-mounted Flir provided a field of regard close to what a pilot would experience during daytime flight."[15]

Each system has its advantages and shortcomings. The pod mounted systems allow constant

presentation of where the aircraft is pointed, but do not allow wide searches for targets or threats. These systems require straight ahead target runs, and do not give the pilot the opportunity to offset his runs to take advantage of terrain features, etc. The Falcon Eye on the other hand does allow peripheral searches, but does not provide continual presentation of where the aircraft is pointed. Most of the time, where the aircraft is pointed is where it is going. However, during turns (especially high g turns), the aircraft's flight path is not necessarily aligned with the nose, as it slips around the turn (like a car sliding on an icy road). The highest threat to a pilot flying low level is always the ground. He must be constantly aware of what is in front of his flight path, and the pod systems are pretty good at that. However, if restrictions associated with worrying about his flight path, prevent him from finding his target and accomplishing his mission, then he risked his life and aircraft for nothing. A possible fix is Night Vision Goggles (NVGs)

NIGHT VISION GOGGLES

Night vision goggles are a light intensifying system that have been available for a long time. Army aviation has used them for helicopter flights for several years, and the Marine Corps has been using them

with their Harriers. But, for some reason the Air Force has been hesitant to incorporate them into its attack roles. However, Lt Col Phillips has been flying with them at the Air National Guard Test Center in Tucson, Arizona. He is extremely pleased with them, and has demonstrated their effectiveness to senior Air Force leadership. He highly recommends them.[16] When NVGs were first produced they were cumbersome, but the current Cat's Eyes version are light weight and ejection safe. According to pilots in the A-10 Operational Test and Evaluation squadron at Nellis, NVG tests with the A-10 will begin this spring, after the aircraft cockpit lighting systems have been modified for compatibility with the goggles. They are also preparing to test a Flir system this summer.[17] NVGs appear to be very effective, but like Falcon Eye they have their problems when used alone. Another light intensifier system is the Low-Level-Light Television (LLLTV). This is a pod system like Pathfinder, but it enhances low lighting instead of producing infrared imaging. So far the attempts at this system have run into some problems. Whether Flir or a light intensifying system, each system has its shortfalls when used in isolation.

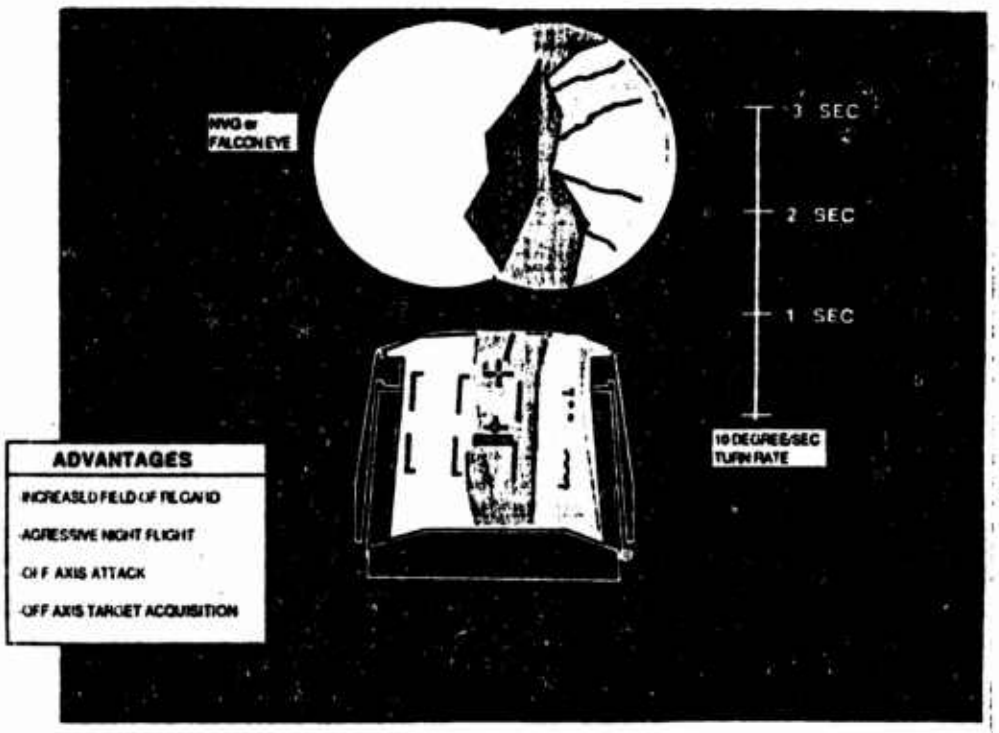
COMBINING SYSTEMS

The optimum fix for night CAS appears to be a combination of a low-light enhancement system like the NVGs and a Flir system. One of the two should be head steerable like the NVGs or Falcon eye, and the other should be a pod system. It is also important to mix the two system types, because infrared systems are degraded by moist air, and light intensifiers are degraded by really dark nights. By combining movement capabilities and systems the pilot will be safer, and more capable of providing the same level of support whether at night or in daylight. Figure 5 demonstrates how much more the pilot can see by combining two systems. NVGs and perhaps a Flir pod system should be in use by the year 2000 or sooner.

OTHER SYSTEMS

Many other modifications are being considered at this time, and there will be many more to come. However, the improvements discussed here appear to be the only ones with a chance of getting funded in this decade. Other systems under consideration include a Tactical Situation Display that will integrate with the other communications and computer systems to enhance the pilot's situational awareness. Another possible improvement is a moving target radar. This system will

OFF-AXIS TERRAIN SITUATIONAL AWARENESS



White areas depict pilot's view through:
- Off-Axis system -- TOP
- Pod system -- BOTTOM

Side Scale indicates how far above centerline aircraft will travel in a high-g level turn.
- With Pod system only the pilot can only see potential collisions one second prior to impact.
- With Off-Axis system pilot can look as far out front as he wishes. (View shows potential collision three seconds away.)

Combining the two systems allows pilot to have continuous view of aircraft's flight path one second away, as well as capability to look at flight path further out in any direction.

Fig. 5. Extracted from Lt Col Albert L. Phillips' collection of material concerning the F-16 in the CAS role, Air National Guard/Air Force Reserve Test Center, Tucson, AZ.

find and identify vehicles for weapons employment at greater ranges. There are also many other survivability enhancements being examined, but they are beyond the focus of this thesis.

HOW IS CAS AFFECTED?

If the technological advancements discussed in this chapter are funded, then the capabilities of the weapons systems will be much better than ever before. The new systems will be able to provide the closest, safest support ever imagined, day or night. But, the picture is not all rosy. Funding is going to continue to be a big problem, and chances are, not all of these improvements will make the cut. Another problem will be interservice compatibility. Even with the emphasis placed on Joint operations and cooperation among the services, inconsistencies still exist and are likely to continue. Items like compatible radio nets still have to be solved. But, steps in the right direction are being taken. Even a few improvements will make the overall system more capable. So, as far as technology is concerned close air support will potentially be closer and safer to friendly troops than it is now.

ENDNOTES

[1]U.S. Army, TRADOC PAM 525-XX, U.S. Army Operational Concept for Combat Identification, (Washington, D.C.: Department of the Army, 1991), 2.

[2]U.S. Army, Army Aviation Desert Shield/Storm After Action Report, (Ft Rucker, AL: U.S. Army Aviation Center, 1991), p. F-15.

[3]U.S. General Accounting Office, Operation Desert Storm: Early Performance Assessment of Bradley and Abrams, (Washington, D.C.: Government Printing Office, January 1992), 4-5.

[4]U.S. Army, Combat Identification Program Interim Report, (Washington, D.C.: Department of the Army, 1991), 1.

[5]Ibid., 2.

[6]Brian K. Hughes, "Combat Identification Program Materiel Programmatics," Briefing presented to the Combat Identification Task Force General Officer Steering Committee, 27 September 1991 (Ft Leavenworth, KS: Force Requirements Directorate and TRADOC Program Information Office ATZL-CDE-B, 1991).

[7]Combat Identification Program Interim Report, 12.

[8]Neil Munro, "U.S. Air Force Opts for Navy-Produced Datalink for F-16 Fighters," Defense News, 23 July 1990, 27.

[9]Albert L. Phillips, "The Integration of the A-16 into the Close Air Support Environment," (1989 Tactical Fighter/Recce Symposium Paper, May 1989), 3, (Air National Guard/Air Force Reserve Test Center Tucson, AZ: from Lieutenant Colonel Albert L. Phillips' collection of material concerning the F-16 in the CAS role).

[10]Lieutenant Colonel Albert L. Phillips, Pilot in the Air National Guard/Air Force Reserve Test Center Tucson, AZ, telephone interview by author, 22 January 1992.

[11]Albert L. Phillips, "The Integration of the A-16 into the Close Air Support Environment," Briefing presented to 1989 Tactical Fighter/Recce Symposium, May

1989, (Air National Guard/Air Force Reserve Test Center Tucson, AZ: from Lieutenant Colonel Albert L. Phillips' collection of material concerning the F-16 in the CAS role).

[12]General Dynamics, F-16C/D Close Air Support Technical Budget Analysis, CCP 9239, Final Report, vol 2, Systems (Fort Worth: General Dynamics, 15 July 1988), pp. 2:14-2:17.

[13]Captain Craig Schlattmann, Pilot in 422 OTES Nellis AFB, Nevada, telephone interview by author, 27 January 1992.

[14]William B Scott, "Falcon Eye Flir, GEC Helmet Aid F-16 Mission Flexibility," Aviation Week and Space Technology, 17 April 1989, 35.

[15]Ibid., 41.

[16]Lieutenant Colonel Phillips interview.

[17]Captain Schlattmann interview.

CHAPTER 6

CONCLUSION

The goal of this thesis has been to try and envision the capabilities of close air support in future battles. Specifically, the question was: "Will close air support in the year 2000 be as close as CAS today?" The answer is yes. In fact, the support could very well be, on average, closer than that of today. The aircraft are going to be increasingly more sophisticated and more capable of making precision strikes with little collateral damage or risk to friendly forces. Doctrinally, close air support will still be necessary for the successful completion of the Joint team's goals. With fewer aircraft available and interdiction missions providing a more efficient use of airpower, less forces will be available for CAS. The operational commander, through his component commanders, will have to anticipate when all his assets will be necessary to support his tactical commanders, and what level of risk may be necessary to support the

overall objective. So, CAS will be there, and it will be very close, but chances are there will not be as much of it as before.

IS THAT ALL THERE IS?

This thesis has looked at CAS in regard to doctrine, technology, and the will to employ it, but there are still questions and concerns to be dealt with. These concerns warrant further study if the Department of Defense is going to achieve a fully complimentary team operation, and if airpower, especially CAS, is going to be employed properly. Two such concerns are compatibility and training.

COMPATIBILITY

Several instances of incompatibility between services have been discussed in this paper, and many others have been highlighted in the research. Communications interoperability is probably one of the biggest problems to be dealt with. Key Air Force systems like the Tactical Air Request Net discussed in chapter 5, have to be compatible with the Army, Marine and Navy systems. The Air Liaison Officer should not be spending his time translating systems. On the contrary he should be advising his ground commander and forwarding requests in the most efficient means possible. This is just one of many examples.

Indications are that communications problems are receiving emphasis, but is the U.S. ready to bet its soldiers' lives on the efforts being taken, and have all the problems been identified?

TRAINING

The key to an effective fighting force is training. A football team does not continually separate its receivers from its quarterbacks or its linemen from its backfield before it goes into the big game. But, in the Department of Defense the team is separated in training more than the leadership likes to admit. Team training is beginning to take more focus in the service schoolhouses, but the level of integration in training exercises is still very low. First of all, computer simulations utilized today tend to be good at simulating ground battles, or air battles, or sea battles, but they do not combine them effectively. The ground commander very seldom gets to see what air support, or naval support can actually do for him. He does not get to see realistic results, nor does he gain an appreciation for the coordination requirements. This problem was identified by most of the personnel interviewed in support of this thesis. More Joint field training is also necessary, and a realistic system for simulating the effects of airpower is needed. A simulation that actually eliminates

forces from the commander's battlefield is required. If the "team" is going to function properly then more realistic joint training at all levels is required.

FINALLY

These are just two of the problems that are still left to be dealt with. The close air support mission is going to be alive and well, as long as man takes to the battlefield. The capabilities to perform the mission are there, and the will is there, but the integration of the team is still not as strong as it should be. The integration of efforts requires continued improvement.

BIBLIOGRAPHY

BOOKS

Cooling, Benjamin F., ed. Case Studies in the Development of Close Air Support. Washington D.C.: Government Printing Office, 1990.

Dupuy, Trevor N. Elusive Victory: The Arab-Israeli Wars 1947-1974. Fairfax: Hero Books, 1984.

Warden, John A., III. The Air Campaign: Planning for Combat. Washington, D.C.: National Defense University Press, 1988.

GOVERNMENT DOCUMENTS

McPeak, Merrill A., General. "Organize, Train, and Equip." Lecture Delivered at Air Force Association National Convention, 18 September 1991. Washington, D.C.: Department of the Air Force, 1991.

U.S. Air Force. AFM 1-1, Basic Aerospace Doctrine of the United States Air Force. Washington, D.C.: Department of the Air Force, 1984.

U.S. Air Force. "AFM 1-1 Basic Aerospace Doctrine of the United States Air Force," Draft, For Instructional Purposes Only. Washington, D.C.: Department of the Air Force, 1991.

U.S. Air Force. TACM 2-1, Tactical Air Operations. Washington, D.C.: Department of the Air Force, 1978.

U.S. Air Force. "White Paper: Air Force Restructure." Washington, D.C.: Department of the Air Force, 1991.

U.S. Army. Army Aviation Desert Shield/Storm After Action Report. Ft Rucker, AL: U.S. Army Aviation Center, 1991.

U.S. Army. Combat Identification Program Interim Report,. Washington, D.C.: Department of the Army, 1991.

U.S. Army. FM 100-5, Operations. Washington, D.C.: Department of the Army, 1986.

U.S. Army. FM 100-15, Corps Operations. Washington, D.C.: Department of the Army, 1989.

U.S. Army. TRADOC PAM 525-5, Airland Operations. Washington, D.C.: Department of the Army, 1991.

U.S. Army. TRADOC PAM 525-XX, U.S. Army Operational Concept for Combat Identification. Washington, D.C.: Department of the Army, 1991.

U.S. Congress. House. Committee on Armed Services. Roles and Missions of Close Air Support. 101st Cong., 2nd Sess., 27 September 1990.

U.S. Department of Defense. J-Fire Multi-Service Procedures for the Joint Application of Firepower. Washington, D.C.: Department of Defense, 1989.

U.S. Department of Defense. Joint Pub 1, Joint Warfare of the US Armed Forces. Washington, D.C.: National Defense University Press, 1991.

U.S. General Accounting Office. Operation Desert Storm: Early Performance Assessment of Bradley and Abrams. Washington, D.C.: Government Printing Office, January 1992.

U.S. Government. National Security Strategy of the United States. Washington, D.C.: Government Printing Office, 1991.

PERIODICALS AND ARTICLES

Airland Bulletin. 31 March, 30 June 1986; 31 March 1987; 30 September, 31 December 1988; 31 March, 30 June, 30 September, 31 December 1989; 31 March, 30 September, 31 December 1990; 30 April, 30 September, 31 December 1991.

Beesley, Jon S. "Developmental Flight Tests." Code One, January 1989, 20-21.

Dryden, Joe B. "Design Philosophy Comparisons." Code One, January 1989, 22-23.

Franz, Wallace P. "Airmechanization: The Next Generation." Military Review, February 1992, 59-66.

Herrly, Peter F. "Joint Warfare: The American Way of War." Military Review, February 1992, 10-15.

Hooker, Richard D. "Redefining Maneuver Warfare." Military Review, February 1992, 50-58.

Hughes, David. "Syracuse Wing Finds F-16A Effective in Close Air Support." Aviation Week and Space Technology, 18 June 1990, 36-46

Lowndes, Jay C. "Cooperative Attack." Air Force Magazine, November 1991, 60-64.

Lydick, Larry N. "Building the System." Code One, January 1989, 19-20.

Morrocco, John D. "Air Force Drops Plan for New A-16s, Will Modify F-16C/Ds for Close Air Support." Aviation Week and Space Technology, 3 December 1990, 28.

Munro, Neil. "U.S. Air Force Opts for Navy-Produced Datalink for F-16 Fighters." Defense News, 23 July 1990, 27.

Scott, William B. "F-16 Completes CAS Test, Demonstration Phase." Aviation Week and Space Technology, 2 April 1990, 38-40.

Scott, William B. "Falcon Eye Flir, GEC Helmet Aid F-16 Mission Flexibility." Aviation Week and Space Technology, 17 April 1989, 34-47.

Shifrin, Carole A. TAC Demonstration Bolsters Support for F-16 in CAS Role." Aviation Week and Space Technology, 17 April 1989, 49-50.

Stout, Joe. "CAS: Close Air Support Role." Code One, January 1989, 24-27.

Sullivan, Gordon R. "Doctrine: A Guide to the Future." Military Review, February 1992, 3-9.

UNPUBLISHED MATERIALS

Bishop, Kelley B. "The Follow-On Close Air Support Aircraft - Should it be a Single Role or Multi-Role Aircraft?" Master of Military Art and Science Thesis, U.S. Army Command and General Staff College, 1988.

Combest, Michael L. "Apportionment and Tactical Airpower in Airland Battle--An Evaluation of CAS, BAI, and AI from an Operational Perspective." School of Advanced Military Studies Monograph, U.S. Army Command and General Staff College, 1987.

DeGovanni, George. "Air Force Support of Army Ground Operations Lessons Learned During World War II, Korea, and Vietnam." Individual Study Project, U.S. Army War College, 1989.

Hallion, Richard P. "Battlefield Air Support: A Time for Retrospective Assessment." Individual Study Project, Directorate of Advanced Programs, Andrews AFB, 1989.

Hamilton, David. "Close Air Support and Battlefield Air Interdiction in the Airland Battle." Master of Military Art and Science Thesis, U.S. Army Command and General Staff College, 1983.

Jordan, D. W. "Tactical Airpower at the Operational Level of War." Master of Military Art and Science Thesis, U.S. Army Command and General Staff College, 1990.

Miller, John F., Jr. "The F-16 in Offensive Air Support." Master of Military Art and Science Thesis, U.S. Army Command and General Staff College, 1982.

INTERVIEWS

Anderson, Steven C., Major previous ALO, 3rd Ranger BN. Interview by author, Ft Leavenworth, KS, 9 January 1992.

Brackett, David S., Major, previous ALO, 4th ID (Mech). Interview by author, Ft Leavenworth, KS, 13 January 1992.

Cherrie, Stanley F., Colonel, Director Center for Army Tactics. Interview by author, Ft Leavenworth, KS, 7 January 1992.

Condon, John, Major, A-10 pilot, TAC/IGIO (Inspector General Inspection Operations) Langley AFB, VA. Telephone interview by author, 7 February 1992.

Day, John W., Major, previous ALO, 2nd Brig/1st AD. Interview by author, Ft Leavenworth, KS, 9 January 1992.

Donald, Steve, Captain ALO, National Training Center, Ft Irwin, CA. Telephone interview by author, December 1992.

Keutman, John, Major, Pilot in 422 OTES Nellis AFB, NV. Telephore interview by author, November 1991.

Leatherman, Jerry, Major, previous pilot A-10 Operational Test and Evaluation Squadron. Interview by author, Ft Leavenworth, KS, 9 January 1992.

Lindell, Jay H., Major, F-16 pilot and Silver Star Recipient. Interview by author, Ft Leavenworth, KS, 24 March 1992.

McDonough, James R., Colonel, Director of School for Advanced Military Studies. Interview by author, Ft Leavenworth, KS, 5 March 1992.

Offutt, Fred, Lieutenant Colonel and Fisher, Henry, Major, TAC/DRFG Langley AFB, VA. Telephone interview by author, 3 January 1992.

Phillips, Albert L., Lieutenant Colonel, Pilot in the Air National Guard/Air Force Reserve Test Center Tucson, AZ. Telephone interview by author, 22 January 1992.

Schlattmann, Craig, Captain, Pilot in 422 OTES Nellis AFB, Nevada. Telephone interview by author, 27 January 1992.

Willbanks, James, Lieutenant Colonel, Center for Army Tactics. Interview by author, Ft Leavenworth, KS, 3 February 1992.

OTHER SOURCES

General Dynamics, F-16C/D Close Air Support Technical Budget Analysis, CCP 9239, Final Report, vol 2, Systems (Fort Worth: 15 July 1988), pp. 2:14-2:17.

Hughes, Brian K. "Combat Identification Program Materiel Programmatics." Briefing presented to the Combat Identification Task Force General Officer Steering Committee, 27 September 1991. Ft Leavenworth, KS: Force Requirements Directorate and TRADOC Program Information Office AIZL-CDE-B, 1991.

New, Terry L. "Excerpts from Interview with Lt Gen Franks," in "Trip Report from Joint Doctrine Center (JDC) visit to Desert Storm Locations." Office Letter, Washington, D.C.: Department of the Air Force, 1991.

New, Terry L. "Excerpts from Interview with Lt Gen Horner," in "Trip Report from Joint Doctrine Center (JDC) visit to Desert Storm Locations." Office Letter, Washington, D.C.: Department of the Air Force, 1991.

North Atlantic Treaty Organization. ATP-27(B) Offensive Air Support Operations. 1980.

Phillips, Albert L. "The Integration of the A-16 into the Close Air Support Environment." 1989 Tactical Fighter/Recce Symposium Paper, May 1989. Air National Guard/Air Force Reserve Test Center Tucson, AZ: from Lieutenant Colonel Albert L. Phillips' collection of material concerning the F-16 in the CAS role.

Phillips, Albert L. "The Integration of the A-16 into the Close Air Support Environment." Briefing presented to 1989 Tactical Fighter/Recce Symposium, May 1989. Air National Guard/Air Force Reserve Test Center Tucson, AZ: from Lieutenant Colonel Albert L. Phillips' collection of material concerning the F-16 in the CAS role.

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