FIREPOWER AND FOLLOW-ON FORCES ATTACK

• *Making Every Round Count* •

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Firepower and Follow-On Forces Attack

Making Every Round Count

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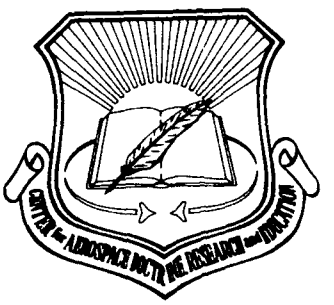

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Firepower and Follow-On Forces Attack

Making Every Round Count

by

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This publication has been reviewed by security and policy review authorities and is cleared for public release.

To Nando, Paul, Blanca, and Diana—your sacrifice will never be forgotten.

To John and Jerry—it couldn't have happened without you as wingmen.

Finally to CINCGRUNGE—thanks for putting up with an irritable, out-of-work fighter pilot.

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About the Author

Lt Col Thomas G. Runge

Proud to be a fighter pilot—pretentious of nothing else.

Introduction

> The Berlin Wall is being dismantled. Soviet and U.S. INF [intermediate-range nuclear forces] missiles are being destroyed. The cold war is over. Negotiations to achieve conventional force parity between NATO and the Warsaw Pact are reportedly making good progress in Vienna. Communist dominoes are falling (or have fallen) in Poland, Hungary, East Germany, Czechoslovakia, Bulgaria, Romania, and even the Soviet Union itself.[1]

The Europe of 1990 bears little resemblance to the Europe of 1989. The events of the past 12 months have easily made that period the most explosive era of change in Europe since the Industrial Revolution. The large number of revolutionary changes in Europe has created instant obsolescence for virtually every economic, political, and military plan for the region. The Warsaw Pact (WP) and particularly the Soviet Union, long the common threat that served as the bond of unity for NATO, appears to have lost all aggressive intent. Thus NATO is destined to endure a lengthy period of reappraisal. This reappraisal undoubtedly will encompass every phase of NATO, including membership, force structure, and roles and missions of the remaining forces.

The outcome of this reappraisal, like the unfolding events that triggered it, is impossible to predict because European changes continue to occur on a daily basis. The very survival of the NATO alliance might be called into question as the need to defend Western Europe from Eastern Europe and the Soviet Union diminishes or disappears. However, NATO will probably remain if for no other reason than the stability its troops offer Europe as a whole.

> NATO's roles (current and future) transcend merely "countering the Soviet threat." In a Gorbachev (or post-Gorbachev) era, NATO, in my view, still has four major missions: to prevent world peace from being endangered by a renewal of Europe's civil wars; to establish structures that will ensure the efficacy of the CFE [Conventional Forces Europe] agreements; to establish two-pillar institutions that will permit NATO governments to procure affordable armaments while equitably and efficiently sharing both the benefits and the burdens of NATO's defenses; and to resume building the Atlantic Community.[2]

Given NATO's continued existence, three generalizations can be made about its future. First, NATO's member-nations will probably field smaller military forces than in the past. Second, mobility and timeliness will be even more important to the proper employment of this smaller force. Third, NATO's military planning still must focus on the defense of Western Europe but could well expand into a need for out-of-area operations. Consider, for example, Europe's reliance on the flow of Persian Gulf oil to sustain economic viability. With the decreased emphasis on the Warsaw Pact threat, NATO's members could easily focus their attention on protection of

the oil lifeline. Readers will recall the deployment of several NATO members' warships to the Persian Gulf during the Iran-Iraq War to prevent third-party tankers from being attacked.

Assuming a continuing NATO (and there is no concrete reason to assume otherwise), the problems of potential combat employment become even more challenging than those of the past. The smaller NATO force will need to be ready for operations throughout the European sphere of influence, not just on the European continent. Such operations will require a command and control (C^2) structure that responds rapidly to a changing situation and quickly implements the commander's decisions. Equally important, the C^2 structure must continue to serve the European theater. These requirements will further challenge the NATO command and control network—a system the author believes is already tasked beyond its limits.

In the face of this ever-changing environment NATO must continue to field new weapon systems and to develop its defensive strategy. Ironically, the improved capabilities being secured are further complicating the situation by invalidating some traditional command and control procedures. There is a mismatch in the nature of the technological advances and in the concepts for using these advances.

Problems

The AH-64 Apache, for example, is a complex, expensive, and powerful weapon system. Costing $10 to $12 million a copy, this potent helicopter gives the US Army a significant increase in firepower and flexibility. Equipped with a laser range finder and weapons designation system, the Apache is capable of highly accurate weapons delivery. Its crew can use onboard systems for low-level flying at night, giving the Apache an operational window constrained only by the absolutely worst weather conditions. Armed with the Hellfire antitank missile, rockets, and a 30-mm cannon, it can engage virtually every WP vehicle. The Apache's combat radius of more than 150 kilometers, coupled with a loiter time in the target area in excess of 20 minutes, means the US Army can carry the battle deeper into enemy territory than ever before.[3] Given its operational capability and a command and control, intelligence, and targeting system equal in capability, the Apache adds a significant amount of firepower to any future conflict. Moreover, the Apache has been designated a corps asset, placing this firepower directly in the hands of corps commanders.

The concept that takes advantage of the capabilities of such systems as the Apache is Follow-On Forces Attack (FOFA). Briefly stated, this concept involves attacking the Warsaw Pact's uncommitted forces with the goal of delaying, disrupting, or destroying them.[4] The main purpose of deep attacks is to prevent WP forces from attaining a force ratio in the close-battle area that overpowers the NATO defense. Although the FOFA concept does

take advantage of the capabilities of such weapon systems as the Apache, there are problems in meshing the concept with the weapons.

The deep battle will be fought in the area past the fire support coordination line (FSCL). This territory has long been the domain, for lack of a better term, of air forces because air forces were the operators of the vast majority of weapon systems that could reach that deep. More importantly, that area has always been considered an unconstrained weapons employment area where only minimal coordination between ground and air forces was required. Since the deep-battle area is now a cornerstone of the defensive concept of NATO; since weapon systems capable of operating in this area are all critical defensive assets, limited in number, and expensive; and since these systems are not controlled by a single service or command facility, one has to wonder if a lack of coordination in this key battle area can continue to be tolerated. In the opinion of several senior air force and army general officers, adequately coordinating weapons employment beyond the FSCL is critical to the success of NATO's defense.[5]

Purpose of Research

This paper examines the question of weapons employment coordination beyond the FSCL with the purpose of improving the current Central Region command and control system for deep employment of weapons. The intent is not to dissect the C^2 system currently in use in the Central Region—to do so would be beyond the scope and classification level of this paper. Instead, the goal is oriented toward functional examination of the Central Region's command and control operations for prosecuting war. Specifically, the research, with the aid of a conglomerate mission management model, attempts to identify shortcomings that would inhibit firepower coordination and FOFA mission accomplishment. This paper proposes changes with the aim of improving the mission management system.

Besides the obvious aim of improving the NATO system for fighting the next European war, another goal is to put forth a framework within which to explore related issues of battlefield management. It is hoped that general acceptance of the simplified model of mission management set forth will lead to the model's further use in other areas of mission management. It has become very apparent that most problems in the NATO arena are "too tough" because the parties involved in the issue cannot agree on the basics. That "toughness" problem must be overcome.

Assumptions and Limitations

Some very important factors have not been specifically addressed in the research. Instead this paper assumes that such items as proper ordnance, accurate air power, communication lines, and rapid reaction will be available. While these factors do not all exist now, nor will they exist in the near future, they are not discussed here because they are not fundamental to

the adoption of the FOFA concept. This is not to deny that these items need to be carefully controlled or that they will provide sizable leadership challenges. However, the system of FOFA implementation must be based on principles which have evolved over time and which absolutely cannot be ignored. Once the FOFA employment concept is successfully implemented, Central Region commanders can set about ensuring the other items do not present problems.

Other factors also limit the final product. This paper was written as an unclassified document. Therefore several subjects could not be explored in the depth that would have been possible in a classified document. The author hopes, because it is unclassified, this paper will be read by more war fighters. Another limitation was the research location. Although Maxwell AFB, Alabama, offers an outstanding research environment, it is far from the airfields of Europe. While staff members at United States Air Forces in Europe (USAFE) were a great help, there's no substitute for being in the theater. The distances involved kept the author from talking to all the individuals and units he wanted to address.

Organization

Chapter 1 defines the battle area, reviews the different terms used to segment the battle area, and discusses the importance of coordinating employment of weapon systems in the deep-battle area. Chapter 1 also discusses issues that currently cloud discussions of command of the deep battle. Chapter 2 examines the history of air interdiction to determine how close the relationship between air interdiction and FOFA air attack really is. This chapter identifies lessons drawn from the history of air interdiction. Chapter 3 examines the current air force and army organizations in the Central Region. It continues with the introduction of a mission management model subsequently used to evaluate the current system in the Central Region. Chapter 4 examines some valuable technological advances in battle management capability that will be fielded in the future. Chapter 5 outlines nontechnological solutions to the faults of the current mission management system. Finally, chapter 6 summarizes and concludes this paper. It also reasserts the utility of the research and emphasizes likely changes in NATO forces.

Notes

1. Thomas A. Callaghan, Jr., "Do We Still Need NATO?" *Defense and Diplomacy* 8, no. 4 (April 1990): 51.
2. Ibid., 52.
3. Michael J. H. Taylor, ed., *Jane's World Combat Aircraft* (Coulsdon, Surrey, United Kingdom: Jane's Information Group Ltd., 1988), 373–76.
4. The FOFA concept will be discussed in much more depth in later chapters. This brief definition provides the basics for understanding the concepts involved.

5. The number of papers moving within the staffs at Central Army Group (CENTAG), Allied Air Forces Central Europe (AAFCE), and Supreme Headquarters Allied Powers Europe (SHAPE), to name a few, bears witness to the weapon coordination problem's importance and to the substantial efforts being made in this area.

Chapter 1

Follow-On Forces Attack and Technology

Push the System Beyond Its Limits

Thus far, the discussion has briefly covered the potential problem caused by the dynamic combination of two significant, but not particularly, recent events. The first was the introduction of the AH-64 Apache attack helicopter into the US Army inventory and thus into the NATO inventory. The other was the introduction and adaptation of the FOFA concept into the NATO strategy of defense. The Apache has been operational for a number of years and in development far longer. The deep-attack concept, envisioned in Supreme Headquarters Allied Powers Europe (SHAPE) Follow-On Forces Attack doctrine, was first introduced more than 10 years ago and has been a part of NATO strategy for almost as long.[1] The combination of these events has far-reaching effects because the events not only change the fundamental makeup of the way NATO will defend Europe, they also make current command and control systems for prosecuting war obsolete.

The tremendous amount of effort and study currently being done in every major NATO army and air force headquarters in the Central Region underscores the slowness of development of the mission management network to take advantage of these new capabilities and FOFA concepts.[2] The mission management process, specifically its planning and tasking functions, has not kept pace with the changes these events have caused. The problems reside in the way NATO arbitrarily divides the battlefield, the way it tasks weapon systems for missions and, finally, the very command and control system it uses. In essence, no current Central Region system adequately coordinates weapons employment beyond the fire support coordination line.

To test these assertions, this chapter begins with a discussion of why coordination of weapons employment beyond the FSCL, the current limit of such coordination procedures, is critical to the defensive capability of NATO. It continues with a discussion of the concepts of AirLand Battle (ALB) and FOFA. The chapter then covers the concepts' similarities (FOFA in its simplest form is a subset of ALB) and important differences. The chapter concludes with a review of the current overlay, for lack of a better term, of the battlefield as defined in the Central Region. In the process, the incorporation of air power into those definitions is also covered. Additionally, the presentation outlines the areas where there is considerable dis-

agreement, not only among services but also among countries, on items ranging from definitions to the very existence of some of the lines dividing the battlefield. The goals of this chapter are to foster an appreciation of the importance of coordinating new weapon systems, to explain the FOFA concept and its importance, and to demonstrate how the organization of the battlefield affects the entire war-fighting process.

Why Weapons Delivery Coordination?

To examine the need for coordination of deep-attack weapons employment, this section discusses five factors: the basics behind weapons employment coordination and how coordination impacts the battlefield, the requirement to achieve maximum firepower effectiveness, the synergistic effects of combined weapons employment, the ever-increasing need for airspace management deeper into the enemy's rear area, and the principles of war. The discussions demonstrate the general need for firepower employment throughout the battlefield and specifically in the key areas that can affect the entire campaign—such as the deep attack.

Weapons Coordination

As a precursor to any discussion of *why* the employment of weapons past the FSCL is important, one must define the term *coordination*. A substantial case can be made that the coordination issue examined here is nothing more than a different twist to the long established concept of fire support coordination. Fire support coordination was identified many years ago for the profound effects its accomplishment can have on the battlefield. Most appropriately, the term *fire support coordination* precisely defines the situation required for winning the deep battle.

> Fire support coordination is the planning and execution of fire so that targets are adequately covered by a weapon or groups of weapons. The aim of fire support coordination is to ensure that fires delivered in support provide the best support possible. History shows that fire support can be decisive when delivered at the proper time and place and in the proper manner.[3]

There are several degrees of fire support coordination. One of the most complex occurs during a close-air-support (CAS) mission. The army, at corps level or below, identifies targets to be attacked, and the army, or at least an air liaison officer (an air force member working on the ground with the army), actually controls aircraft as they attack their targets. Other forms of coordination are less stringent. For example, the army can nominate a target for attack, give the air force a window of time in which the target should be destroyed, and let the air force get on with the business at hand. The need for coordination in the deep battle lies between these two points on the coordination spectrum. For the deep battle there is no need, even if the capability existed, to put a weapons coordinator on the scene deep in enemy territory, but there is a definite need to have some

form of coordination to achieve the objective of providing "the best support possible." To provide this support, coordination must encompass deconfliction and at the same time mass firepower.

Maximum Firepower Effectiveness

Tied into the concept of combining the effects of firepower is the requirement to maximize the utility of every round of ammunition. Indeed, one of the keys to winning any war is the effectiveness of resource usage since war-fighting resources are always limited in quantity. The Germans experienced a resource limit during Normandy when they could not launch sufficient air support sorties because of a pilot shortage.[4] German army units in France also encountered shortage problems when they ran out of ammunition during Operation Overlord. They were simply unable to continue the war effort because they did not have the necessary resources to carry on.[5] The same problem applies to modern weapon systems. Ask any NATO army officer, regardless of nationality, whether NATO has enough resources to fight the next battle. The answer will almost assuredly be "No." In fact, it was only five years ago that Gen Bernard Rogers, Supreme Allied Commander, Europe (SACEUR), campaigned to increase the defense spending of the NATO allies to build a credible defense.[6] Thus virtually every military resource is critical because some portion of combat capability depends on the resource.

The problem of resource limitations becomes even more compelling when it involves expensive, limited, and very powerful weapon systems such as the Apache, the F-111, the F-4G, and the multiple launch rocket system (MLRS). These types of systems are even more important because of their tremendous potential, and their limited numbers add credence to the necessity for making their employment as fruitful as possible. NATO cannot tolerate the misuse of any of its firepower, and these are precisely the types of systems that can have the greatest impact on the battle past the FSCL. These weapon systems' employment must result in maximum benefit. The corollary is that NATO can ill afford to duplicate the efforts of one of these expensive, scarce weapon systems with another.

Combining Effects

Another key requirement is to combine the employment of several different weapon systems to provide overwhelming firepower at a given moment in time and space. This requirement was alluded to earlier when discussing the importance of coordinating firepower. However, the combination of different types of weapon systems can produce effects far greater than each system's employment in isolation. There needs to be a process, which complements the deconflicting process mentioned earlier, that allows these scarce resources to work together. Such a process would have some built-in complexities. One must remember that several of these weapon systems are "owned" by individual services and are controlled by those

services at different levels. Air force air power is typically controlled by the allied tactical air force (ATAF) commanders while the Apache is held at the corps level. Right now, the Central Region does not coordinate the employment of these resources very well; that must be fixed. Moreover, adding the crucial requirement to avoid duplication of effort to the need for combined firepower makes coordination past the FSCL an absolute necessity.

Airspace Control

Any weapon system employed beyond the FSCL must travel through the aerospace medium. As more weapon systems develop the ability to attack deeper, airspace management increasingly becomes a problem. In addition, not all those systems have human pilots who can employ the "see and avoid" concept. Some may question how serious this problem really is at this juncture because the deep-battle traffic in any given period would still be fairly light. After all, the deeper into the enemy's rear area the target is, the fewer the systems that can reach it. However, as the Apache shows, the number of weapon systems that can reach that portion of the battlefield is growing. And, as this discussion has pointed out, they are also the types of systems which we must safeguard as much as possible. Finally, these weapon systems are not owned by any one service and will often be employed in concert with each other, making coordination important for mutual support, survival, and mission success.

Principles of War

Any military mission discussion would be remiss if it did not mention the principles of war. Tried and true, the principles have been the cornerstone for the development and examination of strategy. The principles that apply to the coordination of firepower almost exhaust the list: objective, offensive, mass, economy of force, maneuver, unity of command, and timing and tempo. The common focus is that they all point to ensuring that firepower is used to maximum benefit and that, quite simply, is the focus of this paper—ensuring that NATO can make maximum use of its war-fighting capability.

Concepts: AirLand Battle and Follow-On Forces Attack

It is important, now, to examine the AirLand Battle and FOFA concepts. The next war will be fought with weapon systems and defensive strategies, FOFA being a key ingredient, which have not been tested in combat. (Technically, the FOFA concept has not been tried as a strategy in and of itself.) This lack of experience underscores the importance of fully understanding and implementing the concept. As noted earlier, ALB and FOFA are closely connected concepts.

AirLand Battle (ALB). AirLand Battle doctrine describes the Army's approach to generating and applying combat power at the operational and tactical levels. It is based on securing or retaining the initiative and exercising it aggressively to accomplish the mission. . . . The best results are obtained when powerful blows are struck against critical units or areas whose loss will degrade the coherence of enemy operations in depth, and thus most rapidly and economically accomplish the mission.[7]

Follow On Forces. Follow On Forces (FOF) are those WP ground and amphibious forces not yet engaged in the battle, the logistics and other support forces sustaining them, the command and control communications centres used to direct their movement and deployment, and the locations through which these forces move and from which they are supported.[8]

Follow-On Forces Attack. Follow-On Forces Attack (FOFA) are operations devoted to counter a specific follow-on force threat with specified allied forces and assets within a limited time. They are tasked and conducted as mission tasks which are based on and interlinked with the joint combined commander's operational priorities for the overall battle. . . . The distinguished feature of the ACE [Allied Command, Europe] FOFA concept is the highly centralized focus given to the interdiction effort. . . . Given the constraints of space and time in defending NATO territory, FOFA is a logical and necessary complement to NATO's forward defence strategy.[9]

Gen Bernard Rogers, considered by many to be one of the originators of the FOFA concept, describes FOFA from his perspective as the Supreme Allied Commander, Europe.

FOFA is designed to give us the capability to attack, with conventional weapons (not forces), those enemy forces (including Operational Maneuver Groups) which stretch from just behind the troops in contact to as far into the enemy's rear area as our target acquisition and conventional weapon systems will permit. . . . The objective of FOFA is to reduce to manageable proportions the number of attacking Warsaw Pact forces against which we would have to defend at our forward defensive positions.[10]

Notice that both ALB and FOFA put great importance on taking the battle into the enemy's rear area. Both also emphasize managing the enemy's force ratios at the front by keeping the enemy's subsequent echelons from reaching the forward line of own troops (FLOT) until friendly ground forces can handle their presence. This is exactly the strategy NATO has needed to fight a numerically superior Warsaw Pact. However, some members of NATO have a basic problem with part of the ALB concept.

Although some European defense officials could support the logic of interdicting the Soviet second echelon with conventional weapons, their political interests required that a distinction be drawn between such attacks and the offensive attack elements of the U.S. Army's AirLand Battle doctrine. In particular, because NATO is a defensive alliance . . . there is a clear need to disassociate NATO's evolving concept for second echelon interdiction from the U.S. Army's new counteroffensive aspirations.[11]

ALB concentrates on seizing and maintaining the initiative—taking the offensive if you will. NATO, because it is a defensive alliance, has been hesitant to endorse a concept that embraces the offensive. Some members believed adoption of the ALB doctrine would send the wrong signal to the WP and would, therefore, serve as a destabilizing factor. This difficulty with the acceptance of the ALB strategy has not affected, and should not affect, NATO's complete endorsement of the FOFA concept.

> A great deal has been said about the differences between AirLand Battle and NATO FOFA. First and foremost, FOFA is a part of the overall Allied Command, Europe (ACE), operational concept for the defense of NATO territory. AirLand Battle, on the other hand, is Army doctrine for worldwide application. . . . Therefore, in Europe, the US Army will apply AirLand Battle doctrine according to the ACE operational concept not only for FOFA but also for other aspects of the ACE concept. . . . Second, FOFA applies explicitly to NATO and, consequently, must accommodate alliance political considerations.[12]

Col Thomas A. Cardwell III, a noted writer on the employment of tactical air power, has also commented on the differences between FOFA and ALB:

> AirLand Battle doctrine addresses three interrelated but distinct battles—rear, close in (or central) and deep—while FOFA addresses only the deep battle. AirLand Battle doctrine discusses the integrated use of nuclear, chemical and conventional weapons and talks of preemptive spoiling attacks, while FOFA addresses only defensive measures and conventional strikes after the battle has begun. FOFA also addresses deep attack tailored to the political realities of Europe, while AirLand Battle applies in a worldwide scenario.[13]

The FOFA concept is really a subset of the ALB doctrine—a small portion of the more widely applicable overall strategy. As stated in its definition, ALB "is based on securing or retaining the initiative. . . . The best results are obtained when powerful blows are struck against critical units or areas whose loss will degrade the coherence of enemy operations in depth."[14] FOFA strikes those "powerful blows" to "enemy operations in depth" by concentrating firepower on the enemy's uncommitted forces to prevent defending forces from having to face an overwhelming force ratio in the close battle. Follow-On Forces Attack uses deep-attack weapon systems, predominantly air force assets but increasingly including army assets as well, to destroy, delay, and disrupt the orderly flow of the enemy's second echelon to the battlefield. Success of NATO's FOFA concept would indeed give the initiative to NATO's ground forces, but this does not mean NATO would move to offensive action. In the NATO context, this initiative means a capability to counterattack to regain lost ground, a capability to hold defensive lines, or an ability to retreat slowly while awaiting the time and place to reestablish the original *FLOT*.

One final item must be addressed—the relationship between the need to coordinate weapons employment past the FSCL and FOFA doctrine. To this point the author has consciously ignored this relationship to avoid establishing a requirement for weapons coordination based solely on adoption of the FOFA concept. The present use of the FOFA concept *mandates* deep-fire coordination, but future defensive doctrine may move away from the FOFA concept. Even if NATO were to abandon Follow-On Forces Attack, the need to coordinate firepower directed to supporting the deep battle would remain. The key mission will be to delay, disrupt, or destroy the enemy's uncommitted forces, all of which will be done by the expensive, scarce weapon systems discussed earlier, regardless of the name of the new doctrine.

The important points to remember at this juncture are that Follow-On Forces Attack has been adopted by NATO as a key defensive strategy and

that FOFA is different from AirLand Battle with respect to establishing the offensive. Thus, disagreeing with the ALB concept does not mean rejecting FOFA.

Battlefield Overview

Thus far, this chapter has reviewed the reasoning behind employment of deep-attack weapons and the need for their coordinated employment. The chapter also has introduced the ALB and FOFA concepts and explained their relationship. It is now time to present a basic overview of the battlefield to provide a graphic illustration of its division and to associate air power missions with the battlefield and its segments.

The Battlefield

Battlefield dimensions are shaped from the ground commander's perspective. For example, width boundaries are determined by lines separating adjacent corps. These lines are not entirely arbitrary, as they are often the summation of terrain features and weapons employment limits. Width boundaries are agreed upon between neighboring corps, and the corps have procedures for supporting each other in such ways as cross-corps artillery support.

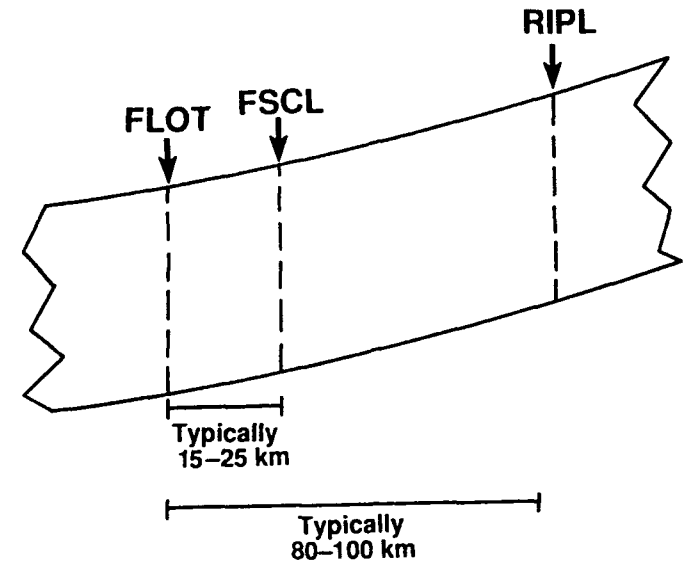
The depth of the different segments of the battlefield is derived from the different ground commanders' ability, through either firepower application or intelligence gathering, to influence the battle. Figure 1 shows a portion of the battlefield in its simplest form. The first line across the area is the forward line of own troops. This line is self-explanatory in that it designates the forward position of friendly forces. The second line is the fire support coordination line, and the last line is the reconnaissance and interdiction planning line (RIPL). The distances annotated in the figure are typical.

The fire support coordination line

> is a line established by the appropriate ground commander to ensure coordination of fire not under his control but which may affect current tactical operations. The FSCL is used to coordinate fires of air, ground or sea weapon systems using any type of ammunition against surface targets. The FSCL should follow well-defined terrain features. The establishment of the FSCL must be coordinated with the appropriate tactical air commander and other supporting elements.[15]

Among the factors the ground commander should consider in establishing the FSCL is the area over which he has direct influence. This area is usually affected by the range of organic army weapons.[16]

The reconnaissance and interdiction planning line is established by ground force commanders (it is coordinated between army group commanders and is usually located 80 to 100 km beyond the FLOT). This planning line would be set so that it separates the leading elements of the enemy force from reserve and follow-on components. The RIPL marks the corps limit of responsibility for intelligence and planning. Thus a corps



Legend:
FLOT—Forward Line of Own Troops
FSCL—Fire Support Coordination Line
RIPL—Reconnaissance and Interdiction Planning Line

Figure 1. Basic Battlefield

commander selects interdiction targets on the near side of the RIPL; the AG commander nominates targets beyond the RIPL.[17]

Note the relationship of the range of organic army weapons to establishing the FSCL. The placement of the FSCL is subject to a great deal of debate because new weapons, such as the Apache, extend the range of organic firepower beyond the typical RIPL, let alone the FSCL. Another factor in the debate is the disparity these weapon systems cause between adjacent corps. When a US corps gets these new systems, its capability in depth of firepower is vastly different than that of neighboring corps which do not have them.

The typical distances shown for the RIPL also cause a problem when reviewed in the context of Apache employment. The RIPL is supposedly the farthest point from which the corps commander can get intelligence information and to which he can influence the battle with organic resources, but the Apache can effectively operate out past the current placement of the RIPL. To take advantage of that kind of penetration, intelligence organizations will need to look a great deal farther than the traditional RIPL. Thus, the current definition of the RIPL, at least in terms of its typical placement, seems to be faulty.

Air Operations

Different categories of air operations are associated with the regions of the battlefield shown in figure 1. These missions are close air support, battlefield air interdiction, tactical air reconnaissance, and air interdiction.

Close Air Support (CAS). 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.[18]

Battlefield Air Interdiction (BAI). Air action against hostile surface targets which are in a position to directly affect forces and which requires joint planning and coordination. While BAI missions require coordination in joint planning, they may not require continuous coordination during the execution phase.[19]

[Such missions attack] land force targets which have a near term effect on the operations or scheme of maneuver of friendly forces, but are not in close proximity to friendly forces.[20]

BAI missions may be flown against targets on either side of the FSCL, but attacks against targets short of the FSCL must be coordinated with the appropriate corps.[21]

Tactical Air Reconnaissance (TAR). The use of air vehicles to obtain information concerning terrain, weather, and the disposition, composition, movement, installations, lines of communications, electronic and communication emissions of enemy forces. Also included are artillery and naval gunfire adjustment, and systematic and random observation of ground battle areas, targets, and/or sectors of airpsace.[22]

Air Interdiction (AI). Air interdiction operations are air operations conducted to destroy, neutralize, or delay the enemy's military potential before it can be brought to bear effectively against friendly forces at such distance from friendly forces that detailed integration of each air mission with the fire and movement of friendly forces is not required.[23]

These missions and their relationship to the battlefield are shown in figure 2. Notice the relationships are not linear and are not necessarily precisely connected to the battle areas. Employment of air power in these areas, as the definitions point out, varies in the amount and degree of coordination required. Coordination requirements change not only for mission execution but also for mission planning. BAI targets, for example, are nominated by corps commanders. In that sense BAI targets are as crucial to the ground commander as CAS targets are. The difference between CAS and BAI missions is one of coordination in the target area, mostly because for BAI targets the distance from friendly troops is significantly higher. Requirements for air interdiction missions are different from either BAI or CAS. AI targets may be nominated at several levels—they need not be, and often are not, nominated by the ground commanders. There is no requirement for coordination as these sorties are typically beyond the RIPL.

TAR is a slightly different category as it can be tasked and flown virtually throughout the battlefield, but its requirements mirror those for other offensive air support (OAS) missions. There is a target, ordnance, and a tactical air power asset assigned to "attack" the target. While the ordnance may not be explosive and the purpose of the attack may not be to destroy the target, the mission elements are basically the same. The aircrew must be "fragged" for the mission. The mission must be planned in accordance with all existing rules of engagement (ROE), airspace coordination rules, and any other factors affecting flight. Enemy defenses must be planned

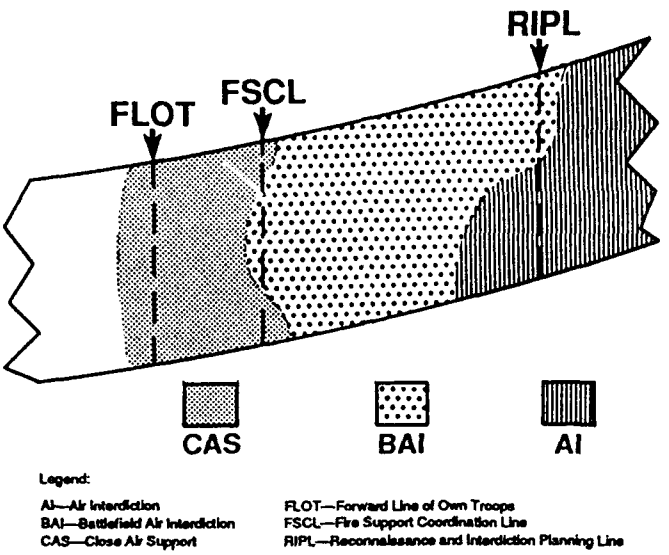


Figure 2. Air Power Mission Areas

for, engaged, and defeated. The target attack must be planned so that the "ordnance" being used can be successfully employed and the aircraft and crew can survive. Thus a TAR mission is essentially the same as its OAS brethren—CAS and BAI.

Some TAR assets are dedicated to the TAR mission while others are multimission aircraft. US RF-4Cs are single-mission aircraft in that they are not equipped to carry offensive weapons. Therefore they are not involved in the apportionment and allocation processes, which will be discussed in some detail later. Such assets could well be involved in the allotment process, however, because of their limited numbers and their unique capabilities. On the other hand, the new reconnaissance variant of the Royal Air Force (RAF) Tornado will have the capability to carry weapons. Thus its employment could well be determined through the same process as all other tactical air power assets in the Central Region. Again, TAR assets and other OAS assets are treated basically the same.

All of these different missions fit into two general categories: offensive air support and air interdiction. As figure 3 shows, the combination of CAS and BAI comprises OAS. However, for the US Air Force, BAI and AI make up another category called interdiction. This strange dichotomy occurs because the US Air Force holds that BAI is a subset of interdiction (BAI and AI), but NATO defines BAI as a portion of OAS. The practical difference is at the level of target nomination, as discussed earlier, and at the level of target planning. For interdiction, the targeting cell at an allied tactical air force and army group (AG) does the targeting. BAI targeting is normally done at the air support operations center (ASOC) and the corps fire support

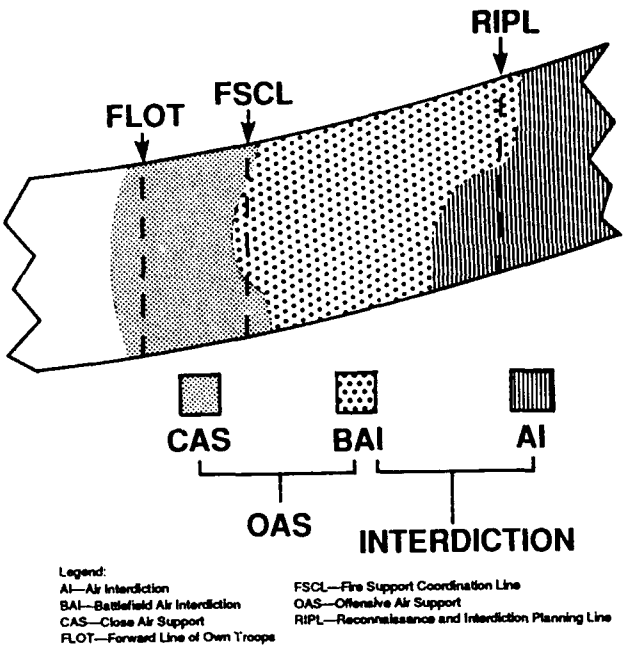


Figure 3. Mission Area Composition

element (FSE). The allied tactical operations center (ATOC), a level between the ATAF and the ASOC, typically does execution planning, force packaging, and tasking. Because this paper addresses the problem in NATO's Central Region, it uses the concept of OAS. The point to remember is that the US Air Force approach to BAI can, and sometimes does, cause additional problems in the workings of air power issues in NATO's Central Region.

A related area is the US Air Force position on the RIPL. Since the Air Force views BAI and AI as parts of the same category, it sees no need for a line to delineate the boundary between OAS and interdiction—it already exists in the FSCL. Again, the main point is to be mindful of the divergence of ideas.

To build a meaningful basis for further discussion, one must return to the FOFA concept briefly. Figure 4 displays the FOFA area of engagement and shows that the FOFA area encompasses every portion of the battlefield. This overlay helps illustrate several points. FOFA battle management must be all encompassing. FOFA battle management must span the length and often the breadth of the battlefield. Thus the coordination system to manage the FOFA battle must have access to all the weapon systems that are able to operate in the deep battle. In addition, the combination of firepower alluded to earlier is critical to the success of the battle. Enemy forces identified as the follow-on force to be attacked may well stretch across two adjacent corps areas and be several kilometers deep. Coordinated firepower is the only good answer to achieving the FOFA goal—destroying, delaying, and disrupting the enemy's uncommitted forces.

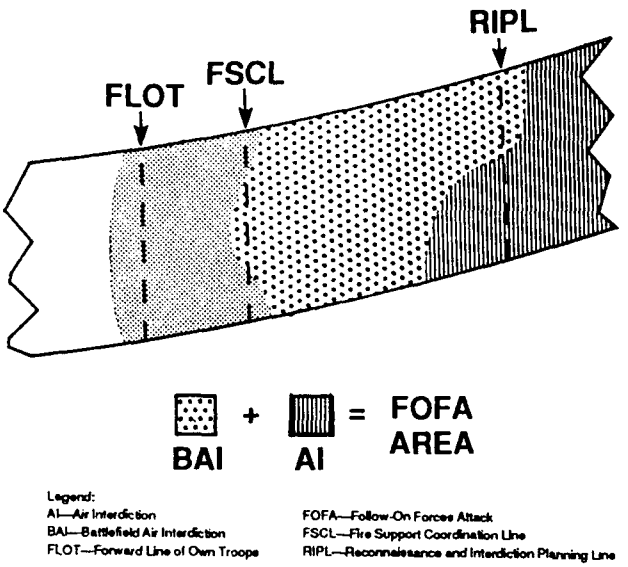


Figure 4. Follow-On Forces Attack Area

Summary

This chapter began with a discussion of the importance of the coordination of weapons employment. It examined several key reasons dictating sound firepower coordination, including the basics behind weapons employment coordination and how firepower coordination affects the battlefield, the requirement to achieve maximum firepower effectiveness, the synergistic effects of combined weapons employment, the increasing need for airspace management deeper into the enemy's rear area, and the principles of war. The chapter also explored the meanings of ALB and FOFA with the goal of explaining the critical role of FOFA doctrine. Finally, the chapter reviewed battlefield composition. Added to this delineation was a discussion of the different types of air power employment used in the different regions of the battlefield. Areas of difference between the NATO allies, in meaning as well as mission, were examined to provide the reader with greater insight. Finally, the chapter displayed the overarching nature of the FOFA mission. With this background, the paper turns to a brief review of some of the lessons learned during the growth of air power.

Notes

1. SHAPE 1510.7.7/SHORL/88, *Concept for Follow-On Forces Attack (FOFA)*, August 1988, 1-3.

2. The author attended the two-day COMAAFCE's Central Region Air Operations Conference, held at Ramstein AB, West Germany, 25–27 September 1989, where most of the discussion items centered on improving the Central Region's mission management capabilities.

3. Lt Col Peter S. Morosoff, USMC, "Fire Support Coordination Tactics," *Marine Corps Gazette*, June 1988, 39.

4. Max Hastings, *Overlord: D-Day & the Battle for Normandy* (New York: Simon & Schuster, Inc., 1984), 266–67.

5. Ibid., 266.

6. Tom Phillpott, "NATO Leader Calls Alliance's Budget Inadequate," *Air Force Times*, 9 July 1984, 32.

7. US Army Field Manual (FM) 100–5, *Operations*, May 1986, 14.

8. SHAPE 1510.7.7, 3.

9. Ibid.

10. Gen Bernard W. Rogers, USA, "New Strategy for NATO," *Defense Update International*, July–August 1987, 27.

11. David J. Stein, *The Development of NATO Tactical Air Doctrine 1970–1985*, Rand Report no. R-3358-AF (Santa Monica, Calif.: Rand Corporation, 1987), 39–40.

12. Gen William R. Richardson, USA, "FM 100–5: The AirLand Battle in 1986," *Military Review*, March 1986, 9.

13. Col Thomas A. Cardwell III, USAF, "Follow-On Forces Attack: Joint Interdiction by Another Name," *Military Review*, February 1986, 5.

14. FM 100–5, 14.

15. Joint Chiefs of Staff (JCS) Pub 1–02, *Department of Defense Dictionary of Military and Associated Terms*, 1 December 1989, 144.

16. NATO Military Agency for Standardization, *Fire Coordination in Support of Land Forces*, STANAG No. 2099, Brussels, Belgium, 5 November 1973, 1–3. A number of NATO documents discuss considerations in establishing the FSCL; see, for example, Allied Tactical Publication (ATP)–33(B), *NATO Tactical Air Doctrine*, November 1986, for a general, unclassified discussion and Allied Air Forces Central Europe (AAFCE) Manual 80–2, *Offensive Air Support* (NATO U), 1988 (NATO RESTRICTED), for a more detailed explanation.

17. Lt Gen Crosbie E. Saint, USA, and Col Walter H. Yates, Jr., USA, "Attack Helicopter Operations in the AirLand Battle: DEEP Operations," *Military Review*, July 1988, 8. The RIPL has no US equivalent.

18. ATP–33(B), 5–5, and JCS Pub 1–02, 70. As is the case with many terms used in the US military and NATO, the official definition for both usages is identical. Different wordings that carry essentially the officially accepted meaning abound. See, for example, the August 1990 draft of AFM 1–1, *Basic Aerospace Doctrine of the United States Air Force*, which quotes both JCS Pub 1–02 and a 1940 US Army field manual. AAFCE Manual 80–2 (NATO RESTRICTED) expands the official definition.

19. AFM 1–1, draft, August 1990, 240. The manual draws this definition from NATO ATP–27(B) and –33(A).

20. Ibid., 239.

21. Saint and Yates, 8. For a more detailed discussion of fire coordination see, for example, STANAG No. 2099, ATP–33(B), and AAFCE Manual 80–2 (NATO RESTRICTED).

22. JCS Pub 1–02, 361. Again the NATO and US definitions are essentially the same. For various wordings, see the NATO documents mentioned in the preceding notes.

23. ATP–33(B), 5–2.

Chapter 2

Air Interdiction and Follow-On Forces Attack

In the first chapter, discussion centered on the advantages inherent in coordination of weapons employment beyond the fire support coordination line. This chapter takes the concept of coordination between forces on the ground and forces in the air one step further. The chapter begins with a further explanation of the Follow-On Forces Attack concept and discusses the dimensions of the area in which the concept could, and very likely would, be fought. The vast size of that area is crucial to understanding the subject. The chapter then examines the relationship between the classic air interdiction mission and the types of missions to be flown under the FOFA concept. Based on that relationship, the next area examined is the major lessons learned from past air power campaigns that have included missions similar to the FOFA concept. The conflicts in which these lessons can be found are World War II, the Korean War, the Vietnam War, and the Arab-Israeli War of 1973. Finally, the author attempts to translate the lessons learned into fundamental principles to serve as a guide for further campaigns.

Follow-On Forces Attack Area

The FOFA engagement zone is defined as that area of the battlefield in which FOFA missions might be employed. In chapter 1, that engagement zone was illustrated as having significant depth—depth which traversed every portion of the enemy's side of the battlefield. The engagement zone has considerable breadth as well. As figure 5 illustrates, the zone may span several corps boundaries. Although the follow-on force may not move across several corps, there is no reason to assume that it will travel through only one corps area of responsibility (AOR). While the follow-on force is well in the rear of the battlefield, it will maneuver so as to conceal its intended point of entry into the close battle. It will also use a route that allows it to change its intended point of attack and to retain its ability to exploit unexpected situations at the FLOT. Thus its maneuver will not conform to the artificialities of the NATO corps boundaries. Once the follow-on force approaches the FLOT and its leaders have determined the exact engagement point, it will probably proceed along the most direct route to its objective.

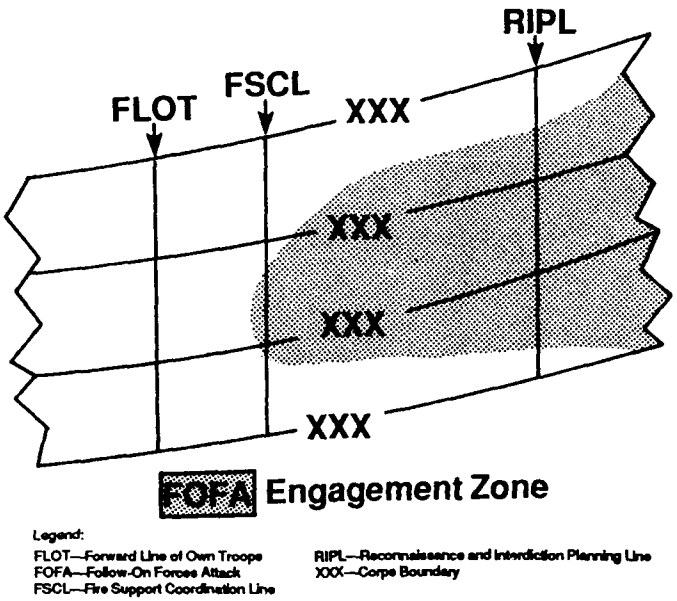


Figure 5. Follow-On Forces Attack Zone

Although the boundaries of the FOFA engagement zone appear to be unpredictable, there are definite ways to determine the area in which FOFA missions will be flown. This area starts at the earliest point the enemy force can be identified as a FOFA target. *This definition sounds simple, but its importance cannot be overstated.* There is no reason to send forces deep into enemy territory until enemy forces present a target of sufficient size and definition to make the sortie productive. A number of critical factors affect when and at what range such attacks can be made. The most important is the ability of friendly intelligence sources to identify the enemy's force. Another factor is the range and availability of air power. Air power must be available to be tasked, and the commander will always have to make tough decisions about the allocation of air assets to different missions. Unless the forces identified are within the range of the weapon systems available, the only option will be to continue to task intelligence assets to track the follow-on forces until they can be engaged. Once an enemy force can be identified, not only as a target but also as a force that will make a difference if it reaches the front intact, and there is available firepower with the range and capability to reach the target, FOFA can begin. This decision point can be reached, depending on the intelligence and air power assets available, when the forces identified as the target are still relatively deep in their own territory.

Another point must be made. Although it would appear that the FOFA campaign would be directed across the breadth of the battlefield, this is not realistic in the European theater. The shortage of weapon systems available for the FOFA mission, given the presence of other taskings and the range

requirements for the deepest missions, will dictate that NATO must identify and engage only the enemy elements that pose the greatest and most imminent threat.[1]

Evolution of Follow-On Forces Attack Concept

The characteristics of the FOFA engagement area are flexible breadth and depth. The size of the zone is determined by enemy objectives (in building and deploying a force "worthy" of attack) and friendly intelligence and firepower capabilities. With an appreciation of the dynamics of the FOFA area and the requirements of the FOFA mission delineated in chapter 1 in mind, it is time to turn to a study of the lessons learned in previous battles where missions similar to the FOFA missions were flown.

Follow-On Forces Attack and Interdiction

While air power employment in FOFA appears to be a new mission concept, there are parties who believe FOFA's air power component is nothing more than the interdiction mission.

> FOFA is not a *new concept*, just a *new name* for interdiction. *Military commanders have always sought to target these follow-on forces, but the fact is we lacked adequate target acquisition resources and conventional weapons systems—other than manned aircraft—with sufficient range and accuracy* [emphasis in original].
>
> In current NATO tactical publications, the term air interdiction is used to describe what the FOFA concept is designed to do.[2]

Indeed, if one examines the definitions supplied in chapter 1, the similarity between air interdiction and FOFA is striking. Air interdiction is "air operations conducted to destroy, neutralize, or delay the enemy's military potential before it can be brought to bear effectively against friendly forces."[3] FOFA is operations

> to attack . . . enemy forces . . . which stretch from just behind the troops in contact to as far into the enemy's rear area as our target acquisition and conventional weapons systems will permit. . . . The objective of FOFA is to reduce to manageable proportions the number of attacking Warsaw Pact forces against which we would have to defend at our forward defensive positions.[4]

On the surface it would seem that FOFA is just interdiction by another name, but this is not the case when one examines the issue closely. Indeed, there is a fundamental difference, significant enough to affect the outcome of any future conflict.

Time and Space

> FOFA is different from the interdiction concept as we have known it. Air Force interdiction, in that it is more time and space sensitive with respect to supporting the land commander's campaign plan and immediate battlefield needs.[5]

Note that time and space are relatively more important to FOFA missions. Remember the FOFA concept is one of impact upon the enemy's ability to

present forces at the forward edge of the battle area (FEBA). Thus the enemy is working a time and space problem when he attempts to present his second echelon forces at precisely the right time and place to have the most effect. Consequently, the NATO reaction to the enemy's movement is also a time and space problem—the enemy must be engaged in a timely manner as soon as he can be identified and is vulnerable. The enemy must also be engaged before he is able to have an impact on the battlefield—thus the space element. The time and space argument is a critical factor in the proper employment of air power in the FOFA role.

As noted, FOFA and interdiction share some characteristics. For the purposes of this discussion the most important shared element is synchronization.

> Air interdiction does, indeed, make its contribution by either destroying enemy forces or delaying and disrupting their movement; however, in order for either effect to contribute fully to the successful outcome of a campaign, air interdiction and the ground maneuver must be *synchronized* so that each complements and reinforces the other [emphasis in original].[6]

The critical dimension is coordination. If the key to winning the next European war is the successful application of FOFA or, put in other words, interdiction in which time and space factors are especially critical in the synchronization of air operations with the ground scheme of maneuver, that key is dependent upon the successful coordination of the air and ground elements—pure and simple.

In short, FOFA employment will cover vast portions of the battlefield. Air interdiction is very similar to FOFA. In fact, when air interdiction is especially time and space sensitive and is synchronized with the ground battle, it is for all purposes equal to FOFA. If one explores the history of air interdiction, identifies its successes and failures, and applies the time/space/synchronization standard, one should be able to develop some principles of the FOFA mission. Such an analysis should point to improvements in the current Central Region mission management system.

Historical Perspective

Although it usually is best to begin at the beginning, there is a great deal of utility to beginning in the middle when it comes to an analysis of air interdiction. The reasons center on the availability of air interdiction analyses that have remained relatively "unmodified" in the course of political and historical review. One of the few such sources of lessons learned from interdiction campaigns was the Far East Air Forces (FEAF), the US air arm during the Korean War. Thus, as a beginning for the development of FOFA principles, a quick review of the lessons learned from the Korean War is in order.

> 1. Air interdiction operations should not be planned without regard for ground operations.

a. Interdiction against lines of operations may be conducted as tension interdiction with the ground force applying the pressure to keep the lines taut.

b. Isolation interdiction must be coordinated to take advantage of its time sensitivity.

2. Limited War does not invalidate these concepts. The limitations must be compensated for.

3. Air interdiction operations should not be conducted alone or in isolation from the aspect of pressure on the enemy. Alone, it becomes attrition by air which is not profitable.

4. Both ground and air commanders and planners need to understand and employ these relationships. In light of the complementary functions, this relationship is no longer optional.[7]

The first lesson discusses the importance of ensuring the air interdiction campaign is at least coordinated with the ground action plan. The lesson is simple enough and has already been the subject of attention in this treatise. The second lesson, dealing with limited war, seems out of place. One must remember, however, that at the time, US leaders generally thought of the Korean conflict as a limited war, even as no more than a possible precursor to the all-out war in Europe. The authors were attempting to say that the requirement for joint planning and coordination was just as important in limited war as it would be in the next major war. The third lesson, making sure the air interdiction campaign is integrated with the other forms of pressure, is as important as the coordinated planning mentioned earlier. Thus, not only does the air interdiction have to be coordinated with the army ground plan but air interdiction must be accomplished while pressure is applied from another front. Alone, the air interdiction campaign becomes attritional warfare. In concert with other pressures on the enemy, the air interdiction campaign reaches its true potential. Lastly, army and air force leadership must understand the need for these relationships—they are no longer considered optional.

In essence, the lessons learned in Korea center on the necessity, not the option, of combining the air interdiction campaign with the army scheme of maneuver. (If this discussion sounds a great deal like the justification used earlier for coordinating the employment of weapons beyond the FSCL, the reason is that the concepts are similar.) It would be easy to move on from here, but remember that this discussion started in the middle to take advantage of the concise statement of lessons "relearned" from World War II. And much to the author's amazement these lessons had to be relearned in Vietnam. Thus history tells us that these lessons seem a great deal harder to accept than to formulate.

To return to the beginning, probably the most striking example of the influence of air interdiction came during World War II. Operation Overlord, the landing at Normandy, was a success for a number of reasons, and air power was one of the reasons. Even more striking was the ability of air power to influence the subsequent battlefield. The Germans had nearly 60 divisions on the Western front when Overlord began. This disposition gave

them a comfortable advantage when compared to the Allied forces brought ashore during the first few days. However, the Germans were unable to bring those forces to bear at Normandy because of the killing power of the Allied air forces in German rear areas. Von Runstedt, the commander of the German forces, summed up the workings of Allied air power:

> The main difficulties that arose for us at the time of the invasion were the systematic preparations by your air force; the smashing of the main lines of communications, particularly the railway junctions. We had prepared for various eventualities . . . that all came to nothing or was rendered impossible by the destruction of railway communications, railway stations, etc. The second thing was the attack on the road, on marching columns, etc., so that it was impossible to move anyone at all by day, whether a column or an individual, that is to say carry fuel or ammunition. That also meant that the bringing up of the armored divisions was also out of the question, quite impossible.[8]

The interdiction campaign for Overlord started three months before the invasion. Its specific objectives focused on disrupting enemy movement through the destruction of the enemy's lines of communication. Once Overlord began, the interdiction campaign adopted the FOFA approach, concentrating on attacking German troops and supplies rather than their lines of communication. While these are different missions, the common thread is their linkage to the Allied ground maneuver. The mission of the air interdiction campaign was to provide time for the Allies to establish themselves at Normandy without having to fight a numerically superior German force. Air power kept that force away from the battlefield. Although the use of air interdiction during Overlord was offensive in nature, the same levels of success are available during the defense.[9]

The Korean War provided an excellent example of the ability of air interdiction to influence the defense. When the North Koreans invaded the South on 25 June 1950, they outnumbered the Allies by a sizable number. Because of this numerical advantage and other factors, the Allies were quickly driven into a rapid retreat. However, the quick retreat stretched the North Korean logistical lines as they sought to maintain contact. Additionally, the North Koreans were forced to move in the daylight to keep pressure on the retreating Allies. This made them lucrative targets for air power.

> As the Allied forces withdrew into the Pusan bridgehead, 5th Air Force inflicted such high losses on North Korean personnel and equipment that the enemy ground forces had neither the strength nor supplies to crack the perimeter. Airpower gave the Allied army time to bring in enough reinforcements and logistics to begin a breakout and pursuit.[10]

As at Normandy, air power's contribution was to give the ground forces the time and space they needed to accomplish the mission at hand. Whether in the offense, as at Normandy, or the defense, as at Pusan, matters little. The effectiveness of both air interdiction operations was directly related to air power's ability to limit an enemy's capability to influence the battle.

Another classic example of the importance of the tie-in between the ground scheme of maneuver and the application of timely air power came during the 1973 Arab-Israeli War. On 7 October 1973, 300 Syrian tanks drove to within five miles of the Benot Yacov bridge. Once across this bridge, the tanks would have had free rein over the entire Golan Heights. However, just as they were ready to proceed, they ran out of both fuel and ammunition. As it happens, their fuel and ammunition stocks, carried in convoys a short distance behind the tanks, had been destroyed *the night before* by Israeli interdiction operations.[11] That's time and space management!

To demonstrate fully the key link between ground operations and the effectiveness of air interdiction, one need only look at the results of the various interdiction campaigns in Korea after the front lines had become static. These interdiction campaigns continued with impressive *individual* mission successes. However, the overall effect of the air interdiction campaigns was less than the sum of their individual missions.

> Interdiction Campaign No. 1 was started on the 2nd of that month. . . . Attacks were made on main transportation centers, key bridges and marshalling yards and the immediate results were very encouraging . . . all but seven of the forty-four bridges north of the 38th parallel listed for destruction by Bomber Command had been put out of action . . . and among other successes they maintained forty-seven rail cuts on the main rail line between Seoul and Taejon.
>
> This level of destruction undoubtedly weakened the North Koreans' ability to maintain heavy equipment such as tanks and artillery in the front line, but the impact of the campaign was far less than had been hoped.[12]

The important point is that the application of air power in interdiction operations will reach its full effect only if combined with surface actions.

To allow for the fullest integration of air power with the ground scheme of maneuver, it is only natural to collocate the command structures of the ground and air forces. As simple as this lesson in integration seems, it appears to be forgotten as many times as learned. The first learning opportunity came in North Africa in 1943 when Air Marshal Arthur ("Maori") Coningham finally integrated air force and army planning. As important as this "breakthrough" was, it had to be relearned during the buildup for Normandy. Part of the problem came from the desire of several senior airmen to prove the importance of strategic air power and its ability to win the war by itself. Nevertheless, until air power was integrated in North Africa and later at Normandy, its influence was indeed limited.[13]

In Korea, the same problems surfaced and had to be dealt with one more time.

> In spite of the obvious need to co-ordinate land-based air with ground operations and with carrier operations, the result, at least until the end of July 1950—when improvised but still inadequate procedures were brought into use at Pusan, was what the official USAF history calls a "fantastically confused command situation in the Far East."[14]

The reader should note the mention of carrier-based interdiction assets which, while providing a significant addition to the total firepower available,

also complicated the command and control structure. Joint cooperation was needed more than ever before.

Unfortunately, this learning process had to be repeated during the Vietnam War. Only late in the war was the air commander's headquarters collocated with the ground commander. This move alone played a significant role in improving the cooperation between the two services.

> One of the major mistakes of the Vietnam War was that the air commander and land commander didn't work from the same headquarters. When we finally did that, it worked. We planned campaigns. . . . The payoff was dramatic.[15]

Thus the lessons illustrated in the Korean War interdiction campaigns have proved to be applicable throughout the spectrum of war that has included air power. The corollary is that there are definite benefits to be realized by collocating army and air force headquarters.

Additional Air Power Aspects

There are other important aspects of the employment of air power which must be practiced to evoke its full potential. The first such aspect, and one that still occasionally generates high levels of heated discussion, is that of centralized command and control. The second aspect, acknowledged by senior army and air force officers everywhere, is the preeminence of air superiority over other air power functions. These aspects provide the foundation for further development of the FOFA management process.

Centralized Command and Control

Air power is inherently a very flexible form of firepower. Many of today's weapon systems can be employed in numerous roles. For example, the F-16 has the capability to perform effectively in every mission mentioned to this point: CAS, BAI, OCA, DCA, the F-16 can do them all. Add these capabilities to the aircraft's range and high sortie generation rate and one can imagine the same airframe being used in virtually every corner of the Central Region *in a single day*. This type of flexibility demands command and control at a level that can effectively select the mission that will benefit the war effort the most. Given the nature of air power—its range, firepower, and flexibility—command and control must be retained at a relatively higher level than for other assets if air power is to be effective and efficient. The Allies learned this lesson the hard way in World War II in North Africa.

> The net effect of . . . decentralization was to subordinate air operations to the ground commander. This resulted in piecemeal utilization of air power throughout much of the US operations in North Africa.[16]

The British experienced much better success in using their air power in North Africa. As a result of their successes, Gen Dwight D. Eisenhower insisted that the Americans adopt the British system, which provided for

centralized control of the tactical air forces under a senior tactical air commander.

> The results? . . . this increased flexibility in meeting ground force requirements enhanced capability to meet unexpected threats, and allowed for more effective employment of available air strength. While the air units could be sent separately to support various ground forces, they could also be massed quickly when concentration of effort was required.[17]

As with other lessons mentioned earlier, the requirement for centralized command and control was one that had to be relearned, even as late as Vietnam. Every time, the bottom line remains the same—centralized command and control is the most effective way to go. Gen William Momyer, examining three different wars, best sums up the lesson.

> The important point, however, (and this was an issue in Operation OVERLORD and in Vietnam), was that the theater air component commander had these air resources under his direct control. . . . The unity of airpower was not only sound in theory, but the theory stood the test of battle and proved to be the most effective method for the command and control of airpower in a theater of operations.[18]

The need for centralized command and control of air power is *not* purely a question of centralization. Decentralization proponents, such as Gen Wilbur Creech, recognize and fully support the necessity for centralized command and control, but argue that the centralization should occur at the lowest possible level. The question then becomes: What is the lowest level of delegation possible that still retains the ability to tap those characteristics of air power mentioned above? At what level is the appropriate air commander, the one person who best can choose when, where, and how to put air power to work? In NATO, that lowest possible level is the allied tactical air force—the level which commands the employment of air forces throughout the army group AOR.

Priority Mission: Air Superiority

In any future European war, air superiority will be the key to employing air power in other roles. This reality does not mean air superiority is the only mission that will be flown initially, or even that most assets will be employed in the air superiority battle until that goal is reached. It does mean that a favorable air picture is a requirement if NATO's armies and air forces are to have freedom to maneuver. While this assertion may appear to be an air force view, it is one which has been totally supported by the highest levels of army commanders in Europe.

> Land commanders' requirements of their air colleagues are on record. A past COMNORTHAG [commander, Northern Army Group] outlined four tasks: to concentrate air support when presented with lucrative targets, to concentrate support in an emergency or breakthrough situation and to impose maximum delay on the follow-on forces—but, in the first place, and of the highest priority, to keep the enemy air off the backs of the land forces. This primary task is regularly featured in my direction from CINCENT as the need to maintain a favorable air situation.[19]

An advantage in the air is a prerequisite for successful operation of both land and air forces. This advantage allows movement in rear areas and concentration on other tactical matters. Without a favorable air picture, NATO forces will face the same problems the German army faced during Overlord.

Summary

This chapter began by outlining the breadth and depth of Follow-On Forces Attack operations. FOFA was then compared with classic air interdiction to determine if the lessons learned throughout air power's history are applicable to FOFA. Air interdiction, with special constraints of time and space, was shown to be essentially the same as the FOFA concept. The chapter then extracted historical principles of air interdiction and thus the fundamentals of FOFA. These are:

- Centralized command and control of air power assets is crucial to air power's most effective employment.
- A favorable air picture is essential to the best employment of both ground and air forces. Creating this favorable air picture is the primary function of air power at the onset of hostilities.
- Air interdiction and FOFA employment must be planned and executed in combination with the ground maneuver of friendly forces.
- Air interdiction and FOFA effectiveness is not constrained to large conflicts.
- To apply air interdiction and FOFA properly, commanders of ground and air forces must understand the relationship of interdiction to ground maneuver and employ that relationship.
- The headquarters of ground and air commanders should be collocated. This collocation allows the maximum degree of synchronization.

With these principles established, the paper now moves to a review of the current command and control system employed in NATO's Central Region.

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Chapter 3

Mission Management Analysis

With the fundamentals outlined in the last chapter as background, this chapter begins with a review of the NATO ground and air command and control organizations in the Central Region. The discussion then turns to a brief examination of how those organizations plan to prosecute the war. Combining the fundamentals, the description of the organizations, and a simple command and control model reveals the weak points of the current organizations. With those weak points identified, solutions can begin to be formulated.

This chapter examines only the NATO *wartime* command and control organization. In most instances the chain of command employed during NATO wartime efforts is different from the national structures which perform command and control functions in the absence of hostilities. This does not mean the peacetime organization is unimportant. In fact, the peacetime organization has a profound effect on wartime capability because it is responsible for deploying, equipping, and training the forces declared to NATO. The peacetime organization also has a major voice in the acquisition of systems and personnel for the wartime command and control system as well as in the workings of those systems. However, for the purposes of this paper, the appropriate structure to evaluate is the one through which NATO commanders will prosecute the war.

Central Region Organizational Structures

The discussion concentrates mainly on the joint and multinational portions of the command and control process. Thus it largely excludes units below the corps level in the army chain of command because below this level the command and control structures belong to individual nations. National rules and procedures exist to serve the applicable country regardless of its area of employment and these can be changed only after thorough internal examination. This does not mean these organizations could not benefit from in-depth analysis of the workings of their command and control structures. Indeed, the author hopes that any discoveries in this paper will be of benefit to all levels of the NATO chain of command.

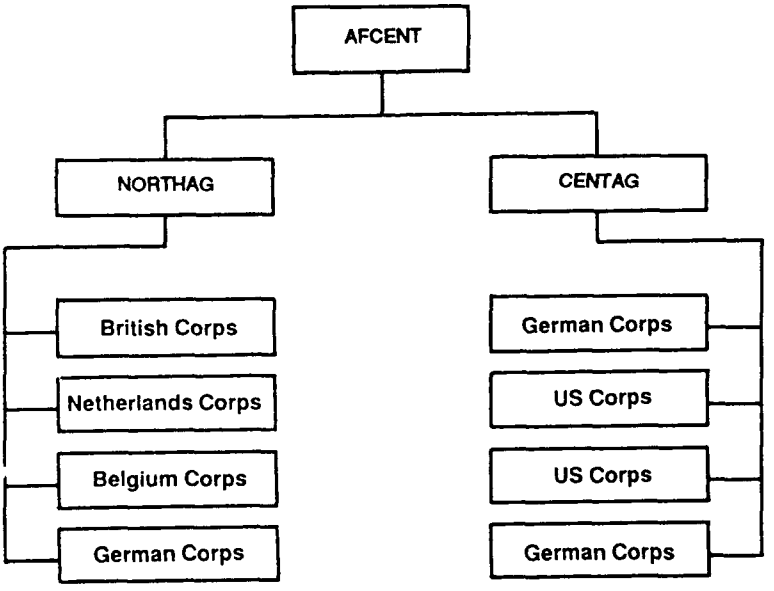
This review concentrates on two facets of the command and control system—mission tasking and mission execution. Mission tasking is the process of assigning available air power assets to targets, or what is

commonly referred to as the fragging process. Mission execution is the organization's systems and functions that allow it to carry out the directions of its commanders in managing air power missions.

Army

The Central Region army organization is shown in figure 6. Allied Forces Central Europe (AFCENT) is commanded by the commander in chief, Central Europe (CINCENT), a German army general. Under CINCENT are three primary commands—one air force and two army. Allied Air Forces Central Europe (AAFCE), the air component of AFCENT, will be discussed in detail later. Northern Army Group (NORTHAG), the army group in northern Germany, is commanded by a British Army general. The Central Army Group (CENTAG), the equivalent of NORTHAG located in southern Germany, is commanded by a US Army general. The rest of the structure, as shown in the figure, is comprised of the national corps assigned to the army groups. While the structure above the corps is multinational, at corps level and below the structure is national. In Europe, the primary war-fighting level on the ground is the corps.[1]

The division between the two AGs is a line stretching east to west through Germany which divides the country approximately in half. The division is also roughly equivalent to the division of the Warsaw Pact into two military



Legend:
AFCENT—Allied Forces Central Europe
CENTAG—Central Army Group
NORTHAG—Northern Army Group

Figure 6. Central Region Army Organization

districts. This NATO demarcation allows for a reasonable span of control for the two AG commanders—COMNORTHAG and COMCENTAG.

Air Force

AAFCE is headed by the commander, Allied Air Forces Central Europe (COMAAFCE), a US Air Force general. COMAAFCE commands the air forces of the Central Region (fig. 7). The allied tactical air forces are organized along the same lines as the AGs. 2ATAF is collocated with NORTHAG and is commanded by a Royal Air Force (RAF) air marshal. 4ATAF is collocated with CENTAG in the South and is commanded by a German lieutenant general. Below the ATAFs are four allied tactical operations centers (ATOC). Below the ATOCs are the air support operations centers (ASOC). Each ASOC is collocated with a corps headquarters. The ASOC is the air force level at which all units are national in character—the same nationality as the army units they support. Notice that the ATOCs are linked to both the ATAFs and all the ASOCs. Although the ATOCs have primary responsibility to a single ATAF for working with two primary ASOCs, they have the physical capability to interface with all the ASOCs and with both ATAFs.

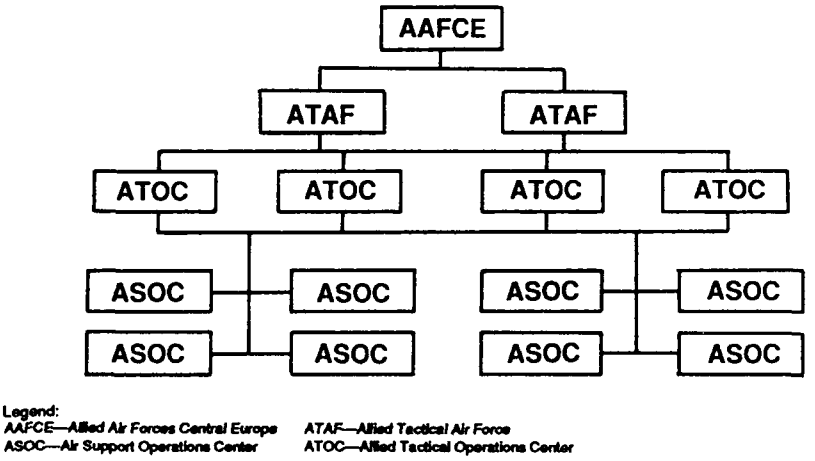


Figure 7. Central Region Air Force Organization

The air force structure differs from the army structure in that it becomes essentially a dual-track system below the ATOC level. The nature of that dual track is illustrated in figure 8. For planning purposes, the ASOCs interface up through the chain described above. For the execution cycle of the process, the ATOCs pass mission requirements to the wings (another national level).

The reader may have noticed another difference between the army and air force organizational structures. As shown in figure 9 the air force has an additional level, the ATOCs, between the ATAFs and ASOCs. That

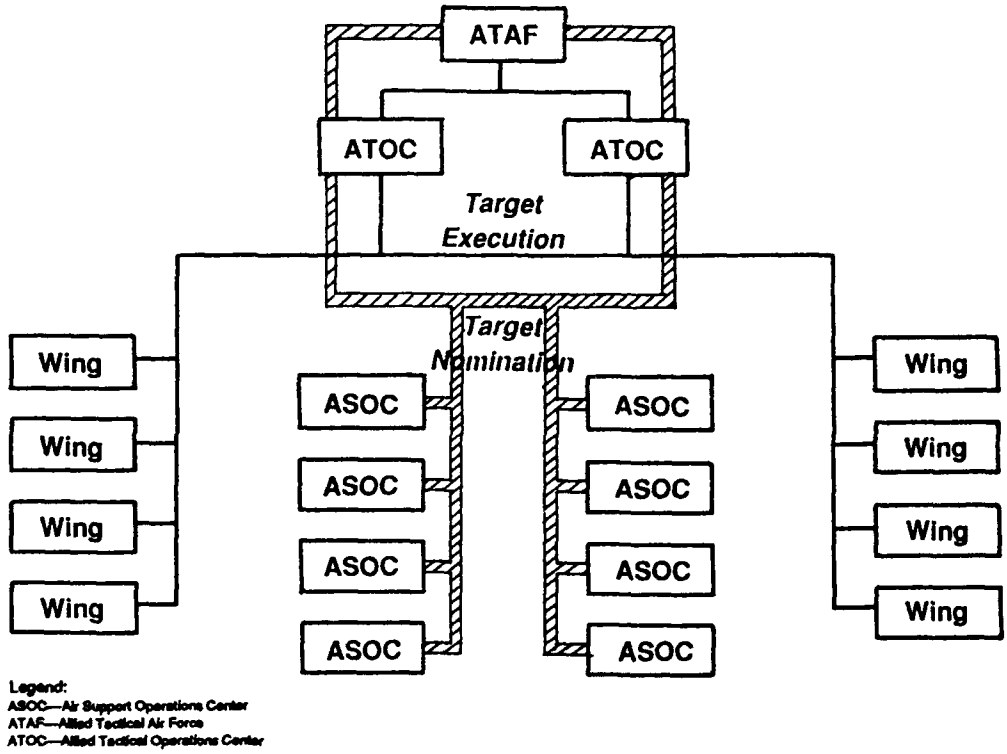


Figure 8. Allied Tactical Air Force Dual-Track System

additional level grew out of a major reorganization in the 1970s. The ATOCs were instituted for two different reasons:

> To make better use of national operations centers to which air forces were normally assigned in peacetime, and in order to share the tremendous burden of managing great numbers of aircraft of different types from different nations, ATAFs delegated certain planning, tasking and control functions for offensive air forces to these national agencies.[2]

Recently, NATO has begun to combine the ATOCs, which basically function on the offensive side of air power employment, with sector operations centers (SOC), the defensive counterpart of the ATOCs. The remainder of this paper assumes the ATOC and SOC are collocated and refers to them as ATOCs.

The ATAFs and the AGs are collocated as are the ASOCs and the corps. Thus the command levels of the major army and air force organizations are in a position to work closely together. There is no army equivalent of the ATOC. The command, control, and communication links between every ATAF, ATOC, and ASOC were designed, at least in part, to substitute communication and coordination for the benefits of collocation.

Liaison Officers

Any discussion of NATO army and air force organizations would be incomplete if army and air force liaison officers were not mentioned. These officers serve with army elements at corps level and below and at air force elements below the ATOCs. For example, air liaison officers (ALO) serve as air power advisers to army elements at corps, division, brigade, and battalion levels. Ground liaison officers (GLO) perform similar functions at tactical fighter wings. These officers not only represent their services but also are considered army or air force "experts." Thus their contribution far outweighs their rank.

At this juncture the *functions* of these elements—not their structures—are of primary interest, but a working knowledge of the structures mentioned above is important for two reasons. First, multinational composition creates political complexities which would not be present in a comparative national structure. Second, the system embodies several compromises to make it acceptable to the various parties and thus allows the system to work. One need only look at AAFCE to understand this latter point. AAFCE was created to provide a tool to allocate air power between the two ATAFs and to standardize employment procedures between the ATAFs. Before AAFCE's creation this process did not occur. All of these factors—multinational influences, different structures, and differences between peacetime and wartime command structures—must be considered as one attempts to understand the functioning of the command and control structure of the Central Region.[3]

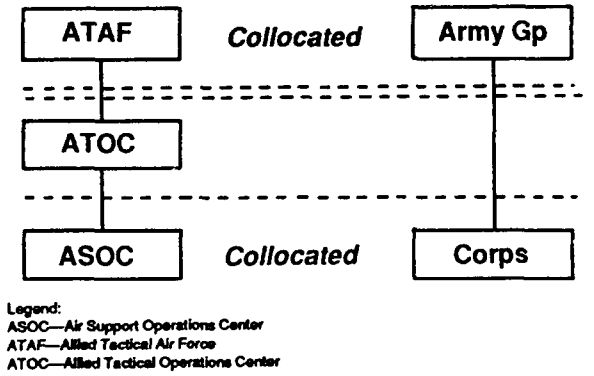


Figure 9. Chain of Command Comparison

Command and Control

The utility of a structure is measured by its performance of the functions for which it was designed. Thus the first step in analysis of the army and

air force command and control systems in the Central Region is to understand their intended functions. The function of joint command and control, and its implications for the rest of the joint arena, is summed up well by Lt Col Robert J. Brooks:

> The only purpose for joint command and control (C^2) procedures and systems is to make joint forces more effective in carrying out their missions. If joint C^2 doesn't work, then jointness in other military areas is largely irrelevant.[4]

Definitions and Concepts

Before further discussion, it is important to define exactly what the terms *command* and *control* mean. The proper place to begin is with the NATO definitions for command and control, as outlined in Allied Tactical Publication (ATP)–33(B), *NATO Tactical Air Doctrine.*

> **Command.** The authority vested in an individual of the armed forces for the direction, co-ordination and control of military forces.
>
> **Control.** The authority exercised by a commander over part of the activities of subordinate organizations not normally under his command, which encompasses the responsibility for implementing orders or directives. All or part of this authority may be transferred or delegated.[5]

These definitions, while helpful, are so broad as to be somewhat vague. ATP–33(B) offers further clarification by defining operational command and control.

> **Operational command.** The authority granted to a commander to assign missions or tasks to subordinate commanders, deploy units, to reassign forces, and to retain or delegate operational and/or tactical control as may be deemed necessary. It does not in and of itself include responsibility for administration or logistics. May also be used to denote the forces assigned to a commander.
>
> **Operational control.** The authority delegated to a commander to direct forces assigned so that the commander may accomplish specific missions or tasks which are usually limited by function, time, or location; to deploy units and to retain or assign tactical control of those units. It does not include authority to assign separate employment of components of the units concerned. Neither does it, of itself, include administrative or logistical control.[6]

Operational command and control, the normal mode of command and control in NATO, differs from full command and control in that full command and control includes responsibility for administration and logistics. These functions always remain a national responsibility in the NATO arena. Note that operational control is not tactical control—tactical control refers to the detailed and local direction of operations to complete operations and/or tasks assigned.[7] Thus command and control in the NATO context refers to the tasking and execution of assigned missions and tasks as well as the authority to position forces for the completion of those missions/tasks. Operational control in NATO is normally temporary and limited in scope.

Another way to view this relationship comes from Frank M. Snyder's "Command and Control and Decision Making":

> The term "command" will be used to mean the function to be performed, the term "C^3" will stand for the supporting system, while the term "command and control" will denote the process that commanders follow (in planning, directing, coordinating, and controlling) as they utilize C^3 systems in order to discharge the functions of command.[8]

Thus the meanings and the relationship of the terms *command* and *control* become clear. The term *command*, taken by itself, denotes the authority vested in commanders to employ the forces under their command. The term *command and control* denotes the process through which commanders direct the efforts of the forces under their command. The focus is on both the commander and the process used to discharge that command.

As shown in chapter 2, command and control of air power should be centralized at as high a level as possible. The execution of the assigned missions, however, is best performed at the lowest levels. It is at those levels that the greatest understanding of the capabilities and limitations of air power rests. From this line of thinking has come the long standing air doctrine of "centralized control and decentralized execution."[9]

The Model

It is now time to select an analytical device to evaluate NATO's command and control operations. This paper uses a combination of two simple models of command and control. Figure 10 illustrates the basic major functions of the command and control process. This portion of the model was developed by Colonel Brooks.[10] The emphasis of the model is the process used to apply combat power. The basic phases are:

> TO SEE – A commander needs to know what is happening on or near the battlefield. A clear picture of events is necessary that includes such items as status of friendly and enemy forces and enemy intentions.

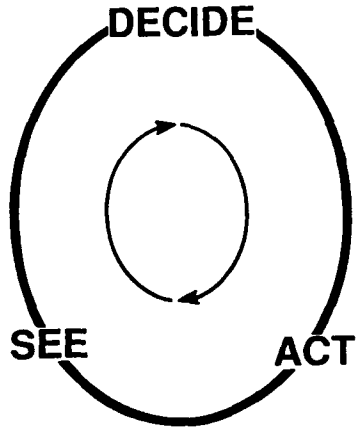


Figure 10. Basic Mission Management Model

TO DECIDE - . . . a clear understanding of what "winning" means is needed before deciding on the right course of action. Every campaign plan has decision points, explicit or implicit, where key choices must be made toward the final objective.

TO ACT - . . . begins when actual battlefield tasks are executed. It involves the interface between the system being controlled and the battlefield environment. Feedback from the battlefield is also an important part of this phase.[11]

See. The commander must first have a clear picture of the battlefield. (In the US Army, this is referred to as intelligence preparation of the battlefield—IPB.) The development of this picture of the battlefield can be further broken down into three steps: to sense, to process, and to analyze (fig. 11). The sensing step involves the collection of information of all types on the enemy, friendly forces, and such external, but important, dimensions as weather. The processing step correlates and filters information from the sensing step so as to be able to present the resultant processed information to the decision maker. Finally, the analysis step takes the processed information and develops an estimate of the current situation and probable enemy intentions. With the presentation of this information to the commander, the see function of the model is complete.[12]

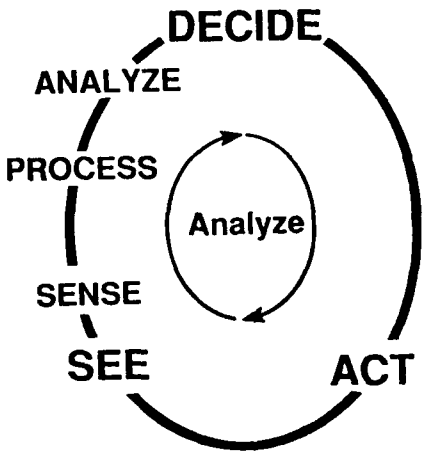


Figure 11. See Function

There are other ingredients in the see phase of the model which must be mentioned now and which will be developed further later. The phase begins with the ability to generate intelligence information on the different areas of the battlefield. It continues with the ability to correlate this information and to use it for decision making. These steps are performed by every NATO army and air force. Integration of these steps is essential if the maximum benefit of all of this effort is to be achieved—it remains to be seen what constraints are currently placed upon the achievement of these actions in the Central Region.

Decide. The decide function can also be dissected into separate parts—planning and directing (fig. 12). Planning is a continuous activity. It combines directions from higher command echelons with products of the see phase to determine objectives for future operations. Directing begins with the transmission of the plan and includes resource allocation for accomplishing the mission. With the completion of the directing step, the decide function ends and the act function begins.[13]

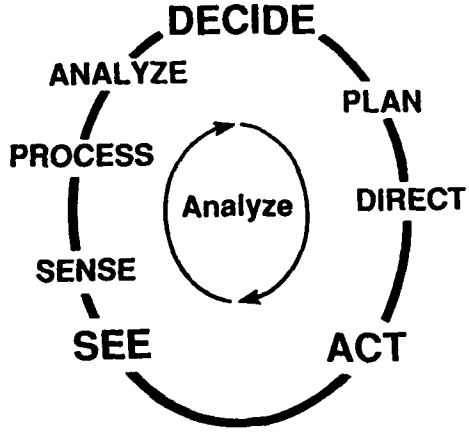


Figure 12. Decide Function

As with the see function, the decide function has additional ingredients that must be acknowledged. Communications capability is essential for passing on the plan as well as for distribution of the processed information attained in the see function. Joint operations and the full integration of individual armed services elements are also essential just as they were during the see phase.

Act. The last phase is the act function, which contains controlling and feedback steps (fig. 13). Controlling includes monitoring and supervising the battle situation, comparing intentions with results, and making necessary adjustments. The feedback step begins a feedback loop for passing information back through the command and control process. The function of the feedback step is to provide information that will be used as the basis for beginning the see function again. The act function includes the same general key ingredients mentioned in the see and decide functions.[14]

This model is depicted as a circle because it is a constant process; it has no concrete beginning and no end—except, of course, the beginning and ending of hostilities. Additionally, the different phases are constantly happening—there is no delay in the see function, for example, after its product has been moved to the decide function. The see function simply starts all over again.

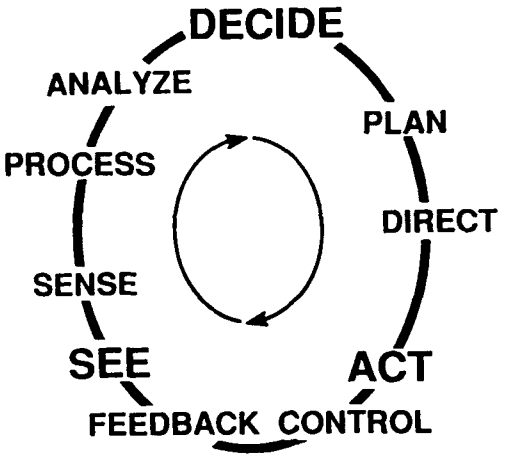


Figure 13. Act Function

Commander's Considerations. The model covers the functioning of the command and control process, but that is only one-half of the picture. To complete the picture, the commander's interface with this process must be included. To provide every opportunity for the commander to make the right decision at the right time, the process must ensure not only that the functions are accomplished but that they are carried out in a manner that ensures all the commander's requirements are met. The following quote sums up the most important considerations for commanders.

> Commanders at every level find themselves worrying about three things: whether or not they will be informed about significant events that affect their operations; whether or not they will be able to transform the information they receive into sensible and timely decisions; and whether or not they can get their decisions executed in time to affect the outcome of their operations.[15]

The first consideration, obtaining needed information, occurs in the first and third functions of the model, seeing and acting. Commanders worry about information flow. They are concerned about intelligence information, enemy force deployments, weather, and logistical factors and feedback on their forces' employment. The second consideration, transforming the information into timely and sensible actions, introduces a new and important concept to the model: timeliness. Thus the time and space problem, mentioned first in connection with the difference between interdiction and FOFA, surfaces again as a critical factor in mission accomplishment. This time and space problem should be viewed in the context of completing the decide function so as to maximize the effectiveness and timeliness of the resulting actions. The last consideration also involves a timing problem. Can the decisions made in the decide phase be executed in the act phase

in a timely and effective manner? Again the time and space element is of primary importance. Finally, with all three questions overlaid, the model takes the form shown in figure 14.

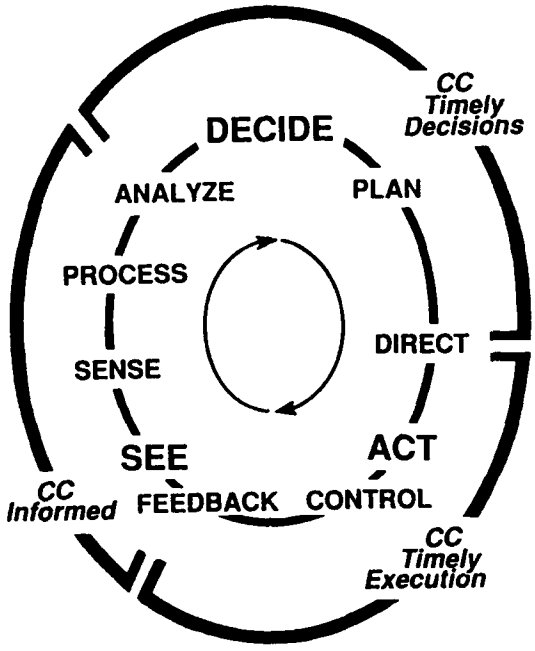


Figure 14. Complete Mission Management Model

The author has chosen to call this hybrid model a mission management model because of its focus on the management and application of air power missions. It exhibits all the earlier mentioned traits of command and control while focusing additional attention on the all-important concerns of commanders as they prosecute the war. The model thus has a dual focus. The first is upon the system itself to ensure that the mission tasking and mission execution processes are completed in a timely and effective manner. The second is upon the needs of commanders. Commanders are the people who have to make the critical decisions at the critical points. Their major concerns, viewed in the form of the three considerations discussed above, must be understood and met if the system is to function properly.

Because of its generic nature, the model is applicable at every level of command and control in the Central Region. Additionally, the model is equally applicable to any armed service and any joint operational mission management configuration.

Central Region Mission Management

With the model just presented and the principles of FOFA developed in chapter 2 as foundation, the workings of the current mission management

system in the Central Region can be examined. To complete the foundation required for an in-depth analysis, however, a few additional definitions must be supplied.

Definitions and Fundamentals

Allotment. Allotment is the temporary change of assignment of tactical air forces between subordinate commands. The authority to allot is vested in the commander having operational command (AAP-6). The process of allotment is used to balance forces in such a way as to facilitate the achievement of objectives stipulated by that commander.

Apportionment. Apportionment is the determination and assignment of the total expected effort by percentage and/or priority that should be devoted to the various air operations and/or geographic areas for a given period of time.

Allocation. Allocation is the translation of the apportionment into total numbers of sorties by aircraft type available for each operation/task (AAP-6). When external or other forces for NATO become available for use by a NATO commander he will allocate them, by sorties within a given period of time, to a subordinate or supported commander or commanders in much the same way he would allot assigned forces.[16]

These concepts are explored in more depth below but an example of these usages may provide greater insight into the NATO command and control process. COMAAFCE is responsible for the allotment of forces. The F-111Fs at RAF Lakenheath, United Kingdom (UK), are normally assigned to 4ATAF. However, if COMAAFCE wanted to use all or a portion of the F-111Fs in support of NORTHAG (2ATAF), he would allot them to 2ATAF for a set length of time (usually 24 hours). COMAAFCE also apportions air power assets by priorities and among missions (OCA, DCA, OAS, and AI). For a hypothetical day, COMAAFCE might assign 20 percent to AI, 10 percent to OCA, 25 percent to DCA, and the remainder to OAS. Finally, the ATAFs take the apportionment and divide it into actual numbers of sorties, versus percentages in the apportionment, for employment in the applicable mission categories and areas. These areas are usually aligned with corps boundaries.[17]

Offensive Air Support Tasking and Planning Cycles

CINCENT has overall operational command of army and air force assets in the Central Region and, in this capacity, is responsible for development and implementation of the Central Region defensive plan. This plan provides general guidance for operations in both NORTHAG and CENTAG. COMAAFCE serves as the air component commander for AFCENT. As such, COMAAFCE is directly responsible to CINCENT for integrating air power into the ground campaign. To accomplish these functions, COMAAFCE uses the apportionment and allotment processes described earlier. COMAAFCE allots assets to 2ATAF and 4ATAF as necessary to accomplish support of the AGs specified in his apportionment message. Apportionment

and allotment do not occur in a vacuum—inputs for both processes come from CINCENT and from the combined AGs/ATAFs. The apportionment and allotment are passed to the AGs/ATAFs in COMAAFCE's air directive.[18]

An ATAF, using inputs from its AG, determines the allocation of air assets to the corps. This allocation process is based on the allotment contained in COMAAFCE's air directive and on the AG's overall defense plan. The AGs/ATAFs transmit their guidance to the corps and the ATOCs. The corps receive an air allocation message or commander's guidance while an operations order (OO) is sent to the ATOCs. The ASOCs and flying units are subsequently informed by air tasking order (ATO). The OO and the ATO specify a time period for the allocation, usually 24 hours.[19]

At the corps level, continuous analysis of the enemy's activity drives the entire targeting process, from the priorities placed upon existing targets to development of new targets. Prioritization of CAS and BAI missions within the corps' area of responsibility is done at corps level. Occasionally, the AG may direct a priority mission in a corps' AOR, but this is usually the exception. Should a corps find its allocation of air power unsatisfactory, it can submit requests up through the command channel.[20]

Requests for OAS missions generally originate at corps levels and below. Tactical air control parties (TACP), in concert with army fire support elements (FSE) at battalion, brigade, and division levels, determine the requirement for air power and forward requests (primarily CAS) up through the army command chain to the corps. At corps level, the ASOC and the corps commander's staff jointly examine the requests for OAS missions, including developing a BAI targeting plan, and prioritize those requirements for approval of the corps commander. The approved list is then transmitted up the command channel, through the ATOCs, to the AG/ATAF level. At the AG/ATAF level, requests from the corps are evaluated in comparison with the overall battle plan of the commander of the AG. At this point corps are prioritized for OAS support, available assets are assigned missions (in the case of multimission aircraft) and are allocated to the corps. This allocation is passed to the ATOC where execution planning for the missions is performed. The ATOC in turn coordinates with the ASOC on the particular elements of the mission, such as timing, ordnance, and desired results. Any force packaging (e.g., use of electronic warfare and suppression of enemy air defense) is done at the ATOC level. The ATOC then passes this information on to the wings. Feedback on mission success, or requested changes to the allocation, are sent back up through the command and control channels just described.[21]

Air Interdiction, Offensive Counterair, and Defensive Counterair Planning and Tasking Cycles

As outlined in chapter 2, air superiority remains the most pressing mission for air power, especially in the early stages of a conflict. This

requirement means that multirole aircraft involved in the air superiority battle will not be available for other missions. For example, aircraft that combine long range with accurate firepower, primarily the F-111 and Tornado, will initially be involved in the offensive counterair program. Similarly, multirole aircraft, like the F-16 and F-18, will be involved in the defensive counterair program.[22]

Tasking for both offensive and defensive counterair comes from the ATAFs, in the operations order, through the ATOCs. With the SOC portion of the ATOC handling the defensive battle and the old ATOC portion handling the offensive battle, coordination has been improved, if for no other reason than collocation. The offensive counterair campaign is based on air force analysis of which enemy airfields, command and control nodes, and air defenses provide the greatest threats. The threat is measured in reference to the enemy weapon systems which potentially have the most significant impact on friendly ground forces and NATO's capability to carry out air operations. In other words, the air campaign is designed to support NATO ground forces by keeping enemy aircraft from influencing the battle. Such influence could either be exerted through enemy air support or through enemy offensive counterair operations. Thus, in the simplest sense, the NATO counterair campaign is nothing other than an extension of the FOFA doctrine—to attrite enemy aircraft in the rear area before they can reach the front line (their targets).

Planning and tasking for air interdiction begins with CINCENT's guidance and directive. Based on that guidance, the AG and ATAF work together to identify and prioritize targets for interdiction. The ATAF then makes the allocation and provides the accepted missions and available assets to the ATOCs for tasking. The ATOC is responsible for transmitting the final product in an air tasking order to the wings for execution. The ATO includes ATOC-developed force packages and integrates electronic warfare and suppression of enemy air defense (SEAD) support where they are feasible, where they are tactically sound, and when assets are available. The wings normally receive the ATO four to eight hours before the execution window. This time allows a wing to analyze the missions, identify those missions the wing can support, and complete mission planning. It may seem strange that at this point wings make evaluations of the missions they can support. One must remember that allocation decisions were made based on information about a wing's capability that may have changed by the time the wing receives the ATO. The wings therefore must be given the opportunity to update their capabilities versus the targets they are tasked to attack. Obviously, those targets which the wings have little or no capability to attack should be the lowest-priority targets allocated to the wings.

The System at Work

The major portions of the Central Region command and control system are outlined in figure 15. When the planning and tasking cycles are

combined, the result is a lengthy process. To provide a look at the entire process, this section covers one complete cycle.

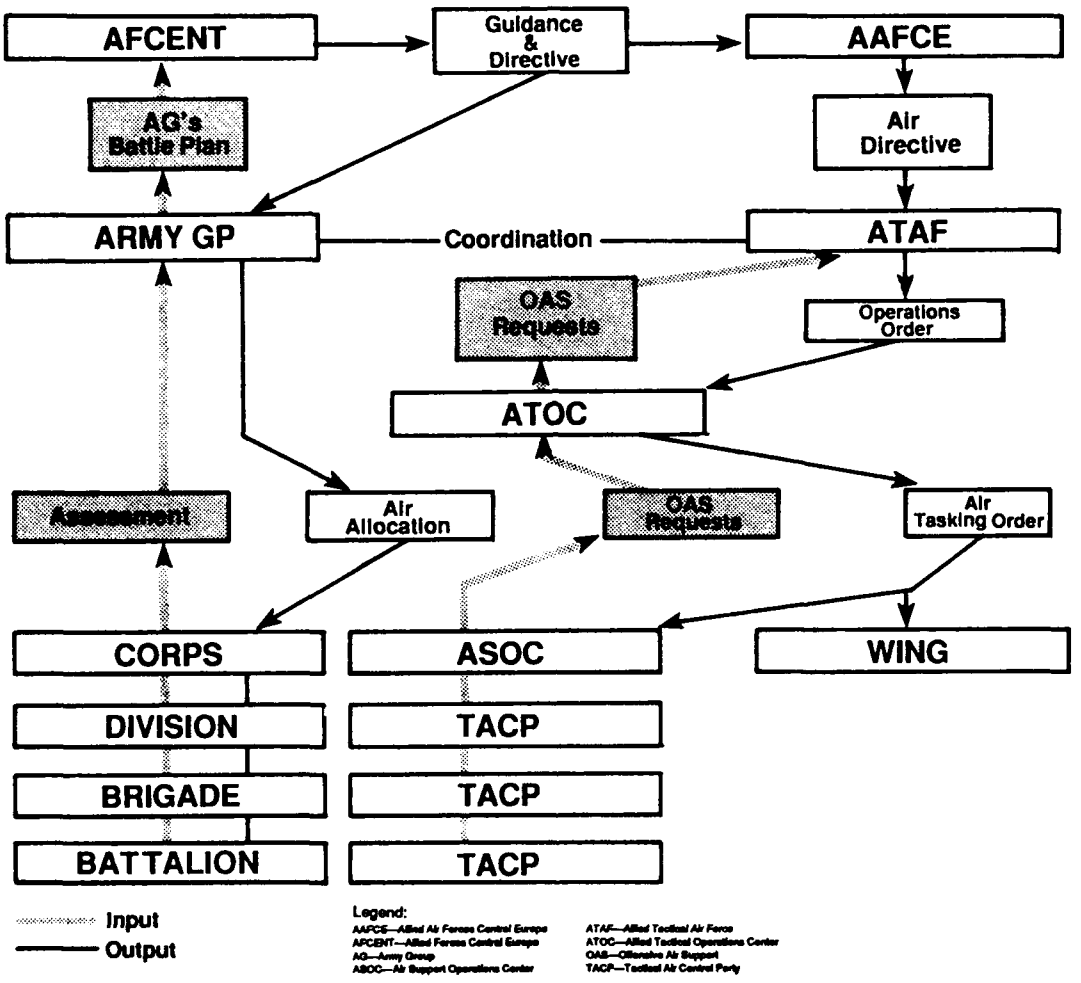


Figure 15. Central Region Command and Control System

The process begins with the intelligence community providing inputs at the corps, AG/ATAF, and AFCENT/AAFCE levels. The corps develop assessments, for the next several days, of their AORs. These assessments, based on their predictions about the enemy's intentions and including corps requests for OAS support, are transmitted to the AGs. The AGs perform much the same process—each integrates its corps' plans with the overall AG plan, again based on AORs, and submits this plan to CINCENT. CINCENT, using his overall battle plan, evaluates the assessments of the army groups, determines the roles air power needs to play in achieving the battle plan, and publishes the overall guidance and directive. This directive is the product on which COMAAFCE bases the air directive. COMAAFCE,

through the air directive, allots and apportions air power. The ATAFs, using the air directive as guidance, allocate air power to perform the missions which are considered the highest priority. Execution planning is performed by the ATOCs who pass the missions onto the wings that will execute the missions.

While the corps and AGs are performing intelligence analysis for their respective plans for the battle (typically 72 hours in advance), the same information is used for the targeting process. At the same time, the air force is analyzing its intelligence information to determine plans for OCA, DCA, and AI missions. These requirements for OAS, OCA, DCA, and AI all basically meet at the AG/ATAF level, as described earlier, and become the basis for the ATO sent to the executing wings.

NATO's air power assets complete the mission management cycle through mission execution. The wings also start the next cycle as the aircrews, returning from their various missions, provide their intelligence cells with their mission results and observations of enemy movements, threats, and other significant sightings.

Obviously this process consumes a significant amount of time. The intelligence system must collect data, analyze and condense that data, and present it to commanders for action. The process of allotting, apportioning, and allocating air power also takes time. Moreover, the tasking for the entire Central Region must be transmitted early enough to allow mission planning before the commencement of the frag, which usually covers 24 hours. Thus the process is one measured in days, not in hours or minutes. Basically, decisions made yesterday by CINCENT and COMAAFCE were based on intelligence information collected and fused some time before. Those decisions are used today to build the air power missions that will be flown tomorrow.

Faults of the Current System

The mission management process that tasks the air assets of the Central Region is long, complicated, and time-consuming. As with every system, the process has a number of strong points and weak points. This paper now turns to an analysis of the areas that need to be improved.

All of the faults of the current command and control system do not fit neatly into one of the three functions of the mission management model—see, decide, and act. Although the overarching nature of some of the following faults makes solutions tougher to formulate and implement, the problems can and must be solved if the Central Region command and control system is to perform adequately.

Time

This paper has repeatedly mentioned the critical need for timely decisions, analysis, attack, and intelligence gathering—in essence, every

single factor in mission management is time sensitive. In addition, as the paper has also noted, time and space constraints are more important in FOFA than in normal air interdiction. These same criticalities apply to OAS to an even greater extent because of the proximity of the enemy to friendly ground forces. The bottom line is that the current command and control system does not respond quickly enough—it takes days to go from intelligence gathering to bombs on the target. In fact every air force officer interviewed during the research for this paper admitted that the system was not responsive enough, in its current state, to engage FOFA targets. For example, "The focus and tempo of joint planning, targeting, and resources allocation functions which currently take place at ATAF/AG are too broad/slow to facilitate responsive coordination of joint fires."[23] Most mobile targets will have moved and most stationary targets will have lost their significance before the aircraft arrive. If air power cannot locate and destroy the enemy, the FOFA concept cannot be successfully completed.[24]

The Chain of Command

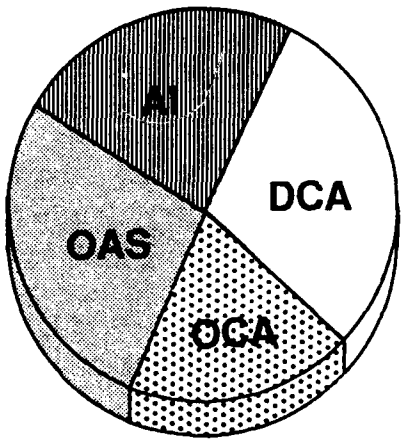
Although the employment of air power beyond the FSCL has traditionally been the sole domain of air forces, the FOFA concept is direct support of the army. Therefore, many say, the overall commander of the FOFA campaign must be an army commander at some specified level. Thus debate over ownership of FOFA continues.[25] Additionally, several very senior commanders have distinct ideas about the evolution of the FOFA doctrine in the Central Region. While these differing opinions do not directly affect the current NATO command and control system, they do impede improvement efforts.[26]

Another area of debate is the appropriate level in the chain of command for FOFA management. One school of thought believes the ATOC is the appropriate level for management of FOFA because the ATOC actually puts together the mission frags. Another school sees the ATAF as the correct level. The argument is that placement at this level would better centralize the execution phase and would also align with the army component—the AG—that is responsible for the land campaign. Whatever the merit of these arguments, the effect is the same—the debate gets in the way of problem solving.

Allotment, Apportionment, and Allocation Processes

These processes, involved in the decide function, are CINCENT's and COMAAFCE's attempts to get the most out of scarce weapon systems. However, the process does not have the flexibility to ensure that happens. The essence of the problem is shown in figure 16. The key factor is the agency that nominates the targets and thus controls the different missions of air power. Currently, the block of available air power is proportionally divided according to expected mission requirements, not according to desired results. Once the apportionment has been made, no comparison

is made of the relative utility of an AI mission as compared with an OAS mission. There may be a significant disparity between the desired result of the lowest-priority AI mission and that of the lowest-OAS mission. However, because of the way the current system operates, the missions may not be reapportioned. Thus the arbitrary division of OAS and AI missions may be counterproductive.



Mission	Target Nomination
AI	AFCENT
DCA	AAFCE
OCA	ATAF
OAS	CORPS

Legend:
AAFCE—Allied Air Forces Central Europe
AFCENT—Allied Forces Central Europe
AI—Air Interdiction
ATAF—Allied Tactical Air Force
DCA—Defensive Counterair
OAS—Offensive Air Support
OCA—Offensive Counterair

Figure 16. Target Nomination Process

The same can be said of the apportionment of OCA aircraft. These aircraft may also be employed in other roles—roles which, depending on the state of the conflict, may have very different levels of utility. To expand the point, every multimission aircraft should be examined for possible allocation to various missions.

Intelligence Support

One of the major keys to successful FOFA operations is the requirement for accurate and timely intelligence. As one can see from the mission management model, the intelligence data gathered in the see function is the informational basis for the remainder of the process. However, the current Central Region command and control process suffers from several important intelligence-related problems.

The first problem lies in the ability to gather the required intelligence. Obviously, the current system depends on the ability of commanders and intelligence officers to look into the future. That future look, in the FOFA sense, depends, in turn, on the ability to look deep into enemy territory and determine the enemy's intention and the forces he plans to use. This

capability to look deep is currently extremely limited. At the corps level, radar, signals intelligence (SIGINT), and human intelligence (HUMINT) assets do not reach deeply enough to satisfy even a corps' deep-battle needs. For example, an Apache helicopter brigade might well want to begin planning a deep attack 72 hours before the mission. The commander would need this time for several functions, probably the most important being the focusing of intelligence assets on potential targets to gain information. Since the Apache can be employed 150 kilometers into enemy territory and this mission is planned 72 hours before its execution, one can appreciate the requirement for intelligence collection at least 200 to 300 kilometers into enemy territory. However, the severely limited number of systems that can gather data this deep in enemy territory are usually categorized as national assets by their respective countries. In essence, the products of these systems are not available to NATO on a regular basis. Although one hopes these assets would be released to NATO in a conflict, the non-availability of these sources for training definitely inhibits their effectiveness.[27]

The second problem area is at the corps/ASOC lash-up. This joint endeavor is the point where the corps commander's battle plans are translated into targets for corps organic assets and into the requirements that form the basis for requests for air power. However, a basic problem in the current approach to intelligence analysis and dissemination within the corps prevents proper translation at the corps/ASOC level.

> Here in the Central Region, however, all that information [intelligence] comes into the all sources information center (ASIC) within the corps headquarters and there's no air forces folks in that element at all. So what happens is that now all this information comes to the ASIC and it may take 3, 4, 5 hours before it gets to a blue suiter in the ASOC for BAI targeting. . . . Now the blue suiters have to accept that information is valid. . . . There's a step that I think you could cut down that time, having a BCE [battlefield coordination element] here in NATO.[28]

The reference to the BCE is to an element in the US tactical air control system (TACS). This element works for the corps and includes airmen and soldiers in a central mission-planning cell.

> The BCE expedites exchange of information through face-to-face coordination with elements of the TACC [tactical air control center]. The BCE's primary mission is processing the Army's request for tactical air support, monitoring and interpreting the land battle situation for the TACC, exchanging current intelligence and operational data, and coordinating air defense and airspace control matters.[29]

Although something resembling a BCE may help, the important point is the delay in having the possible targets reviewed by air force representatives. This delay, coupled with the possibility of less than optimum targeting, makes the current setup one that should be changed.

While there are provisions for the addition of air force intelligence officers at the ASOC/corps level during contingency operations, even that number is too low. Lt Col John Crane, the commander of the 8th ASOC, sums up

the solution: "Obviously, from as early a stage as possible, you need both green and blue suiters looking at the tactical problems."[30]

A similar but reversed condition exists at the ATOC. The ATOC is responsible for planning actual sortie composition and for force packaging as well. However, the ATOCs have far too few army intelligence officers. For example, the ATOC at Sembach Air Base (AB), West Germany, which the author visited in September 1989, has only one army intelligence officer assigned. Such undermanning ignores the value of collocation, makes developing a joint FOFA campaign nearly impossible, and creates a significant void with respect to coordinating such options as joint SEAD.

The requirement, in the author's view, is integrated army/air force intelligence sections at every level of the command chain. Every level except the ATOC is a joint army and air force headquarters—this fact alone should mandate the presence of intelligence specialists from both services. The ATOC, although exclusively an air force unit, equally needs the services of a joint intelligence section. As noted, the see process begins with the collection of intelligence data, but that data is useless unless it is processed and analyzed in a timely manner. Although such data is obviously valuable to the army and the air force separately, its full potential can be realized only when evaluations based on the different frames of reference inherent in the army and air force are shared.

Information Flow

Another area that needs attention in terms of both established channels and hardware is the flow of information, because timely information flow is essential to every phase of mission management. The see, decide, and act functions are all interconnected by the flow of information.

The most obvious example of hardware problems comes from the ATOCs, where two different and incompatible computers are used during the mission management process. Data actually has to be transferred by hand between the two. This problem is well documented:

> It still cannot be said that all headquarters have been uniformly equipped with effective command and control systems. Instead, a patchwork consisting of all ADP [automated data processing] generations has been developed and at times joined together. The resulting problems of interoperability, software, maintenance, and also training, are only too obvious.[31]

Moreover, the primary computer currently used for the mission management process, the Eifel system, is woefully overtasked. Originally designed as an accounting system for the Germans, it cannot handle the amount of information it has to process.

The problem on the other side of the communication process is the absence of key nodes of communication. For example, if the corps ASIC gets an input on a target (e.g., the target has moved or gained size) that input should be transmitted as quickly as possible to the weapon system tasked against the target. However, that process is not as quick as possible

because of the already mentioned computer problems and because there are no direct links between the lowest echelons on the planning and the execution sides.

Weapons Employment Coordination Past the Fire Support Coordination Line

Problems in this area prompted this paper, and the shortcomings of the current system are still the fundamental issue that needs to be resolved. In short, no process is available to coordinate the employment of weapons past the FSCL.

Mission Priority

The benefit of some "classic" air power missions, specifically CAS and OCA, appears to have lessened in recent years. The Warsaw Pact's airfields, improved air defenses, and rapid runway repair capabilities have all significantly decreased NATO's ability to degrade an airfield's sortie-generation capability. In addition, NATO lacks a suitable antiairfield weapon. Thus the continued high priority assigned to the OCA mission must be revisited.

In effect, CAS has become an emergency air power mission. For example, the West Germans have abandoned the CAS mission.[32] Close support will be provided by army systems, thereby freeing their tactical air assets for other missions. The British have not gone to that extreme, but their view demonstrates the future of the CAS mission:

> Close Air Support (CAS) is a subject which raises the emotions of both protagonists and opponents. It is, of course, quite understandable. It is the only role in which the Army sees the Royal Air Force participating in what is, for them, the battle. Yet, as technology has favoured the anti-aircraft defence over the close air support aircraft during the past years, so it has been necessary to use CAS sparingly if flexible air assets were not to be squandered. Both COMTWOATAF and COMNORTHAG, from this stage, have reiterated that while CAS will be provided in the extreme situation, under modern conditions air power is best utilised elsewhere.[33]

A complete evaluation of all air power missions is required. Tactical air power resources will be even more scarce in the future—every single sortie must produce the maximum amount of combat effectiveness.

Definitions

The introduction of army weapons that can be employed well past the fire support coordination line apparently has effectively outdated the current FSCL's location (now currently listed as approximately 15 to 25 kilometers beyond the FLOT). Unless the essence of the FSCL—the limit of army organic firepower and thus the limit of the requirement to coordinate the employment of air power with the corps—changes, the current positioning or definition no longer seems useful.

Another definition that appears to be out of date is that of the reconnaissance and interdiction planning line. The RIPL suffers the same currency problems as the FSCL. In fact, the Apache can be employed past the RIPL

(typically 80–100 km), which is supposed to be the limit of the corps' intelligence-gathering ability. Again, the definition should be updated or changed.

The important point here is not definition for its own sake. These lines delineate key divisions of responsibilities for intelligence gathering and coordination of air power and ground-based weapons employment. To begin to formulate solutions to the problems of FOFA integration in the Central Region, the definitions must be rewritten or rejuvenated.

Summary

The faults exposed above are significant for several reasons. First, they affect virtually every critical node of the mission management process. Second, they involve every organizational level of the mission management process. Finally, with one exception, the faults cross the boundaries of at least two of the three major functions of the process of mission management. The nature of these overarching problems is illustrated in figure 17. This complexity, coupled with the number of countries involved and the political climate in Europe, will make solutions difficult to formulate and implement.

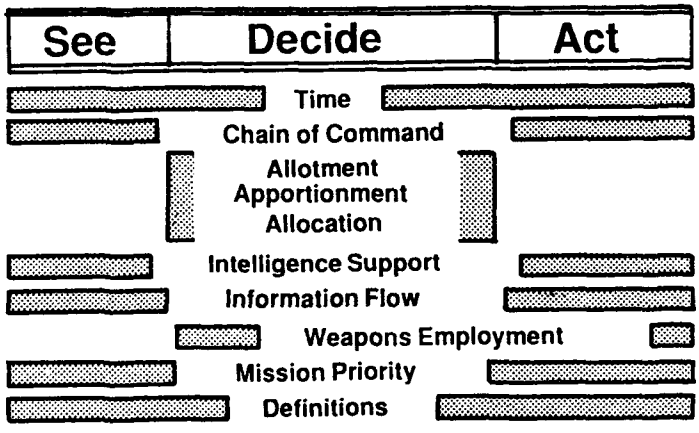


Figure 17. Overarching Nature of Faults

This chapter reviewed the general characteristics of the Central Region command and control process. It began with a review of the organizational structures of the army and air force command and control elements in the Central Region. It examined the basics of the mission planning and tasking processes. Then, using a mission management model adapted by the author from two separate command and control models, it identified faults in the current mission management process.

The next chapter focuses on possible technological solutions to these problems. FOFA, with its requirements to look deep and respond quickly, can benefit a great deal from the promises modern technology makes—if it can deliver.

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Chapter 4

Technology and Follow-On Forces Attack

The last chapter derived a mission management model to identify several faults in the current Central Region command and control process:

Timing
Chain of command
Allotment, apportionment, and allocation processes
Intelligence support
Information flow
Weapons employment coordination past the FSCL
Mission priority
Definitions

This chapter continues the discussion of those fault areas. It begins with an examination of the reliance of successful Follow-On Forces Attack employment of technological developments. The chapter then examines major command and control faults that can be remedied or ameliorated through the application of new technology. It concludes with a warning of the pitfalls of technologically based solutions.

Technological Improvements

The true measure of FOFA's success will be determined in the close battle. The key will be the ability of NATO allies to destroy, disrupt, and/or delay the enemy's uncommitted forces before they can impact the close battle. In essence, successful FOFA application rests upon the *means* of finding and hitting the enemy deep in his own territory. Unless commanders can see, decide, and act deep, the remainder of the process is doomed to failure.

A commander's ability to carry out these functions is questionable, and thus FOFA has been the source of much debate. The debate centers on attempting a strategy such as FOFA without the required ability to look and act deep.

> It has been a controversial doctrine. Much of the controversy has centered on issues of the technology and systems available, or needed, to execute the concept. For it is development of new technologies and new systems to make the concept v[illegible] on which the success of FOFA will depend.[1]

The current round of debate is not a declaration of the complete inability of NATO's weapon systems and command and control structures to execute

the FOFA mission. As pointed out earlier, FOFA parallels air interdiction in several ways. Most of the *current* capability for FOFA rests in the execution of the classic air interdiction mission.

> NATO's current systems and procedures are probably capable of supporting the attack of targets that do not move very frequently, but they fall far short of providing broad, deep continuous coverage and targeting data on highly mobile systems, especially those that do not emit radar or radio signals. At present, only fixed targets and vehicles that halt for relatively long periods can be acquired reliably.[2]

Fuller realization of potential FOFA effects rests with the acquisition of systems that concentrate specifically on the time and space problems this paper has alluded to repeatedly.

> FOFA requires an ability to acquire targets, which involves detecting and identifying enemy forces and determining or predicting their locations with sufficient accuracy to attack them, before they can engage in combat. Target acquisition supports attack planning and attack control, providing timely directions to the attack platforms.[3]

Just as the faults outlined in the preceding chapter overlap the three areas of the mission management model, so do most of the technological advances NATO is seeking. The following sections generally follow the see, decide, and act phases, but where a technological improvement affects more than one function of the process, the effects are explained.

See

If any one function of mission management is the most important to improve, it would appear to be the see function. For, if the mission management system lacks the ability to look deep, the remainder of the system's operations degrade to pure speculation.

> Three things are clearly important about the information required by military commanders about the enemy. First, it must be accurate. Second, it must be as near real-time as is possible if it is going to be of any value; and, third, as the performance of weapon systems improves, it needs increasingly to encompass ranges which extend deeper and deeper into enemy territory.[4]

It is not surprising, therefore, to find several NATO countries investing heavily in both reconnaissance systems designed to look deep and in systems to process quickly the information gained by those reconnaissance systems.

The first type of such systems that this chapter examines is stand-off surveillance and target acquisition systems (SOSTAS). The long-range capability of these systems allows their platforms to remain well behind the FLOT and still see deep into enemy territory. Many of the NATO countries are fielding SOSTAS. These vary significantly in capability and cost.

Joint Surveillance Target Attack Radar System. Probably the most important improvement, and definitely the most publicized, is the Joint Surveillance Target Attack Radar System (J-STARS). J-STARS involves the mounting of a large, side-looking phased-array radar on a Boeing 707. The aircraft will have command, control, and communication systems to transmit rapidly the radar information it collects to various ground-based

command sections. The radar is highly capable and is the cornerstone of the system's performance.

> The radar will have both MTI [moving target indicator] and SAR [synthetic aperture radar] modes along with a spotlight ability. The antenna will be mounted on the forward underside of the E-8A. Although performance capabilities are classified, the radar is estimated to be able to track targets up to 320 kilometers behind the FLOT.[5]

With this kind of radar range and performance, the J-STARS aircraft will be able to maintain an orbit well behind the FLOT and still look deep into the enemy's rear area. The platform will also have the ability, when given the proper protection, to deploy well forward to allow even deeper surveillance.[6]

Of course, J-STARS is more than an aircraft—it is a complete intelligence collection, fusion, and transmission system. As such, the J-STARS program includes the capability to process and analyze data collected in the sensing phase. The J-STARS concept has an interesting twist, however, in the methods used to provide data to air and ground forces.

> The Air Force will do its radar data processing on the aircraft, feeding target information to its command and control network on the ground via Joint Tactical Information Distribution System (JTIDS) terminals. Raw radar data will be transmitted to the Army's ground stations for processing via a secure, high capacity Surveillance and Control Data Link developed by Cubic Corporation.[7]

Although performing the intelligence fusion aboard the J-STARS aircraft has merit, the system has the potential to provide two *different* sets of fused data to its users—one set for ground and another for air forces. The problem, of course, is that FOFA demands that surface and air forces select targets and fight the war from a single, joint perspective.

Regardless of the potential problem of different interpretations of the same data, J-STARS offers at least a partial solution to several of the problems facing the Central Region command and control process. However, J-STARS is only one of a multitude of systems being developed.

Advanced Synthetic Aperture Radar and Advanced Tactical Air Reconnaissance Systems. The advanced synthetic aperture radar system (ASARS-II) and the advanced tactical air reconnaissance system (ATARS) are airborne systems. Both US systems are designed to provide ground and air forces with near real-time (within 20 minutes) target information.

ASARS-II, which is already operational, is a high-resolution, side-looking radar mounted upon the TR-1. The system can operate around the clock and in bad weather. Like J-STARS, ASARS-II is a long-range radar system that permits its platform to stand off from the battle. Unlike the J-STARS, ASARS-II is best against such fixed or semifixed target sets as surface-to-air missile sites and command posts.[8]

ASARS-II data is transmitted via data link to ground stations. The ground operator actually views the radar presentation in real time and can redirect the radar to optimize both coverage and presentation. The system provides radar photos that operators can reproduce and interpret. The system's

operators can send the resultant information to users in less than 15 minutes.

The ASARS-II is already in use in Europe. While the contractor continues to improve ASARS-II with moving target indicator, NATO has completed construction of hardened ground stations. These hardened facilities are designed to be survivable, but the small number of stations (only two in Europe) makes them a high-priority target for the Warsaw Pact. Additionally, transmission of data, both to and from the ground stations, relies on communications systems which the enemy will, in all probability, also target.[9]

ATARS is a new electro-optical suite being developed for employment on tactical reconnaissance aircraft. The suite includes low- and medium-altitude cameras, giving the parent aircraft employment flexibility. The suite includes an infrared scanner for night operations. The resulting imagery will be recorded on videotape. Also, the system's in-flight operator can edit the videotapes and can data link the information to a ground station for processing and dissemination. Beginning in 1991, ATARS will be installed in US Air Force RF-4s and is planned for the RF-16 (the RF-4 follow-on). The system could also be installed on several other types of platforms, including US Navy reconnaissance platforms and even remotely piloted vehicles (RPV).[10]

The ground station for ATARS, called the joint service imagery processing system (JSIPS), is a system of transportable, sheltered equipment that automates both image processing and exploitation. The use of digital systems, versus the old film-based system, allows near real-time operational speed. JSIPS is designed to be deployed with both army and air force units. This characteristic, coupled with its possible application with several systems, makes JSIPS more flexible than ASARS-II.[11]

ASARS-II and ATARS both have subsystems that will allow their operators to integrate the sensing function with the processing and analyzing processes. A drawback is that these two systems use different processing stations—and both are different from J-STARS. The problem does not end there; several other SOSTAS are also in various stages of development.

Other Stand-Off Systems. The French are developing a system similar to J-STARS but on a smaller scale. The system, called Orchidee, is a radar mounted on the Puma helicopter. The French require the system to have a range of at least 100 kilometers and the ability to detect moving targets. Orchidee has its own truck-mounted ground station that will process and exploit incoming information. The Puma helicopter will communicate with its ground station via data link.[12]

The Italians are developing Creso, also a helicopter-mounted system with range and accuracy similar to Orchidee. The Germans are developing several different systems: Geamos-LR, Lapas, and Loras. Geamos is a radar mounted on a helicopter, again with range in the 100 kilometers region. It will supply information to the German Heros command, control, communication, and information (C^3I) system. Lapas and Loras are radar

systems that use light aircraft as radar-carrying platforms. The British have a test program called Astor, which is a technology demonstrator, based on using a Canberra with a SAR and MTI radar. Another British test platform is an Islander aircraft fitted with an MTI radar similar to the Orchidee.[13]

Other Sensing Systems. Another group of reconnaissance platforms use unmanned aerial vehicles (UAV) and remotely piloted vehicles. Basically, such systems share a common design philosophy; they are low-cost vehicles that can carry a variety of sensors. Although RPVs and UAVs do not have the range or capability of the other systems discussed, their low cost means large numbers of them can be procured. Their small size, in most cases, provides a degree of protection against enemy defensive systems. Also, depending on their equipment, their price may make them poor targets, in the economic sense, for the Warsaw Pact's newer surface-to-air missile (SAM) systems.[14]

The US Army is continuing to improve its Guardrail series of reconnaissance sensors. The current operational systems, Improved Guardrail and Guardrail V, find targets by locating a target's electronic emissions. Guardrail Common Sensor, the newest generation in the series, will offer improved accuracy and range.[15]

This "explosion" of reconnaissance systems demonstrates NATO's dedication to improving substantially its ability to look deep. The developmental approach for all of these systems includes not only collection of data but also its processing and exploitation. Through these efforts, improvements will occur all across the spectrum of the see process.

Link between See and Decide

The second area one must examine is the processing of information collected by the sensing systems. The key elements here are accuracy and time. Above all, if fused intelligence is not correct, it will lead to erroneous decisions by commanders. Speed is critical because information on the enemy's rear echelon begins to lose value almost immediately. If the data can be translated into usable information quickly, it can provide a valuable basis for commanders at every level. Thus the end requirement is to provide accurate, timely information on which commanders can make key battle decisions. In other words, the rapid processing of valuable data is the link between the see and decide functions.

> Acquiring, reaching and hitting targets deep inside the enemy's follow-on forces are difficult requirements to meet. But by far much more difficult are the tasks of deciding which targets to hit, when to hit them, and making sure the weapons systems do it before the enemy has a chance to react to the attack.[16]

This linkage is also receiving a great deal of attention. Several complex and expensive programs, designed with commanders in mind, are under development.

Joint Service Imagery Processing System. Earlier in this chapter the JSIPS was introduced. Teamed with the ATARS, JSIPS has the capability to process data from electro-optical, infrared, and radar imagery in addition to older film-based systems. The JSIPS is flexible in that the services can tailor the system to meet their unique needs. Another strength of the system is its division into different operational segments. For example, one of the segments processes national reconnaissance sources while another processes tactical information sources. Analysts, located in the exploitation segment, can analyze the data immediately upon its arrival.[17]

Joint Tactical Fusion Program. The Joint Tactical Fusion Program (JTFP) is probably the most important program involving fusion of intelligence in the Central Region. The major program elements are the US Army's all-source analysis system (ASAS) and the US Air Force's enemy situation correlation element (ENSCE). These automated tactical fusion centers are specifically designed to rapidly integrate information from all battlefield sources, including J-STARS, and to provide a continuously updated picture of the battlefield.[18]

ASAS and ENSCE will provide Army and Air Force commanders with a real-time picture of the battlefield. The systems will receive digital information from a variety of intelligence sources and automatically process the information for the commander's use. Because the systems use deployable graphical display terminals, information will be within easy reach. Through analysis of that information, systems operators can direct intelligence collection assets to concentrate on certain portions of the battlefield. ASAS and ENSCE will also support the targeting process (the act phase) by identifying key, high-value targets.[19]

A test bed for ASAS/ENSCE already exists in Europe. The US Limited Operational Capability Europe (LOCE) system is an operational tactical fusion system that provides near real-time ground situation information while providing developmental feedback for both the ASAS/ENSCE and Battlefield Information Collection and Exploitation System (BICES). LOCE already links all Allied Command Europe major subordinate commands to a number of US and NATO intelligence collection systems.[20]

Joint Tactical Information Distribution System. JTIDS is basically a radio network designed to facilitate transmission of information between all forces involved in a conflict.

> JTIDS is a jam-resistant radio network designed to automatically exchange position, navigation and target information in the form of digital data between aircraft, ground forces, and surface ships.[21]

JTIDS will initially be deployed on F-15s and airborne warning and control system (AWACS) and J-STARS platforms. Placing these communication links on several airborne platforms will allow commanders at various levels to receive the latest picture of the surface and air battles.

Battlefield Information Collection and Exploitation System. This system is the key integration link between the numerous NATO reconnaissance, intelligence processing, and command and control systems. Inter-

operability with BICES is a requirement for all new intelligence processing systems, and the new NATO command and control system, covered later in this chapter, will be compatible with BICES. Thus BICES forms the conduit between all the systems designed to improve the ability to look deep and the mission management process.[22]

The multitude of systems just reviewed will have a tremendous impact on mission management in the Central Region. The problem areas identified earlier that will benefit the most are timing, intelligence support, and information flow. All three of these areas are closely linked, and an improvement in one will inevitably benefit the others. With better near real-time information (in some cases real-time information) commanders at all levels will be better able to direct the battle. These systems will also indirectly improve the allotment, apportionment, and allocation processes. Greater ability to look deep, improved value of intelligence collected, and quicker processing will provide more lead time and better data on which commanders can base key decisions in these processes.

Direct

The dividing line between the functions of directing the battle and developing the information for that direction is fine indeed. For example, the communication links that end the see phase form the beginnings of the decide phase. Thus most of the technological upgrades referred to earlier—JSIPS, JTIDS, JTFP, and BICES—*actually improve the commanders' ability* to wage war throughout the three phases. The improvements listed under the decide phase focus on providing systems that allow commanders to make and implement their decisions in a timely manner.

Air Command and Control System. The Air Command and Control System (ACCS) is the largest acquisition process (estimated cost of $28 billion) ever undertaken by the NATO alliance. Representatives from every NATO country developed the system architecture and master plan. The objective of the ACCS is

> to automate and modernize command and control of offensive and defensive air operations by NATO forces throughout the European theater. The umbrella system will link the air command and control systems of the individual NATO countries, as well as their aircraft and air defense weapons, under a single integrated structure with common control nodes.[23]

To accomplish this task, "NATO sensors and intelligence systems will feed information to ACCS production centers, which will process the data and disseminate the common air picture to NATO ground and air commanders."[24]

Army Tactical Command and Control System. The US Army is also developing a new command and control system, the Army Tactical Command and Control System (ATCCS). This upgrade does not involve the application of new technology. Instead, ATCCS uses existing computer hardware and software. For use at all command levels, the system is

designed to aid management of combat information in such areas as fire support, intelligence, electronic warfare, and combat support services.[25]

Wing Command and Control System. The US Air Force is developing the Wing Command and Control System (WCCS) to aid the wing commander's decision-making process. WCCS will tie together all the major war-fighting functions at the wing level—higher headquarters tasking, aircraft, munitions, aircrew availability, runway status, and many other items of interest. WCCS will link to other national systems as well as NATO command and control systems.

The requirement to serve both NATO and US national command chains creates a complex data integration and separation problem. Given the requirement to support two different classification structures, the system must be able to integrate information cleared for both classification criteria. At the same time, the system must be able to prohibit integration of data when clearances differ.

Currently, the system relies on floppy disks to transfer information, which probably will not provide the speed required. Despite the speed penalty caused by manual transfer, the system definitely shows a great deal of promise.[26]

These command and control improvements—ACCS, ATCCS, and WCCS—will substantially increase NATO's command and control capability. The improvements will specifically help alleviate several faults identified earlier in the areas of timing: chain of command; allotment, apportionment, and allocation processes; and information flow. These systems will help timing; allotment, apportionment, and allocation processes; and information flow in the same way new technology will aid acquisition and processing of intelligence—by providing more time to make decisions based on more accurate data. Additionally, the improvements will allow those decisions to be implemented quicker. The chain of command will be improved by the integration of all the different command and control systems into one network. The additional benefit of these improvements is their application to the execution phase of the mission.

Act

The result of all the improvements covered thus far should be better achievement of the commander's goals. In other words, firepower brought to bear upon the enemy at the time and place of the commander's choosing. James Blackwell, a noted writer who follows NATO closely, elaborates: "In order for FOFA to work, and, indeed, to justify the commitment of platforms to a deep battle at the expense of the close-in battle, the munitions that reach the target area must hit and destroy their targets."[27]

The technology involved in improving the seeing and deciding processes improves the likelihood of a successful target attack by cutting down the

time required to find the targets and by obtaining more precise locations. To take advantage of these improved capabilities, NATO's weapon systems must be able to react quickly and accurately. A number of programs currently under development will bolster these capabilities.

Army Tactical Missile System. The Army Tactical Missile System (ATACMS) is *the* US Army's FOFA weapon of tomorrow. ATACMS will replace the Lance missile and will provide improvements in range, lethality, and responsiveness. ATACMS's actual range is classified, but all sources agree ATACMS is indeed a deep-attack weapon. Variants are already being designed that will further increase its deep-attack range while providing submunitions tailored for different types of targets. For example, Block II ATACMS, the next generation of the missile, will include a warhead capable of killing a moving hard target.[28]

A real advantage of ATACMS is its use of the already operational multiple-launch rocket system's launchers. Once MLRS launchers receive a small modification, they will be able to employ either weapon. The advantages of this flexibility are more employment platforms, flexibility in weapons employment, and a tougher targeting problem for the enemy.[29]

Weapons Interface Unit. The Weapons Interface Unit (WIU) is a little-known component of the J-STARS being developed under the JTFP. The WIU will pass J-STARS targeting information to attack aircraft en route to the target. This capability will provide near real-time target information right up to the time tactical aircraft begin their attack.[30]

Low-Altitude Navigation and Targeting Infrared for Night System. The low-altitude navigation and targeting infrared for night (LANTIRN) system is contained in a set of pods designed for installation on modern fighters—currently it is slated for installation on US Air Force F-16s and F-15Es. LANTIRN uses IR imagery, similar to the Pave Tack system installed on USAFE's F-111F fleet, for navigation and weapons delivery. The use of LANTIRN allows aircraft to perform low-altitude flight at night and in marginal weather conditions. Perhaps even more important than providing an expanded operating window in poor weather conditions, this capability will add immensely to the Central Region's night FOFA capability. The night mission currently falls to the F-111, Tornado, and Apache. The tactical flexibility of the F-16 and F-15E means these systems will be applicable in a wider variety of combat situations than the F-111 or Tornado can handle.[31]

The technological improvements discussed in the see and decide phases could increase the effectiveness of the Central Region's command and control process. The weapon systems updates discussed here will augment those command and control improvements. These improvements will be felt in the augmented efficiency of each firepower unit employed in battle. While these weapon systems improvements will not totally alleviate any of the faults outlined in chapter 3, they will contribute to an overall improvement in the performance of the NATO command and control system.

Areas Technology Cannot Directly Improve

The previous pages outlined several applications of technology. These applications have the potential to provide a quantum leap in the ability of Central Region forces to attack the enemy's rear echelon. However, technology does not hold the key to solving every fault—there are problems that require other solutions.

Chain of Command

Several of the technological advances just outlined will improve the efficiency and effectiveness of the operations of the Central Region's chain of command, but technology and its application cannot improve the actual chain. Moreover, because of the nature and structure of command relationships, any changes must be implemented by the commanders in the chain.

Allotment, Apportionment, and Allocation Processes

As with the chain of command, the allotment, apportionment, and allocation processes could be improved and quickened by several technological developments. However, the simple fact is the current allotment, apportionment, and allocation system must consume some amount of time to accomplish the steps involved in assigning air power (a scarce resource) to the targets deemed most important to the battle. Such consumption does not automatically signal that the process is flawed. On the contrary, the allocation of scarce resources, in any system, is a process which *must* be done correctly. The bottom line is that technology may improve the allotment, apportionment, and allocation processes, but those processes will still be lengthy and time-consuming.

Weapons Employment Coordination Past the Fire Support Coordination Line

Advanced technology, as has been shown, will be able to automate several portions of battlefield management. This same technology could have a significant impact on weapons coordination past the FSCL. Such improvements, however, must be preceded by a decision to implement coordination procedures in that area. Until that decision is made, technology will be of little help.

Mission Priority

Although technology can aid in the development of a weapon or weapon system that dramatically alters the utility of different types of missions, technology can do little to improve the process of determining relative mission priority. Assignment of mission priorities is a command decision.

Definitions

Another area in which technology appears to have little use is the determination of what changes, if any, need to be made to the definitions of the FSCL and RIPL. However, it is ironic that new applications of technology were the primary reason for the "demise" of the usefulness of the current FSCL and RIPL definitions.

Problems Related to Technological Dependence

Although applications of new technology appear to hold answers for several of the faults uncovered in chapter 3, there are traps in relying on technology to provide the answers to problems. Recent British experience with development of an airborne early warning (AEW) aircraft provides several examples of these pitfalls. The British originally had the choice of buying US E-3As or developing their own aircraft, a variant of the Nimrod, as their AEW aircraft. For a number of reasons, which included political and economic factors, the British decided to procure the AEW Nimrod. Despite its promise of better capability than the E-3A, the AEW Nimrod's radar systems never met specifications. After investing more money than the original E-3A buy would have cost, the British finally canceled the Nimrod-based project and bought E-3As.[32]

There are several lessons here, and unfortunately a number of NATO countries, including the United States, have gone through the process of learning them. First, technology failed to deliver the capability it promised. Second, the pursuit of the solution cost a substantial amount with no tangible increase in military power.[33] Third, other less-capable systems were required to fill the void as the British "recovered" from the AEW Nimrod experience. These factors—uncertainty of technological advances, severe financial constraints and ramifications, and interim loss of capability—are of even greater concern today.

Uncertainty of Technological Advances

Technological innovation is a promise. However, there is no certainty that the promise will come true. This problem is particularly important in the Central Region today.

The "explosion" of technology means that several countries possess the scientific and engineering prowess to solve complex problems. For example, virtually every large NATO country is designing some type of unmanned air vehicle platform.

> The Allies are developing over 70 UAVs covering such fields as Intelligence, Surveillance, Reconnaissance, Target Acquisition, Electronic Support Measures, Jamming, Decoying, Weapons Delivery, Communications Relay and Artillery Support.[34]

This technological explosion has a negative side. Because of the attractiveness of purchasing from a nation's own industry, NATO agencies are

forced to tackle the daunting task of ensuring the interoperability of all new systems. This interoperability problem has the potential to absorb resources and time equal to those used in the development of the systems that must be integrated. As Air Commodore Gabriel I. Ferenczy, a retired RAF officer with extensive NATO experience, points out:

> Technological advances and the demands for accurate near real time information on enemy dispositions and movements has led to a plethora of battlefield surveillance and target acquisition systems being developed. There is a realisation that this explosion of systems could result in a lack of interoperability and an uneconomic use of Alliance resources.[35]

Gen Hans-Henning von Sandrart, CINCENT, highlights the severity of this problem at the AFCENT level: "My problem is not that we may not get enough information, but whether all these nice systems that the nations have bought can work together."[36]

Fiscal Constraints

The importance of the second concern, financial constraints, cannot be overstated. Peace has broken out all over the world, especially in Europe, and will make the battle for military funding even tougher. Even before the amazing changes of late 1989, there were signs that finances for FOFA improvements would be hard to obtain:

> [US Secretary of Defense] Carlucci's revised FY89 budget submission terminated 18 programmes and deferred 17. FOFA technologies were included in the cutbacks. The AQUILA RPV and the AGM-130 (powered GBU-15) were cut. Deferrals included the Army Data Distribution System and the air force sensor-fuzed weapon.[37]

Especially because funding is an increasing difficult challenge, NATO leaders must not rely only on technological solutions to problems. The time has also come for a thorough evaluation of all anticipated upgrades as well as NATO's entire fiscal strategy.

Interim Loss of Capability

NATO leaders must be fearful of the trap of waiting for technology to deliver new and improved capability. Often the wait results in a decrease in interim capability and that interim period may extend for years. For an example, one need only to return to the case of the British development of their AEW aircraft. When the British made the decision to forego the original purchase of the E-3A, the obsolete Shackelton AEW aircraft had to remain in the inventory for several additional years. The Shackelton was the RAF's only AEW aircraft until the British gave up on the Nimrod AEW and bought E-3As. Thus the RAF not only suffered lost capability while awaiting the promise of a technological advancement, it also had to wait for proven, off-the-shelf equipment. In short, the RAF lost significant capability over a long interim.

Another example of this concept is the wait in the US for a "real" runway attack weapon. Yet another new weapon is being developed even as this is

written. The constant postponement of the acquisition of a runway attack weapon has left a void in the offensive counterair area. Air superiority is one of the primary missions of Central Region air power, and the lack of an adequate runway attack weapon significantly reduces the potential contribution of OCA to achieving air superiority.[38]

Summary

This chapter focused on the possible contributions of technology to the entire spectrum of FOFA operations. The chapter showed that application of technology is a major factor behind increasing the capability of Central Region air forces to take the battle deep into enemy territory. Using the mission management model introduced in chapter 3, the chapter examined several possible technological advances in the three main phases (see, decide, and act). Citing the uncertainty of technology; new, very tight fiscal constraints; and the possible loss of interim capability, the chapter closed with a warning about overemphasizing the possible gains from technology. Next, the discussion turns to other changes that can be made to correct the faults outlined in chapter 3.

Notes

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3. Ibid., 83.
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5. Capt Kent S. Sanderson, USA, "Joint STARS Look Deep to Win," *Field Artillery*, February 1988, 25.
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15. Col Jon C. Schreyach, USA, "Fire Support for Deep Operations," *Military Review*, August 1989, 30.
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18. Goodman, "New Airborne Sensors," 87.

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23. Glenn W. Goodman, Jr., "New NATO Air Command and Control System Moves toward Implementation," *Armed Forces Journal International*, December 1988, 88.

24. Ibid.

25. Blackwell, 119.

26. Col Mark Hall, USAF, untitled briefing to author at Gunter AFB, Ala., 3 January 1990.

27. Blackwell, 117.

28. Schreyach, 30.

29. Maj Gen Raphael J. Hallada, USA, "Field Artillery Vision: Master Plan for Fire Support for the Future," *Field Artillery*, February 1988, 12.

30. Goodman, "New Airborne Sensors," 84.

31. Blackwell, 117.

32. Brian Wanstall, "Which Way for British AEW?—GEC versus the US Big Three," *Interavia*, September 1986, 967.

33. It would be hard to argue that the development of the radars associated with the Nimrod AWACS did not yield engineering benefits. However, the bottom line for the military, especially in a time of constrained funding, is the fielding of military power.

34. Ferenczy, 51.

35. Ibid.

36. Quoted in ibid., 52.

37. Blackwell, 125.

38. Ibid., 117.

Chapter 5

Nontechnological Improvements

The last chapter examined the application of technological advances in improving the Central Region's ability to conduct Follow-On Forces Attack operations. The chapter showed that technology offered the promise of significant improvements in virtually all areas of mission management. However, technology cannot alleviate every Central Region problem. This chapter offers a number of solutions complementary to the technologically based solutions of the last chapter.

The solutions contained in this chapter were developed from applying a different perspective to the FOFA concept. The chapter begins with an explanation of this new perspective and applies it to the mission management model introduced earlier. Finally, the chapter explores a number of the author's proposals to alleviate the current faults outlined in chapter 3.

A New Perspective

Gen Robert D. Russ, commander of Tactical Air Command, has stated the mission of tactical air forces as succinctly as possible: "The missions of the tactical air forces are the strategic air defense of the United States and support of the army. It's as simple as that."[1] As this paper's focus is on the Central Region, the mission of the tactical air forces boils down to a single mission—support of the army. Take this one step further. Support of the army can be defined as the employment of air power in synchronization with army actions.

Synchronization is critical to realizing the fullest effects of FOFA.

> Air interdiction does, indeed, make its contribution by either destroying enemy forces or delaying and disrupting their movement; however, in order for either effect to contribute fully to the successful outcome of a campaign, air interdiction and ground maneuver must be synchronized so that each complements and reinforces the other.[2]

In other words, tactical air power is employed as an extension of, or supplement to, surface firepower. In the simplest terms, *tactical air power is airborne fire support.* Since this statement may sound like heresy to air force proponents, examination of this perspective is required.

For a beginning reference, the following definition of fire support comes from US Army Field Manual 6–20, *Fire Support in Combined Arms Operations*:

> Fire support for the air-land battle is the collective and coordinated use of indirect fire weapons, armed aircraft, and other lethal and nonlethal means. It is used to destroy, neutralize, suppress, degrade, or disrupt enemy operations.[3]

Notice the similarity between this definition of fire support and the NATO definition of air interdiction presented in chapter 1.

> Air Interdiction (AI) operations are air operations conducted to destroy, neutralize, or delay the enemy's military potential.[4]

A review of the major missions of air forces in the Central Region—offensive air support, air interdiction, defensive counterair, and offensive counterair—further demonstrates the similarity between tactical air power and army firepower assets.

The OAS mission is perhaps the easiest mission to equate to the airborne fire support concept. After all, the army nominates the targets for close air support, battlefield air interdiction, and tactical air reconnaissance. Using the process of target identification discussed earlier, army elements at division, corps, and army group nominate the targets. In reality, offensive air support targeting and employment is an extension of the firepower concept.

The classic AI definition, about which so much has already been said, is also an extension of army requirements. Air interdiction is designed to delay, disrupt, and/or destroy enemy ground forces before they can impact the close battle. Again, the army decides which follow-on forces constitute the biggest threat and against which forces air power assets will be tasked.

On first examination, defensive counterair and offensive counterair missions do not appear linked to the army's ground mission. However, the similarity between the goals and targets of the counterair and counterfire missions is striking:

> Counterfire is the attack of the enemy's fire support means. This includes the attack of his field artillery, rotary wing aircraft, forward airfields, rearm and refuel points and forward air controllers . . . it is a necessary component of our doctrine that allows our maneuver forces the freedom to maneuver.[5]

> Offensive counter air operations include counter air attack, fighter sweeps and suppression of enemy air defenses (SEAD) conducted to deny the enemy full use of his air resources. Targets include . . . airfields, aircraft on the ground and in the air, missile complexes, command and control facilities, POL and munitions sites and support facilities.[6]

The defensive counterair mission is the mission air power skeptics often mention when making the point that the air force should spend most of its time in classic air battles. However, this line of skepticism ignores the real goal of the counterair campaign. OCA and DCA missions are definite and direct contributions to the ground battle.

OCA and DCA missions are performed to negate the effect enemy air forces can have upon friendly ground forces. In NATO, the timely arrival of

reinforcements from rear areas in Europe and in America is critical to the success of virtually every defense plan. NATO's enemies are fully aware of this weakness. NATO's rear areas are also key targets. "At the same time, the US cannot ignore the problems in allied forces in the Central Region. . . . These problems indicate that NATO is probably far more vulnerable to FOFA than the Warsaw Pact."[7]

To mount and sustain a capable defense, NATO ground forces must have the freedom to maneuver. This freedom can only be achieved and sustained if the enemy does not have the capability to interfere with the process. Hence, a combination of airborne and ground assets plays a vital role in sustaining the ground forces' operations by maintaining a favorable air picture overhead. The airborne contingent consists of the assets dedicated to OCA and DCA.

This view also supports the notion of OCA and DCA as counterbattery fire. After all, if air power is an extension of the army's firepower, then OCA and DCA are virtually the same as the application of artillery in the counterfire role. In fact, examination of the counterfire roles shows a definite parallel to the missions of OCA and DCA.

> Counterfires attack enemy indirect fire systems, to include mortar, artillery, air defense, missile and rocket systems. . . . Counterfire is accomplished with mortars, cannons, guns, and aircraft and is not a separate artillery battle. These fires are planned and executed for offensive and defensive operations, or they respond to an immediate request from a maneuver commander.[8]

Obviously, OCA has a much greater meaning than an attempt to destroy the enemy's airfield attack capability. OCA becomes a dual-purpose mission—protection of NATO's own air power generation capability and defeat of the enemy's. DCA complements OCA by attacking the enemy's airborne firepower before it can be brought to bear on friendly troops or installations. Thus both OCA and DCA fit the classic counterbattery mission.

The fire support perspective of tactical air power does not dictate complete subjection of command and control of air power to ground forces. The same principles that led to the split of air forces from ground forces earlier in this century are still valid. The point is that in the Central Region tactical air power's main purpose is to support the ground commander's efforts.

Review of Current System's Faults

As outlined above, the mission of tactical air power in the Central Region is airborne fire support. Using this mission as a baseline, solutions to the Central Region's problems can be developed using the mission management model and the principles of FOFA developed earlier in this paper. The relationship of the mission management model and the principles of FOFA is portrayed in figure 18. Those FOFA principles are:

- Centralized command and control of air power assets.
- Creation of a favorable air picture as the highest priority mission and essential to the best employment of both ground and air forces.
- Air interdiction campaigns planned and executed in combination with the ground maneuver of friendly forces.
- Understanding in command and control nodes of both ground and air forces of the relationship of interdiction to ground maneuver.
- Effectiveness of air interdiction and FOFA not constrained to large conflicts.
- Collocation of ground and air forces commanders provides maximum synchronization.

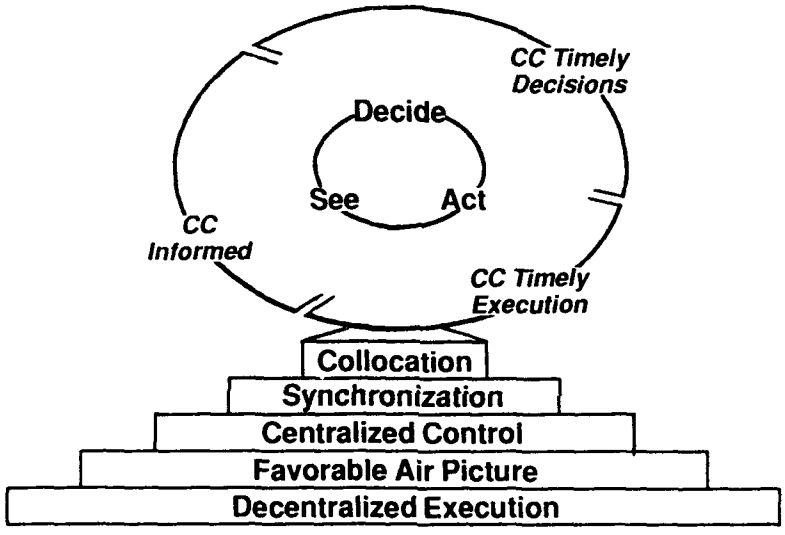

Figure 18. Foundation of Mission Management Model

Any solution to the Central Region's faults must be built upon these principles. Solutions must "honor" the principles while at the same time improving the performance of mission management. With this simple background, the paper now turns to nontechnological solutions to the problems facing the Central Region today.

Definitions

The seemingly obsolete definitions of the fire support coordination line and reconnaissance and interdiction planning line were significant factors in the author's decision to examine the Central Region's wartime mission management process. The importance of these definitions lies in the battlefield sectors the terms describe and the mission management principles that are built around those sectors. Those management decisions are essential to the proper performance of the system.

Fire Support Coordination Line. Earlier discussion in this research demonstrated that the current placement of the FSCL may be out of date

by virtue of the number of army organic weapon systems that can be employed beyond it. Thus the current definition of the FSCL is no longer valid—or more appropriately, no longer applicable in its classic interpretation. The importance of what the FSCL does, rather than what the term means, must receive the primary attention in deciding what corrective actions should be taken.

The key to the FSCL is its use as a coordination transition line. The corps is in control of the close battle and any air power committed to that battle must be integrated into the army's scheme of maneuver and fire support plan. Thus, inside of the FSCL, coordination is a relatively simple process. Coordination takes the form of operational control, with the army determining the targets and controlling weapons employment against those targets. In the area beyond the FSCL, where up to the present coordination has not been required, air power is free to maneuver. The FSCL, then, has formed the coordination boundary between the close battle and the deep battle.

The limits of that close battle have historically been based upon the range of the army's organic artillery. That artillery's range has been the extent of the army commander's ability to influence the battle directly—thus the coordination boundary. New army weapon systems, mentioned earlier, have changed the range limit of army organic firepower.

Given that the requirement for a coordination boundary is still valid—and no one would dispute the existence of a line beyond which the army commander does not need to actively control air power—the concept of the FSCL is still valid. Where this coordination transition line is drawn becomes the key point.

Although new army weapon systems do indeed have deep-battle capability, by far the greatest portion of CINCENT's deep-battle assets are air force weapon systems. Thus to place the FSCL at the range limit of the ATACMS, for example, would place the coordination barrier far beyond the vast majority of the army commander's firepower *and* place a needless coordination task on army and air forces. The FSCL, it would seem, *should* exist at the limit of the *largest* portion of the army's organic firepower.

The difference between selecting targets and attacking targets is critical to this concept. Beyond the FSCL, corps commanders still drive the target identification and selection process for FOFA, but realistically they have little influence on firepower employment. Use of the ATACMS or Apache, moreover, would probably be dictated by a lack of sufficient tactical air power. Therefore, the current limit of the FSCL, perhaps adjusted slightly deeper for those corps with a sizable number of multiple-launch rocket systems, still forms the coordination boundary needed to divide the battlefield. This division becomes increasingly important if coordination of the deep battle, which this study has demonstrated is mandatory, is instituted in the Central Region.

The preceding paragraph may seem to offer a nonsolution. After making the case that the definition no longer applies, the author now supports the term and demonstrates the reasons supporting it. This contradiction is

more apparent than real. The importance of the definition lies not in specifying a location for the FSCL, though the author has offered a formula for "fixing" the FSCL. The importance of the FSCL is the meaning of the concept in terms of coordination. The concept must be recognized and supported by the forces in the Central Region. NATO air forces must understand the significance of the line, that it will vary between corps based on their organic weapon systems, and that the line's position will vary with time. NATO ground forces must understand that the corps' control of weapons employment ceases at the FSCL. Past that point, control should pass to the commander who will direct the deep battle. (This ownership question is explored later.) The critical factor is acknowledgment of the line and support of the concept by NATO air and ground forces.

Reconnaissance and Interdiction Planning Line. A key distinction embedded in this discussion is the difference between control of weapons employment and identification of targets for weapons employment. The FSCL outlines the limits of active army control of weapons employment. The RIPL is supposed to address other battlefield limits. The RIPL, according to the definition in chapter 1, is a planning line determined by the army groups which is supposed to coincide with the tail of the enemy's first echelon and the beginning of the second echelon. Its placement is also supposed to define the limits of corps planning and intelligence responsibilities. How can the location of the enemy's second echelon be a static line? How can the tail of the enemy's first line be equal to the corps' planning and intelligence limits for longer than a passing moment? With the advent of FOFA the current RIPL has lost meaning, except perhaps as a reference to the limit of the corps' intelligence-gathering capability.

In the FOFA concept, the deep battle begins as soon as an enemy component is identified as a force that must be attacked in depth. From that time until the remaining portions of that force pass the FSCL, thus entering the close battle,[9] the enemy formation will be the focus of attack by FOFA assets. Employment of those FOFA assets will not be *solely* dependent on the use of the corps' organic intelligence systems or those of the army group. Under the FOFA concept, intelligence assets should collectively focus on the enemy force identified as the follow-on force.

As the enemy force advances toward the close battle, however, the need to redirect his advance and to force him to deploy as the corps commander forecast in battle planning increases. The closer the enemy's actual forces and location are to the corps commander's predictions, the better the close battle will go. Therefore, at some point in the deep battle, targeting decisions must increasingly reflect the corps commander's desires. A more appropriate name for this line would be the corps planning line (CPL). On the far side of the CPL, targeting decisions would be made by the commander in charge of fighting the deep battle. Inside the CPL, the corps commander's battle plan would be the predominant guidance for targeting. The location of the CPL should be corps dependent, should be determined by the limits of corps intelligence assets, and should be a line inside which

the enemy force probably would not change its course of advance by a large extent. The CPL would *not* delineate a boundary between the corps and AG intelligence-gathering assets—all such assets will be needed to fight the battle—but it would delineate the *focus* of the targeting work that results from the processing of the intelligence collected by all of the assets available.

The location of the CPL, as the location of the RIPL, is not of importance to the air force units tasked with executing Follow-On Forces Attack. Any mission (whether TAR, OAS, or AI) flown against targets past the FSCL is essentially air power employment in the FOFA role.

Deep Battle. Where the deep battle begins and ends has been the subject of many discussions. Some parties address the deep battle in relation to the delineation of division and corps areas of responsibility/interest. Others consider the deep battle as the area beyond the RIPL. However, the most appropriate definition is a point past which engagements take place out of the range of close-battle assets. Recall the suggestion that the basis for placement of the FSCL be the range of the majority of corps artillery assets. This definition would make the limit of the close battle, and therefore the beginning of the deep battle, the FSCL. Inside the FSCL, the corps and its divisions identify and attack the enemy. Between the FSCL and CPL, the corps targets, but other assets attack in an effort to shape the close battle. Past the CPL, the deep-battle commander shapes the future close battle by engaging forces considered the most serious threat.

This is not to suggest that there is no deep component to the close battle. After all, the close battle will contain various deployments of enemy forces to the depth of the FSCL. However, organic division and corps assets will target and engage these forces as a portion of the close battle.

This deep-battle delineation, essentially past the FSCL, aligns weapons employment responsibility with battle command. This appears to be a much clearer approach than to rely on such a nebulous term as *area of responsibility.*

The FSCL must be rejuvenated and honored by ground and air forces. Adopting the concept of a CPL would improve the current mission management's focus on deep operations. The proposed definition of the deep battle appropriately aligns with these actions. With this discussion as background, it is time to turn to a discussion of command in the mission management system.

Chain of Command

The debate over "commandership" of FOFA operations (who should command and at what level should command be exercised) continues. The principal fuel for this fire has been the procurement of deep-fire weapon systems by armies in the Central Region, especially the US Army. The debate is not simply a turf battle—*resolution of this question is central to solving the other problems this research has discussed.*

Before discussing any changes to the current chain of command, the importance of structuring the organization for mission management functions must be made clear:

> Executing commanders benefit from organizational decisions that create workable command relationships, that insure information flow that supports effectively information decision making at the scene of action and that provide the staff and other C^3 facilities needed to predict outcomes in support of operational decision making at the scene of action.[10]

Making sure the Central Region organization *directly* supports the mission management process is, therefore, key to the development of other improvements to the mission management process.

The point of contention is the proper command level for commanding the deep battle. As recently as June 1989, 4ATAF published a document specifying different regions and command levels for FOFA depending on geographical references. Under the 4ATAF concept the army group/allied tactical air force would be responsible for actions beyond the RIPL. The corps/allied tactical operations centers would fight the battle between the RIPL and the corps' divisional areas of responsibility.[11] This kind of arbitrary breakdown causes problems. First of all, the ATOCs and corps are not collocated or even aligned, creating serious problems in synchronization. Second, the breakdown of the deep battle into arbitrary sections creates decentralized control of air power, thus ignoring a basic tenet of air power. Finally, because FOFA assets are scarce resources, the more levels of required commitment, the higher the threat of misallocation. Proposals such as those in the 4ATAF paper, although attempting to settle the question of command levels for FOFA, lead to a misunderstanding of the key tenets of FOFA.

The deep battle requires a commander with authority over the forces he employs.

> In order to fight the deep battle, tie it to close operations, and have access to higher headquarters, assets will require much coordination and will also require command authority. Obviously, coordination is no substitute for command authority. The successful outcome of the deep battle will require a commander, who knows the intent of the commander two levels above him, understands the concept of operations of his immediate commander, and has an appropriate command organization and effective structure of command, control, and communication.[12]

Thus the decision must be made as to which component should command the deep battle and then the appropriate level for that commander must be explored.

Three principles of the deep battle have been thoroughly explored: First, the army identifies targets and provides a priority for those targets. Second, the air force tasks and provides the vast majority of the weapon systems employed in the deep battle.[13] Finally, the army and air force must synchronize their efforts in the deep battle to produce the maximum effect. Command of the deep battle, therefore, involves the question of the impor-

tance of target identification and selection functions versus firepower control.

The target identification and prioritization functions are obviously critical. These functions involve identifying and attacking those enemy elements that possess the highest potential to impact the close battle. These functions (the see phase in the mission management model) involve the focusing of available intelligence assets on important portions of the enemy's rear area, determining which targets must be struck, and providing all of this information to the firepower assets that will perform the attack. These functions involve the resources of all the services in the Central Region.

The execution process is also critical to successful attack of the enemy's follow-on forces. After all, achievement of the commander's objectives is the ultimate measure of the process—if key enemy formations are attacked and destroyed or delayed in accordance with the ground commander's intentions, FOFA has been successful. The decide and act phases constitute the execution functions.

Although both targeting and execution are crucial to the success of FOFA operations, the execution function is the dominant *command* activity in the deep-battle area. The target identification function is a valuable source of information for the commander as part of the see function in the mission management model, but it is not a command function—it is an informational function that leads to a command decision. The see aspect does not entail the activities discussed in the definition of command in chapter 3:

> Authority granted to a commander to assign missions or tasks to subordinate commanders, deploy units, to reassign forces, and to retain or delegate operational and/or tactical control as may be deemed necessary.[14]

It is the execution function which assigns missions, albeit based upon the information developed in the see function, and tasks subordinate commanders. The execution process should be the dominant factor in determining command of the deep battle.

Choice of the execution phase as the dominant command factor has been supported in other studies. Lt Col Joseph Monko, examining command of the deep battle, noted:

> The force artillery commander would be the logical choice to assign responsibility as the commander of the deep battle. FM 100-15 (Draft) [US Army FM 100-15, *Corps Operations*, November 1987] touches on this when it states: "Normally the corps fire support coordinator is the individual who is given responsibility and authority to control all aspects of the deep operation."[15]

Monko, discussing the fire support coordinator, continued:

> He is the combat arms commander within an organization who has the organization and assets to reach into an area where the deep battle will be fought, under all weather and visibility conditions.[16]

Another study also answered the question of "Who should command the deep battle?" with the fire support coordinator. Maj Joseph Sheridan, in

his examination of fire support at echelons above corps (EAC), noted the need for a fire support coordinator at the EAC level:

> Whether by design, or just through the evolution of the AirLand Battle doctrine, the ground forces commander above corps level will now be directly involved in fire support planning and coordination process. In light of this fact, there is now a definite need to identify a fire support coordinator to provide the necessary advice, and conduct the continuous planning and coordination which will be required.[17]

These examples demonstrate the importance attached to the coordination and command of fires for the deep battle. The synchronization requirements of the deep battle and the reliance of the ultimate success of NATO forces on the successful application of the FOFA concept dictate—no demand—fire support coordination above the corps level.

Why above the corps level, one might ask? Because of the vast expanse of FOFA employment, well outside the deep extension of corps boundaries, and because of the time-honored principle of centralized control of air power, fire support coordination must rest at a level above the corps level.

The fire support coordinator, then, is the commander at the EAC level who has command of the execution forces. For the deep battle, air force assets constitute the majority of the EAC execution assets. Therefore, an air commander performs the fire support commander role and must serve as the deep-battle commander.

Three levels of air commanders meet the above criteria: allied tactical operations center, allied tactical air force, and Allied Air Forces Central Europe. Each level offers advantages—these must be weighed against the list of fundamental requirements presented in chapter 2 as well as the information discussed above.

The ATOC offers redundancy of function—a definite benefit in a wartime environment. The Central Region has four ATOCs; two separate facilities per ATAF. However, redundancy is the only advantage offered by an attempt to command the deep battle at the ATOC level, and such a scheme has several disadvantages.

First, the ATOC has no counterpart in the army chain of command. There is one army group per ATAF and this AG will have a single scheme of maneuver. Synchronization, therefore, becomes a difficult if not impossible problem.[18] Second, a corollary to this disadvantage is the inability at this level to centrally control air power. Third, a lack of physical space is a problem, especially given the recent integration of sector operations centers into ATOC facilities. Room within the ATOC at Sembach AB, West Germany, visited by the author, was very limited and army presence on the ATOC staff was essentially nonexistent.[19] Finally, an ATOC is little more than a dislocated work center for an ATAF. ATOCs implement, plan, and coordinate air power packages once force taskings (command decisions concerning the employment of air power assets) have been made. Despite the insistence of some elements of the USAFE staff, the ATOC is not the optimum level for command of air power in the Central Region.[20]

Location of the command of the deep battle at Allied Air Forces Central Europe appears to solve the problems faced at the ATOC level. After all, AAFCE is the top level of air power command in the Central Region. Command at the AAFCE level achieves centralized control. Additionally, AAFCE is logically aligned with AFCENT, which places synchronization at the highest-command level. However, these advantages do not overcome the restrictions AAFCE-level operations would have.

In the Central Region, two distinct land battles will be fought. The CENTAG situation is decidedly different from that of NORTHAG. In CENTAG American and German corps enjoy a better overall mix of weapons and reconnaissance platforms than found in the corps of NORTHAG. Additionally, a sizable portion of CENTAG's forces are located at or near their forward-defense positions. In NORTHAG several units will have to deploy forward from their home countries. The northern terrain, to make matters worse, is fairly flat and favors enemy tank advances. In the south, the terrain is more rugged—tank advances would be tougher. As a result, NORTHAG and CENTAG differ in their defensive plans. These differences could be overlooked at the AFCENT/AAFCE level.

Moreover, the deep-battle commander will serve as the EAC fire support coordinator. The functions of the fire support coordinator indicate that the appropriate level for fire support is not at the AAFCE level.

> The key to effective fire support planning at the operational level rests in our ability to decide what to do, to detect the appropriate targets quickly and accurately, and to deliver fires rapidly and effectively.[21]

These functions entail targeting and air power employment decisions, and these are functions tied to the army scheme of maneuver.

The AFCENT/AAFCE level serves an important function in its long-range approach to the battle. The AFCENT and AAFCE staffs will be attempting to formulate battle plans several days in advance to provide their respective commanders with information to shape the future deep and close battles. In essence, AFCENT and AAFCE are working future requirements—the immediate close and deep battles are best left to the next lower echelon—army group/allied tactical air force.

The ideal level for deep-battle fire support coordination, the air commander's primary mission as the deep-battle commander, is at the AG/ATAF level. This level provides the best trade-off of centralized control with decentralized execution and best fulfills the requirements of supporting the ground scheme of maneuver. The ATAF level is aligned and collocated with the AG—the author of the scheme of maneuver that will be used by its corps. This plan forms the basis of the air component commander's integration of air assets as fire support. This level also controls reconnaissance and deep-attack platforms that will operate in the heart of the FOFA envelope. Overall, the AG/ATAF level provides the best balance of synchronized operations and centralized control.

The employment of air power, though, encompasses more than just the deep battle. Air power will be required for close air support in the close

battle and defensive counterair flown in the corps close battle or rear areas. Thus, the air commander, besides acting as the AG's deep-battle commander, must also function in the process of directing air power to other areas and missions.

The ATAF level is still the appropriate level for these tasks. The synergy between ground maneuvers and air operations is essential in balancing the requirements of the AG. For example, critical movement of reserve forces in the corps rear areas, in preparation for employment in a counterattack, may increase the requirement for DCA in these areas. The AG/ATAF level is precisely the level for making such decisions. Decisions such as placing CAS assets on alert for short-notice operations are also appropriate at the AG/ATAF level. Those assets could be employed quickly in support of any corps in the AG. The necessary communication for this employment would be corps to AG/ATAF to executing wing. If the level were decreased to the ATOC, the worst-case communication requirement could be corps to ATOC to AG/ATAF to other ATOC to executing wing. The AG/ATAF level is the precise location for commanding the battle.

Under the FOFA concept, the ATAF commander's role would be as the AG's fire support coordinator. In that role the ATAF commander would perform two major functions: (1) the AG's deep-battle commander, responsible for deep firepower employment in support of the AG's scheme of maneuver, and (2) coordinator of the employment of air power in support of the close and rear battles. Again, because the same air power assets may be moved between these missions, the ATAF level is the optimum level for the important command functions.

Given this new focus on the chain of command, the Central Region's air force organizational chart must undergo small but important changes. These changes are designed to allow the chain of command to perform as quickly and accurately as possible. A by-product of these changes should be resolution of the faults identified under the categories of time; allotment, apportionment, and allocation processes; and information flow.

The new basic chain of command, shown in figure 19, looks essentially unchanged. The basic functions and command relationships of the levels, however, have been altered to align with the chain of command changes.

Timing; Allotment, Apportionment, and Allocation Processes; and Information Flow

Under the new command structure, COMAAFCE would still function as the air adviser to AFCENT. In that role, COMAAFCE would advise CINCENT on the best use of air power for achieving AFCENT's overall goals. COMAAFCE would also retain command of the air forces assigned to the two ATAFs. However, this command would be exercised on a by-exception basis. Unless COMAAFCE specifically allotted or apportioned forces, the two ATAFs would plan on employing the forces normally under their operational control. For example, COMAAFCE might choose to allot F-4Gs

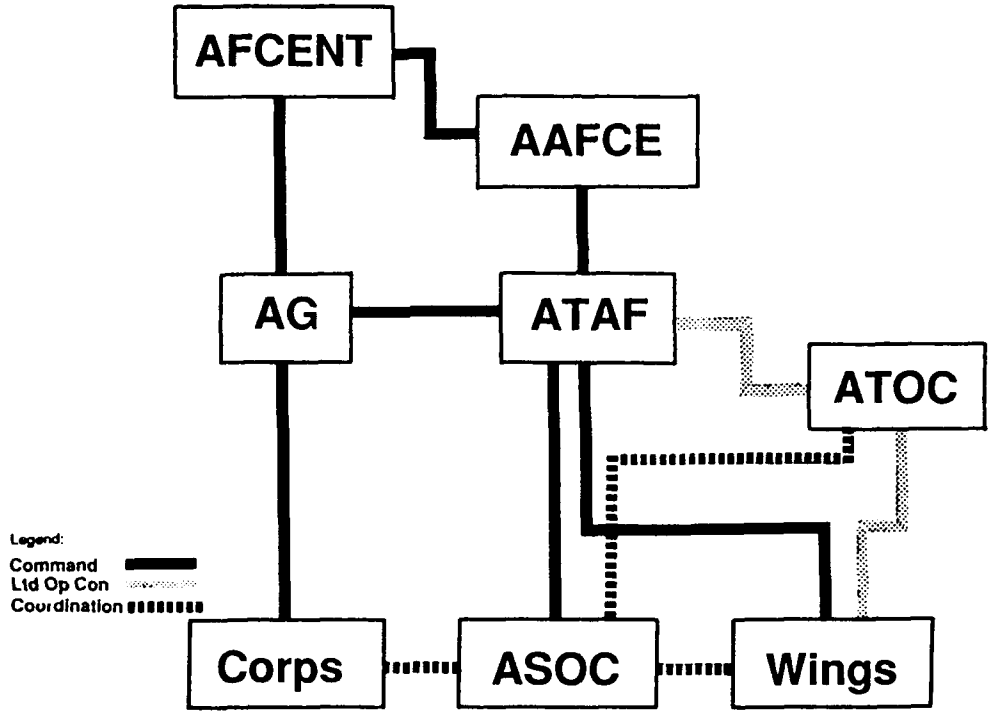

Figure 19. New Command and Control Organization

and EF-111s to the ATAFs. These very scarce, highly specialized resources may be specifically needed in one portion of the battlefield. COMAAFCE might also direct one ATAF to perform OCA against a set of airfields and allot the forces required for that OCA to the ATAF.

In the absence of these types of actions, however, *no allotment or apportionment would be made.* This by-exception command relationship would accomplish several different things. First, it would largely eliminate the time it now takes for the AAFCE command staff to recommend, receive approval for, and publish the allotment and apportionment messages. Second, it would place mission apportionment decisions at the synchronization level. The ATAF commander, using guidance from the AG commander, could develop a plan for the best employment of every weapon system under operational control of the ATAF. This system would give the added flexibility of tailoring the employment of air power exactly to the AG's scheme of maneuver. Would close air support be overrated under this system? Would defensive counterair be cut? Probably not. The decision to add CAS missions would drive, in most cases, a reduction in other offensive air support areas. A decision to cut DCA or even OCA might lead to reductions in the freedom of friendly forces to maneuver in the close- and rear-battle areas. The key element of this new command relationship is to

allow the AGs and ATAFs to maximize the effectiveness of every air power asset.

At the ATAF, the current joint targeting cell (JTC) would have to be enlarged to support the inclusion of this new command role.[22] Army intelligence personnel would be needed to perform targeting tasks from the ground commander's perspective. The JTC could be enlarged by careful screening of the manpower requirements of the AG and ATAF staffs. Strengthening the JTC would benefit both functional commands—even if it resulted in the loss of some manpower positions in their own organizations. The result must be a JTC that has the capability to translate the ATAF commander's desires into frag orders as quickly as possible.

Under this concept, the ATOC's mission would be altered slightly. The biggest change would be the placement of the ATOC outside of the command chain—placing the role of the ATOC as a planning adjunct of the ATAF staff. The command and communication channel would go directly from the air support operations centers to the ATAF. This would parallel the army organization, cut down on transmission time for valuable information, and streamline command and coordination relationships. The ATOCs would still perform the mission-packaging function—coordinating the support requirements of large attack missions. In addition, the ATOCs would pick up planning functions for missions that could not be handled at the AG/ATAF level. The ATOC, because of its inclusion of the sector operations center, would still perform operational control and tasking of all DCA assets. Finally, because of their dispersal, the ATOCs would still offer redundancy for ATAF-level functions.

Another functional area in the chain of command which can be improved is the relationship of the ASOC and the fire support element. For best total weapons employment, these units must function as a single unit—the ASOC and FSE should function as the close-battle commander's joint targeting cell. In this capacity, this JTC (corps) would have support of army and air force personnel in every major area and thus could quickly identify targets for prioritization as well as the systems that should be used for their attack.

Finally, efforts must be made to link the ASOCs directly to the fighter wings—the final leg in the execution process. The most critical FOFA battle area, in relation to the enemy's movements and FOFA's impact on those movements, will be the area just outside the close-battle area.[23] This area, between the FSCL and the CPL, is the last opportunity for deep-battle engagement. Corps-level intelligence assets will be focused on the enemy's advance. All new target data should be passed to the executing wings as quickly as possible. This new focus, placing the emphasis on supporting the executing nodes in the mission management process, is critical to FOFA's success.

> While commanders at every echelon understandably see the purpose of the command and control process to be the support of their own particular decision making needs, it turns out that the decision making needs of the executing commanders are the most

> important of all. If the executing does the right thing, the command and control process has been successful; if he does the wrong thing, it has failed.[24]

Once a wing has been tasked for a mission, communication between the ASOC and the wing should begin. The flow of updated target information would improve the probability for mission success and generate a better picture of the overall battle.

The proposals listed above will not magically fix the time; allotment, apportionment, and allocation processes; and information flow problems. However, these actions, by lowering the levels of command and opening new communication channels, will increase the potential of each sortie and decrease the amount of time needed to get information to the executing commanders. Placing mission management emphasis at the executing level, when coupled with the deep-battle command, should create substantial improvements at practically no extra cost.

Intelligence Support

The intelligence support problem is a simple one to fix—but the least-cost option is a manpower intensive one. Before beginning to discuss this area, however, one must understand that army and air force intelligence personnel are not interchangeable. In fact, army and air force intelligence personnel approach a tactical problem from two different perspectives. When presented with a tactical problem, typical army intelligence representatives begin analysis by figuring out the best way to kill the target. When given the same tactical problem, air force intelligence representatives begin analysis by determining the threats to the mission. These different approaches were demonstrated several times during the author's research and are subconscious results of different types of training. Army intelligence resources serve as advisers to their commanders. The target and how to kill it is their focus. In the air forces, pilots figure out how to kill the target—the intelligence community helps the process through analysis of the threat. Do these differences present a problem? Definitely not—as long as both intelligence resources are represented at critical nodes. With advice from both perspectives, the commander is assured of getting a thorough look at the tactical or operational problem. Unfortunately, the current mission management process does not enjoy the benefit of these resources.

At the ASOC/corps level, air force target intelligence specialists are virtually nonexistent. Their inclusion at this level would add another perspective to targeting decisions. At the NATO fighter wings the opposite is the case. Typically, for example, at US fighter wings, one US Army officer is permanently assigned as a ground liaison officer. Additional Army officers are available during exercises but not to the point where Army personnel actively participate in the targeting process, and targeting is an area that needs attention from both perspectives.

The situation at the ATOC has already been discussed. Even with the ATOC involved as a functional subordinate to the ATAF, inclusion of army intelligence officers at that level would benefit all joint weapons employments.

Finally, the AG/ATAF must have sufficient intelligence resources to allow the see functions to be processed, thus allowing quick, accurate decide and act phases. Even though manpower positions are already hard to add, and this difficulty will only increase, joint representation of intelligence personnel from the ASOC level on up is vital to the FOFA concept's success. If NATO is not able to acquire the new standoff surveillance and target acquisition systems it wants, the addition of intelligence personnel would still speed up and improve the targeting process. If the new systems do arrive, the intelligence assets will enjoy a quantum leap in productivity.

Weapons Employment Coordination Past the Fire Support Coordination Line

The coordination of weapons employment past the fire support coordination line was another of the problems that led to this research. Even with the FSCL remaining in approximately the same place relative to the FLOT, weapons coordination will remain an acute problem. Gen Hans-Henning von Sandrart, CINCENT, voices his concern about this problem: "Last, but not least—and this is an Achilles heel—satisfactory airspace control means and measures must be developed as a joint army/air force task."[25]

Weapons employment past the FSCL is essentially a problem with two facets—airspace coordination and weapons optimization. The airspace problem arises because every weapon system, whether owned by ground or air forces, must transit the deep-battle area airborne. Weapons optimization, ensuring exactly the right amount of firepower—nothing more and nothing less—is needed for every target.

Airspace coordination basically has two different forms—positive control and procedural control. ATP-33(B), *NATO Tactical Air Doctrine*, defines the two as follows:

> Positive control. A method of airspace control which relies on positive control, tracking and direction of aircraft within an airspace . . . relies upon real time data using facilities equipped such as radar, IFF and communications.
>
> Procedural control. A method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures. Procedural control includes techniques such as the segmenting of airspace by volume and time and/or the use of weapons control orders.[26]

It is obvious that the nature of the deep battle will not permit positive airspace control since identification features that allow positive control can also be used by the enemy to shoot down aircraft. Procedural airspace control, then, becomes the method of choice.

The best method would be to use designated segments of deep-battle airspace for air force tactical aircraft and other segments for cruise missiles, Apaches, ATACMSs, and MLRSs. Using this system, weapon systems could

be employed simultaneously without undue fratricide. Air force assets, which take the longest to coordinate and employ, should use whatever segments offer the most tactical flexibility. The other assets could be employed around them. Thus the burden of deconfliction would fall upon the systems with the most flexibility. This problem is potentially much more complex if the control of all deep-battle assets is not placed in the hands of the deep-battle commander.

Coordinating segment usage between surface and air force weapon systems in the deep battle presents a potential problem if command of these assets is performed at two different levels. Presently, army assets belong to the corps while air force assets are employed by the ATAF commander. The solution to this problem is not a popular one, but it does align weapon systems with likely employment—the optimum solution. Weapon systems with the capability to be employed in the deep battle should be commanded by the deep-battle commander. In other words, ATACMS, Apache, and long-range MLRS should come under the operational control of the ATAF commanders. Group Capt Peter Millar, RAF, tackled this point in his article "Areas of Responsibility Beyond the FEBA: An Analysis,"

> Thus, like aircraft, ATACMS should be controlled at the highest possible level (i.e., AG), unless for short periods of time a lower level of control would have advantages. This would result also in good coordination between ATACMS and airpower.[27]

Group Captain Millar suggests the AG level as the right level. Under the author's proposed realignment, the ATAF commander is the AG's deep-battle commander. The move to place ATACMS under the ATAF commander would satisfy Millar's final point, ensuring close coordination with air power. Given the inclusion of the armies' deep-battle systems at the ATAF level, the deep-battle commander would have operational control of all deep-battle assets.

This optimum solution will not work in practice, however, because of the corps commander's requirement to be able to employ such assets as the army tactical missile system in the close battle. In fact, given the importance of timely reaction in the close battle, such weapon systems as ATACMS, commanded and employed by corps commanders, may even be preferable to air power for the close battle.

The best compromise is to identify a portion of ATACMS assets for assignment to the ATAF commander. As the deep-battle commander, the ATAF commander would be free to task these assets as part of the deep-battle plan. Remaining ATACMSs could be employed in the close battle in accordance with corps and AG schemes of maneuver. Any employment of the systems beyond the FSCL would have to be coordinated with the ATAF. The portion of ATACMS, and similar deep attack army platforms, allocated to the deep battle could be used by the ATAF commander, under the guidance of the AG commander, as quick reaction deep-attack forces.

Thus weapons coordination becomes a minor problem if weapon systems are allocated to the commanders who will most likely employ them. The

command of ATACMS by the ATAF commander would not create as big a problem as might be expected. First of all, the ATAF commander tasks through the JTC, which has the essential army expertise. Second, the ATAF commander works with the AG commander who would definitely understand ATACMS employment. Finally, the decentralized execution agency of the army, at brigade level, should be free to employ the system in the best possible manner.

The timing problem, as it relates to mission execution, would also be alleviated by these moves. Both close- and deep-battle commanders would have immediate reaction weapons. Additionally, the coordination problem, which could have been substantial and time-consuming, is alleviated by assigning weapon systems to the appropriate level of operational command.

Mission Priority

Mission priority is not a portion of the mission management process, per se. However, preconceived notions about what missions must be flown should be challenged. Two such notions concern the *current* utility of close air support and offensive counterair.

Today's battlefield, especially in Europe, is an extremely high-threat environment for close air support. The days of an aircraft being able to circle repeatedly above the battlefield are over. Even in limited intensity conflicts, hand-held antiaircraft weapons make CAS a high-threat mission. This threat escalation led to the Air Force's decision to look for a replacement for the A-10, but this reevaluation of CAS has not been limited to the United States. NATO countries have recently been investigating the future of CAS and have generally echoed the theme here expressed by the British.

> Close Air Support (CAS) is a subject which raises the emotions of both protagonists and opponents. It is, of course, quite understandable. It is the only role in which the Army sees the Royal Air Force participating in what is, for them, the battle. Yet, as technology has favoured the anti-aircraft defence over the close air support aircraft during the past years, so it has been necessary to use CAS sparingly if flexible air assets were not to be squandered. Both COMTWOATAF and COMNORTHAG, from this stage, have reiterated that while CAS will be provided in the extreme situation, under modern conditions air power is best utilised elsewhere.[28]

In short, CAS is now considered an emergency measure. For example, the West Germans have abandoned the CAS mission. Close support will be provided by army systems while freeing tactical air assets for other missions. Thus CAS has at best been relegated to an emergency operation because the benefits do not measure up to the expected costs. At the worst, CAS has effectively disappeared.[29]

Offensive counterair in the Central Region has three main submissions—suppression of enemy air defenses (SEAD), airfield attacks (including all airfield facilities supporting sortie generation), and attacks against other such military components as command posts that support air operations. SEAD can have an important, if temporary, effect on the battlefield. However, in the Central Region only a small number of aircraft are dedicated

to the SEAD role (USAF F-4Gs). These aircraft can be employed in teams with F-16s on SEAD missions. Of course, the F-16 also can be employed in virtually every other mission in the Central Region. The SEAD mission can be a critical mission, but the limited number of assets, coupled with the vast number of enemy weapon systems, means the SEAD mission is likely to be executed only in contingency or large attack package support roles. Trying to schedule these assets in support of other missions may result in unnecessary delays. Any delay in applying air power, as discussed earlier, can result in significantly lower probability of successful target attack.

The second portion of the offensive counterair mission, airfield attacks, must come under close investigation. Attacks on WP airfields appear to be a counterproductive use of air power.

> The effectiveness of this approach remains a matter of conjecture. . . . First, there are over 200 airfields in the forward area available to the 9,000 Warsaw Pact aircraft. Attacking even one-fourth of these airfields would severely strain NATO air capabilities. Second, the US capability to damage airfields is limited to cratering surfaces, destroying buildings, and damaging aircraft in the open. . . . Finally, timing the attacks to kill as many aircraft on the ground as possible may prove difficult.[30]

Although this evaluation was made eight years ago, little has changed in NATO's ability to put WP airfields out of commission. The most significant factor is the lack of a weapon, or set of weapons, that can substantially degrade sortie-generation capability. The current airfield attack capability in the Central Region would be employed almost exclusively in the OCA campaign. If this occurs, the WP has succeeded in tying up NATO's FOFA assets.

The final portion of the offensive counterair campaign, attack of the enemy's infrastructure which supports air power operations, has the most promise of the three submissions. However, given the redundancy and sheer numbers of these nodes, a sizable portion of NATO's assets would have to be dedicated to this role to realize any progress. Additionally, those segments of the enemy's military structure are used for many other functions than the enemy's counterair missions. Thus attack of these targets by NATO assets, if that command decision is made, could just as easily be categorized as air interdiction or FOFA missions.

CAS and OCA are important missions and given the right theater, right weapons, and lucrative targets they can have critical effects. However, the proper conditions do not exist in the Central Region today and they may never again. NATO air commanders must acknowledge this lack of capability and support the transfer of OCA tasked assets to the FOFA mission.

Timing

The timing problem has been discussed in several different portions of this research because proper timing is critical to applying air power effectively in the FOFA concept. Solutions already offered in this chapter

have involved fixes that will affect target identification, mission tasking, and communication of updated information to tasked units. However, the answer to the timing problem is far from complete.

Thus far this chapter has avoided high-tech answers as part of a conscious attempt to keep systems improvements as inexpensive as possible. Even if NATO acquires such systems as JSTARS, ASARS II, ATARS, and ACCS, it still must focus on getting information to the executing wings as rapidly as possible. The best solution, of course, would be to put JSTARS terminals in every fighter squadron. Once tasked with a target, the squadron could continually monitor its assigned target's position.

A related improvement would be the use of mission-type orders, an increasingly popular concept in NATO. Instead of tasking a wing with specific targets, a mission order might read, "Delay the lead elements of the 80th Soviet Guards Tank Regiment by 24 hours." This leaves the "how" to the experts, the executing units tasked with the mission. Mission-type orders have a definite advantage, but their implementation would require developing new manning, deconfliction, and airspace coordination measures.

Mission-type orders would further highlight the requirement for increased army intelligence presence in NATO's wing targeting cells. Army representatives would be there to identify the targets, much the same as in the other echelons of mission management. Airspace deconfliction procedures would also have to be amended to prevent several wings from attacking several targets in the same area at the same time. Such procedures would be needed because most of the enemy units targeted by mission-type orders would be too large for one wing to have sole responsibility.

Summary

This chapter addressed nontechnological solutions to the faults of the current mission management system. Low-cost solutions were offered to alleviate the problems hindering mission management in the following areas:

- Definitions
- Chain of command
- Allotment, apportionment, and allocation processes
- Intelligence support
- Information flow
- Weapons employment coordination past the FSCL
- Mission priority
- Timing

Suggested solutions included creating a command relationship and structure better suited to the mission management system. The chapter recommended modifications to improve the processes of allotment, appor-

tionment, and allocation. It also offered suggestions to improve intelligence support at virtually every level and command channels to improve information flow and mission management. The chapter also took a new look at mission priority to determine how best to employ NATO's scarce resources. Finally, the overarching nature of the timing problem was addressed, and several suggestions for improvements were offered.

Notes

1. Gen Robert D. Russ, USAF, commander of Tactical Air Command, address at Air War College, 8 January 1990. General Russ granted permission to quote from his talk in a letter to the author dated 16 April 1990.

2. Lt Col Price T. Bingham, USAF, "Ground Maneuver and Air Interdiction in the Operational Art," *Parameters*, March 1989, 17.

3. US Army Field Manual (FM) 6-20, *Fire Support in Combined Arms Operations*, 28 January 1983, 1-1.

4. ATP-33(B), *NATO Tactical Air Doctrine*, November 1986, 5-2.

5. Maj Gen Raphael J. Hallada, USA, "Fire Support Modernization: A Major Step toward Deterrence," *Military Review*, August 1989, 11.

6. ATP-33(B), 4-2.

7. Anthony H. Cordesman, "Technology and the Search for Conventional Options: Religion versus Reality," *RUSI Journal*, Spring 1989, 57.

8. FM 6-20, 1-3.

9. Hopefully, the FOFA attacks defeat the combat capability of the enemy before he enters the close battle.

10. Frank M. Snyder, "Command and Control and Decision Making," in *Principles of Command and Control*, ed. Jon L. Boyes and Stephen J. Andriole (Washington, D.C.: AFCEA International Press, 1987), 20.

11. CENTAG/4ATAF, "Levels of Responsibility for FOFA," 1520.10/4FPLWP/DKC-7/C-245/09, annex A, 15 June 1989, A-1.

12. Lt Col Joseph P. Monko, Jr., USA, *Doctrinal Shortfall: Who Will Command the Deep Battle* (Carlisle Barracks, Pa.: US Army War College, 23 March 1988), 12.

13. After the introduction of MLRS, and even including the introduction of ATACMS, the air forces in the Central Region will still provide the vast majority of firepower for the deep battle.

14. ATP-33(B), 3-1.

15. Monko, 14.

16. Ibid.

17. Maj Joseph O. Sheridan, USA, *A Proposed Fire Support Coordination Facility for Army Echelons Above Corps* (Maxwell AFB, Ala.: Air Command and Staff College, 1984), 15.

18. CINCUSAEUR AEACC, "Joint Ground Attack Control Cell (JGACC)," talking paper, 5 May 1989, 1.

19. The author visited the ATOC at Sembach AB in July 1989. Only one US Army member was assigned to the ATOC at that time. A significant increase in manning at this level is probably not physically or financially possible.

20. Maj James C. Charles, USAF, "Joint Ground Attack Control Cell," Headquarters USAFE/XPXJ to USAEUR/DCA, letter, n.d. (c1989), 1 through 2.

21. Col Jon C. Schreyach, USA, "Fire Support for Deep Operations," *Military Review*, August 1989, 31.

22. The emphasis on adopting a form of the battlefield control element called the joint ground attack control cell demonstrates the recognition of the requirement for a form of joint planning cell at the ATAF/AG level.

23. Col Ronnie Perry, US Army, Land Section Combat Requirements Branch, interview with author at Supreme Headquarters Allied Powers Europe (SHAPE), Brunssum, Belgium, 21 September 1989.

24. Snyder, 20.

25. Gen Hans-Henning von Sandrart, German Army, "Considerations of the Battle in Depth," *Military Review*, October 1987, 14.

26. ATP-33(B), 3-8 through 3-9.

27. Group Capt Peter Millar, RAF, "Areas of Responsibility beyond the FEBA: An Analysis," *NATO's Sixteen Nations*, August 1989, 41.

28. Air Vice-Marshal John R. Walker, RAF, "Airpower: Present and Future," *NATO's Sixteen Nations*, Special Edition, August 1989, 48.

29. As an attendee at the 1989 COMAAFCE's Central Region Air Operations Conference held in September, the author was able to learn of the latest trends in the Central Region.

30. Maj James B. Henderson, USAF, *The "Air" in AirLand Battle* (Fort Leavenworth, Kans.: US Army Command and General Staff College, 1982), 63.

Chapter 6

Summary and Conclusions

This paper has presented an in-depth analysis of the Central Region's mission management system. It began by stating the requirement for this examination—the new weapon systems introduced into the Central Region in the last decade. The examination contained a discussion of the different segments of the battlefield. The current doctrine for engaging Warsaw Pact uncommitted forces, Follow-On Forces Attack, was examined for content as well as for its relation to both the US Army's AirLand Battle doctrine and the classic interpretation of the air interdiction mission. The paper continued by providing a historical basis, or foundation, for the employment of air power in FOFA operations.

From this basis, the paper moved into the areas of army and air force command and control in the Central Region. A model, adapted by the author from two earlier models, was developed to examine the command and control systems. As part of this examination, faults were uncovered and discussed. The paper then moved to an examination of the benefits technological advances could have in improving mission management. Finally, the study examined low-cost initiatives that could be used for the faults outlined earlier.

Is this extensive analysis all for nought given the recent developments in Europe? President George Bush's State of the Union Address in February 1990 outlined his plan for further troop reductions in Europe. Is there still a possibility of conflict? If the Central Region is no longer a potential battlefield, what applicability does this research have?

Utility of Research

Although peace has broken out in Eastern Europe, there is no overwhelming evidence of Soviet withdrawal from the Warsaw Pact countries. In fact, most of the widely discussed Soviet equipment withdrawals have been older systems. Some of these weapon systems have been replaced by newer equipment, some have not. Regardless, the substantial Soviet troop strength in Europe still constitutes a threat, and that threat alone is enough to warrant improving NATO's deep-battle capability.

As NATO continues to evolve as a military alliance, all opportunities should be taken to improve the combat effectiveness of its troops. NATO

should never stop trying to provide the best defense it can; this research is an attempt to aid in this endeavor.

Additionally, this research can provide valuable guidance during the process of paring down NATO's military structures in this era of "peace dividends." Placing the bulk of mission management at the allied tactical air force level allows a drawdown of the Allied Air Forces Central Europe and the four allied tactical operations centers' staffs without degradation of mission management. The benefit of this process is that the ATAF, the organization that will command the deep battle in the future, can be protected from the significant cuts that may take place.

One trait of FOFA air power developed in chapter 2 has not been readdressed. That trait is the universal applicability of air interdiction in conflicts where echelon attacks are employed; in short, "air interdiction's effectiveness is not constrained to large conflicts." The lessons learned in this research have wider application than just in the Central Region. The improvements suggested here are equally applicable across the spectrum of multicorps air power employment possibilities. If, as seems likely, NATO becomes involved in out-of-area operations, this research will apply. Moreover, if NATO expands its military role to include out-of-area operations, the command and control structure and procedures for possible conflicts should be standardized. Standardization would allow any NATO troops to be used without needless confusion.

Several of the recommendations contained in this paper are manpower intensive. How can these types of increases be recommended in a time of sizable troop reductions? The answer is simple. Investment in command and control of NATO forces is of paramount importance. If NATO is forced to fight with only the troops in theater, the efficiency and effectiveness of those troops must be as high as possible. Should some reinforcement be possible, the mission management element must be ready and able to deploy *and* employ those troops. Thus 1990 seems to be an ideal time to concentrate on improving the mission management of the Central Region's air power assets.

Notwithstanding the current trends in Eastern Europe, the need still exists for implementing the changes outlined in chapter 5. Now is the time to continue, through the author's recommendations, the qualitative improvement of NATO's deep-battle mission management process. Whatever the troop levels in Europe, those troops will be more effective when commanded by a more responsive mission management team.

A Vision of Tomorrow's NATO

NATO will most certainly be smaller—the Conventional Forces Europe negotiations will quickly lead to that result. The author believes NATO will evolve into two international army groups. Both of these will be much smaller than the present organizations and both will have certain out-of-

area commitments. Given a new form of NATO multinational, mobile forces, the changes recommended in chapter 5 become even more important. The army group/allied tactical air force level, taking advantage of all the principles discussed in chapter 2, provides NATO with the command and control structure to deploy and manage forces. Teamed together in the Central Region's two areas, these organizations provide a continuity of employment in the Central Region and in any future NATO involvement out-of-area. Bolstering the army group/allied tactical air forces level *now* will improve the current command and control problems and provide a significant, safe investment in the future.

Finally, it is the author's hope that the lessons learned about command of the close and deep battle will lead all the NATO countries toward better command and control *and* better weapon systems acquisition. Technological advances such as J-STARS, as potentially powerful as it is, will have a tough time surviving budgetary crunches in the United States and Europe. NATO must learn to identify and implement low-cost changes giving maximum value for the investment. In addition, its ground and air forces must integrate their weapons acquisition strategies. Such action would avoid duplication of efforts and ensure synchronization from the very beginning.

The next war in Europe or involving European allies (and history seems to indicate it is only a matter of time until it occurs) will be won by the best *team*. That team will be the one which best executes its strategy. Mission management will be the avenue of execution—NATO cannot afford any roadblocks.

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