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THE ROLE OF THE CORPS AIR DEFENSE ARTILLERY BRIGADE

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

MASTER OF MILITARY ART AND SCIENCE

by

ROBERT H. WOODS, JR., CPT(P), USA
B.A., Augusta College, Augusta, Georgia, 1979

Fort Leavenworth, Kansas
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This study investigates the role of the corps ADA brigade in support of corps and divisional contingency operations, in view of the numerous corps missions and the need to reinforce the divisional air defense element. The concept presented is one that allows the corps ADA brigade to provide air defense coverage for corps critical assets while also simultaneously providing air defense networks throughout the corps area of operation.

The study emphasizes the importance of the relationship between the U.S. Air Force and the corps ADA brigade. The study also explains the rationale behind the use of air defense networks throughout the corps area of operations. The study promotes the forward deployment of our weapon systems to extend the brigade's offensive capabilities.

This forward deployment is necessary for the brigade to engage aircraft deep within the corps area of interest as opposed to the corps area of operations.

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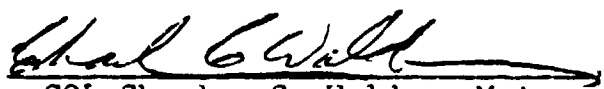
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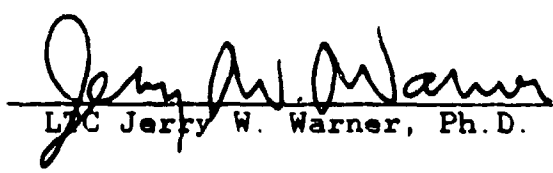
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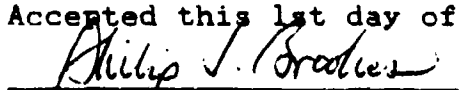
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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the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

ABSTRACT

THE ROLE OF THE CORPS ADA BRIGADE by CPT(P) Robert H. Woods, Jr., USA, 141 pages.

This study investigates the role of the corps ADA brigade in support of corps and division contingency operations, in view of the numerous corps missions and the need to reinforce the divisional air defense element. The concept presented is one that allows the corps air defense artillery brigade to provide air defense coverage for corps level critical assets while also simultaneously providing air defense networks throughout the corps area of operation.

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The study explains the rationale behind the use of air defense networks throughout the corps area of operations. This study promotes the forward deployment of our weapon systems to extend the air defense artillery brigade's offensive capabilities. This forward deployment is necessary for the brigade to engage aircraft deep within the corps' area of interest as opposed to the corps' area of operations.

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I wish to express my gratitude to the Tactics Department at the USAADASCH. They were very supportive with ideas and technical information.

I must also express my deepest appreciation to my wife, Nadine. Her everlasting support made this thesis possible.

LIST OF FIGURES

CHAPTER I INTRODUCTION

A. Background.

Historically, U.S. Army air defense artillery units provided air defense coverage in two primary locations. The divisional air defense artillery battalion provided air defense for the divisional maneuver elements. Theater level air defense artillery units provided air defense for the corps rear area. Consequently, the lack of air defense greatly reduced the corps mobility. The capabilities of theater level assets were not sufficient to perform the dual roles of providing air defense artillery for a mobile corps and for stationary critical assets within the theater area. Therefore, the United States Army Air Defense Artillery School and the Deputy Chief of Staff, Operations (DCSOPS) established the brigade to provide the needed flexibility to the corps commander. Doctrine pertaining to the formation and fielding of major elements at the corps level is still in an early stage of development. My primary reason for choosing this topic is to investigate and to bring to light the need for such doctrine and to contribute to its establishment. In this thesis, I will address the role of the corps air defense artillery brigade in support of corps and divisional operations.

To provide a better understanding of the role of the brigade, I will present a review of the role of the corps. The corps, the largest tactical unit, conducts major military operations and fights battles and engagements. The composition

of a corps varies depending on the location and mission assigned. Regardless of the composition, each corps has enough organic support to conduct sustained operations.

The conduct of sustained corps level operations relies upon a complex infrastructure. This infrastructure is composed of combat, combat support, and combat service support units. The combat units have both maneuver elements and other combat arms units whose missions are to provide direct support to the maneuver elements. Infantry, armor, and to some extent aviation elements perform as the maneuver elements. The field artillery brigade and the air defense artillery brigade complement the maneuver elements. Additionally, the armored cavalry regiment serves as both a security and a maneuver element. (FM 100-15, p.2-4)

These complementary elements provide security and support to the maneuver elements. The armored cavalry regiment performs security and early warning missions for the corps. The field artillery brigade provides artillery support to the corps as well as reinforcing support to the divisional artillery units. In addition to their maneuver role, some aviation brigade missions include close air support and reconnaissance. The air defense artillery brigade provides the maneuver units freedom of maneuver by nullifying the enemy air threat.

Engineer, signal, military intelligence, and military police units support the maneuver commanders in their respective areas of expertise. These combat support units provide both direct support and general support to the maneuver units within the corps.

The combat service support units, quartermaster, transportation, ordnance, finance, medical Service, and adjutant general, provide necessary logistical and personnel services to the corps. These units provide the battlefield with personnel, equipment, supplies, and services.

Commanders place each of the combat, combat support, and combat service support units in the best location on the battlefield to maximize their capabilities. The establishment of a corps air defense artillery brigade maximizes the effectiveness of air defense artillery .

In an effort to use its assets more effectively, the air defense artillery branch has reorganized its assets and has established three corps air defense artillery brigades. Currently, these brigades are located within the Continental United States (CONUS). The Department of the Army (DA) Deputy Chief of Staff for Operations (DCSOPS) located in the Pentagon is evaluating the fielding of air defense artillery brigades for the two overseas corps located within the Federal Republic of Germany. Fort Bliss is establishing the doctrine for these units simultaneously with the final processes of authorizing, funding, and assigning them.

Prior to the fielding of the brigade, corps commanders relied on theater level assets to provide area coverage. Consequently, this limited the corps commander's ability to provide sufficient air defense coverage to maneuver units during major operations. Corps air defense artillery brigades provide the corps commander the additional flexibility in both the support of his maneuver units and the defense of his critical assets. The brigade with its long and short range weapon systems enhances the corps's security from the enemy air threat.

In order to understand fully the need for further integration of air defense systems into tactical units at all levels, a review of the evolution of the branch is necessary. This review will highlight both the combat capabilities of air defense artillery soldiers as well as the lack of air defense combat experience during the last two major military operations.

The Air Defense Artillery branch, which was officially created in 1968, traces its roots back to the Revolutionary War. During the following centuries, the study of artillery developed into two primary areas of concern--coast and field artillery. In 1917, a team went to Europe to investigate the best method of employing American forces in Europe. The director of the team, Colonel Chauncy B. Baker, recommended "not only the creation of an antiaircraft artillery (AAA) service but also a school to train air defenders." (Handbook, p.51) The driving force behind this belief was the realization that air power posed a threat to the allied forces. The enemy used zeppelins and airplanes extensively for reconnaissance and bombing missions. The

Secretary of War gave the antiaircraft artillery mission to the Coast Artillery Corps. Consequently, three officers formed the AAA service in France. With borrowed French equipment, the American AAA gunners developed a reputation for excellent marksmanship. After the war, American air defenders developed the "basics of modern air defense: mass, mix, mobility, balanced and overlapping fires, and defense in depth." (Handbook, p.52) Today's air defenders still use these basic principles.

Research and development, acquisition, and the promotion of AAA characterized the years between World Wars I and II. The need for AAA was very prominent during World War II, when the U.S. Army was fighting air wars on both the European and Pacific fronts. Air defense artillery soldiers made excellent use of their air defense artillery weapons and earned numerous awards for bravery during World War II. For example, air defenders stationed - Bataan, Philippines earned "more than a dozen Distinguished Service Crosses, a host of Silver Stars and lesser decorations, the Presidential Unit Citation and the admiration of a nation." (Handbook, p.53) On the European front AAA units were among the first to land on D-Day. These units were instrumental in the establishment of the beachhead and penetration of the enemy lines. Throughout the war AAA units proved themselves by providing support against both enemy air and ground forces. This trend of dual roles, which was quite common during World War II, continued throughout the Korean and Vietnamese conflicts.

At the conclusion of World War II, the School for Antiaircraft Artillery moved from Camp Davis, North Carolina to its present location at Fort Bliss, Texas. During the late 1940's and early 1950's, a primary concern of the school was the development of a viable defense against high performance jet aircraft. The renewed interest in air defense brought about a significant change in the use and assignment of air defense artillery units. "For the first time, light antiaircraft battalions were assigned to Army divisions...and heavy antiaircraft artillery gun battalions were deployed around critical assets within the United States." (Handbook, p.55) This distribution was a mixed blessing. The assignments of air defense artillery units to army divisions was a critical step towards combined arms warfare. However, the assignment of air defense artillery assets to fixed sites around the United States would have long term consequences.

Although these long range weapons were capable of protecting our major cities, they were functionally static. Since the systems operated from established sites, maneuver commanders were reluctant to think of the air defense artillery unit as a member of a combined arms maneuver force. However, during the next two conflicts, mobile air defense artillery units routinely worked beside the maneuver forces.

Unfortunately, support of maneuver forces by eliminating ground targets became the prominent trend for air defense artillery units throughout both the Korean and Vietnam conflicts. The branch, however, which separated from the field

artillery in 1968, was not able to firmly establish its place on the battlefield. During Vietnam, the main reason for this was the lack of a real air defense mission. Air superiority, gained and maintained by the U.S. Air Force, kept enemy air traffic to a minimum. Therefore, combat units quickly used the available air defense firepower to supplement their own. Convoy security and perimeter defense against ground versus air targets became standard. The individual air defense artillery crews earned reputations for being combat soldiers, as they performed excellently in their ground defense missions. During the Vietnam conflict Duster and Quad 50 units worked side by side and fired "well over four million rounds of 40mm ammunition and 10 million .50 caliber rounds." (Vietnam, p.56) Unfortunately, even though air defense artillery soldiers earned the respect of both their U.S. Army and United States Marine colleagues, the U.S. Army leadership failed to gain the much needed appreciation for the abilities of the air defense artillery branch due to no viable air threat in this war.

Air defense artillery assets were used in a combat zone during Operation Urgent Fury on the island of Grenada in 1983. Of the thirty-one Stinger teams deployed to the island by the 82d Airborne Division, four teams were in the initial assault and twentyseven teams were part of the follow-on echelon. The use of air defense elements in the initial wave was a step in the right direction. However, since all of the systems used during this operation were manportable, the Urgent Fury experience did not add to the credibility of the more sophisticated air defense

artillery systems. Likewise, Stinger teams deployed to Panama in 1989 during Operation Just Cause. Therefore, air defenders did participate in the most recent miltary operations against hostile forces. However, again there was no enemy air threat to defeat.

In view of the limited air defense combat experience, why were corps air defense artillery brigades established? The need for a viable air defense network has never been a point of contention. Rather, the Air Land Battle study forced a reevalutation of air defense artillery assets. Prior to the study air defense artillery was only found at the divisional level, which then was the primary tactical force, and the theater level. The air defense artillery units under theater control provided general support of the theater and incidental coverage for subordinate units. These theater level assets did not directly reinforce the divisional or corps operations.

Theater level air defense artillery has not changed as a result of the Air Land Battle study. The 32d Army Air Defense Command (AADCOM) provides administrative control over the European theater level assets. The four brigades of 32d AADCOM have both short range and long range weapon systems and are a formidable cornerstone of the North Atlantic Treaty Organization (NATO). During a conflict, 32d AADCOM units work directly for one of two Allied Tactical Air Forces (ATAF). The interaction between regional ATAFs and air defense artillery units have a direct impact on the role of the corps air defense artillery brigade. I will illustrate the relationship in Chapter V.

With the newfound emphasis on the corps as the primary tactical force and to support the findings of the Air Land Battle study, an air defense artillery reorganization was inevitable. The reorganization directs the movement of selected batteries from divisional units and battalions from contingency forces to form the nucleus of these new brigades. The reorganization prohibits the transfer of theater level assets to form the battalions of the brigade. Currently, the brigades are operating with an interim TO&E (Table of Organization and Equipment). The TO&E used for this study will be the Total Army Analysis (TAA) 96 TO&E. (See Figure 1-1 for the the composition of this brigade.) The addition of the corps air defense artillery brigade closes the gap between the well established theater network and the limited divisional assets. At the divisional level, the air defense battalion's primary missions are in support of maneuver forces. One of the major problems for the divisional air defense artillery battalion is the limited number of weapon systems assigned. The small number of weapon systems cannot adequately cover all of the maneuver forces and provide coverage for all of the division's critical assets. Prior to the reorganization, divisional air defense artillery battalions had no higher units from which to receive reinforcement.

The second reason for the formation of the corps air defense artillery brigade is the U.S. Army's desire to extend the offensive capabilities of air defense artillery units. The emphasis on the Deep Battle through the Air Land Battle concept promotes the study of extending our offensive capabilities.

Therefore, the need to intercept enemy air at the earliest possible time is inherent in the successful accomplishment of deep operations. The Air Land Battle study states that there are sufficient air defense assets at both the theater and divisional level. This statement assumes that the Forward Area Air Defense systems (FAADS), under development for the division, are fielded. The study also recommends the development of a corps level air defense artillery element. As a result, the Air Defense Artillery branch developed a corps air defense artillery brigade.

The establishment of the corps air defense artillery brigade has resulted in a significant reorganization of the Air Defense Artillery branch. The successful completion of this transition is dependent upon the accomplishment of two primary requirements. First, the maneuver commander must realize that the battlefield of today is three dimensional. Second, the air defense artillery leaders must truly understand the ground commander's concept of the operation and be involved in the planning of the operation. The participation of air defenders at the corps level is a major step towards fulfilling the second primary requirement. In Chapter V, my discussion will show how both the corps and division air defense artillery commanders must work together with the maneuver commanders to best synchronize all of the systems to defeat the enemy air threat.

B. Basic and Subordinate Research Questions.

The basic research question for this thesis is: What is the role of the corps air defense artillery brigade in support of corps and division operations, in view of the numerous corps missions and the need to reinforce the divisional air defense element? The focus will orient on the brigade's ability to reinforce the division while accomplishing all corps level air defense missions. I will evaluate the air defense missions in terms of support for critical assets and maneuver force support. I will focus on maneuver force support in terms of the best possible method to reinforce the air defense artillery battalion found in each division, while simultaneously completing the corps air defense artillery requirements.

Inherent in the study of the brigade is synchronization, which has recently received a lot of attention by both senior Army leaders and doctrine writers. The U.S. Army is still in the process of establishing its definition of the term. FM 100-5, Operations, the capstone U.S. Army document for operations defines synchronization as the "arrangement of battlefield activities in time, space, and purpose to produce maximum relative combat power at the decisive point." (FM 100-5, p.17) I will suggest a means for synchronizing assets from the combined air defense artillery assets within a division and corps. My analysis will concentrate on the optimum engagement process in terms of the anticipated air threat against a division and corps.

The corps is the first level where the U. S. Air Force integrates its air defense capabilities along with those of the U.S. Army. In support of the integration process liaison officers are used as the connecting link between the two services. Liaison officers between services and air defense artillery units strongly influence the role of the corps air defense artillery brigade in terms of responsibility and synchronization. I will illustrate the importance of this relationship between the US Air Force and the brigade in Chapter V.

C. Context of the Problem.

The emergence of this topic as a research project was derived from a conversation with the Director of the Tactics Department at the United States Army Air Defense Artillery School (USAADASCH), Fort Bliss, Texas. Research on this topic is needed for two primary reasons. First, air defenders need to promote discussion about the role of the corps air defense artillery brigade. This discussion should help identify the relationship of the brigade to other air defense artillery units on the battlefield. Second, planners in the Air Defense Artillery branch believe that it is necessary to prepare for any possible force reductions which might occur as a result of future legislation. Therefore, this research project will attempt to identify the best possible use of the limited air defense assets.

Limitations. Three primary limitations are involved in this research project. The first limitation is the virtual non-existence of literature pertaining to the corps air defense artillery brigades. In most air defense artillery field manuals (FM), reference to a unit above brigade level usually is covered on approximately one page. Unfortunately, this information only informs the reader that Fort Bliss is developing the doctrine for the unit. Currently, Fort Bliss is in the process of drafting an FM to address this subject. I will discuss the review of literature in detail in Chapter III.

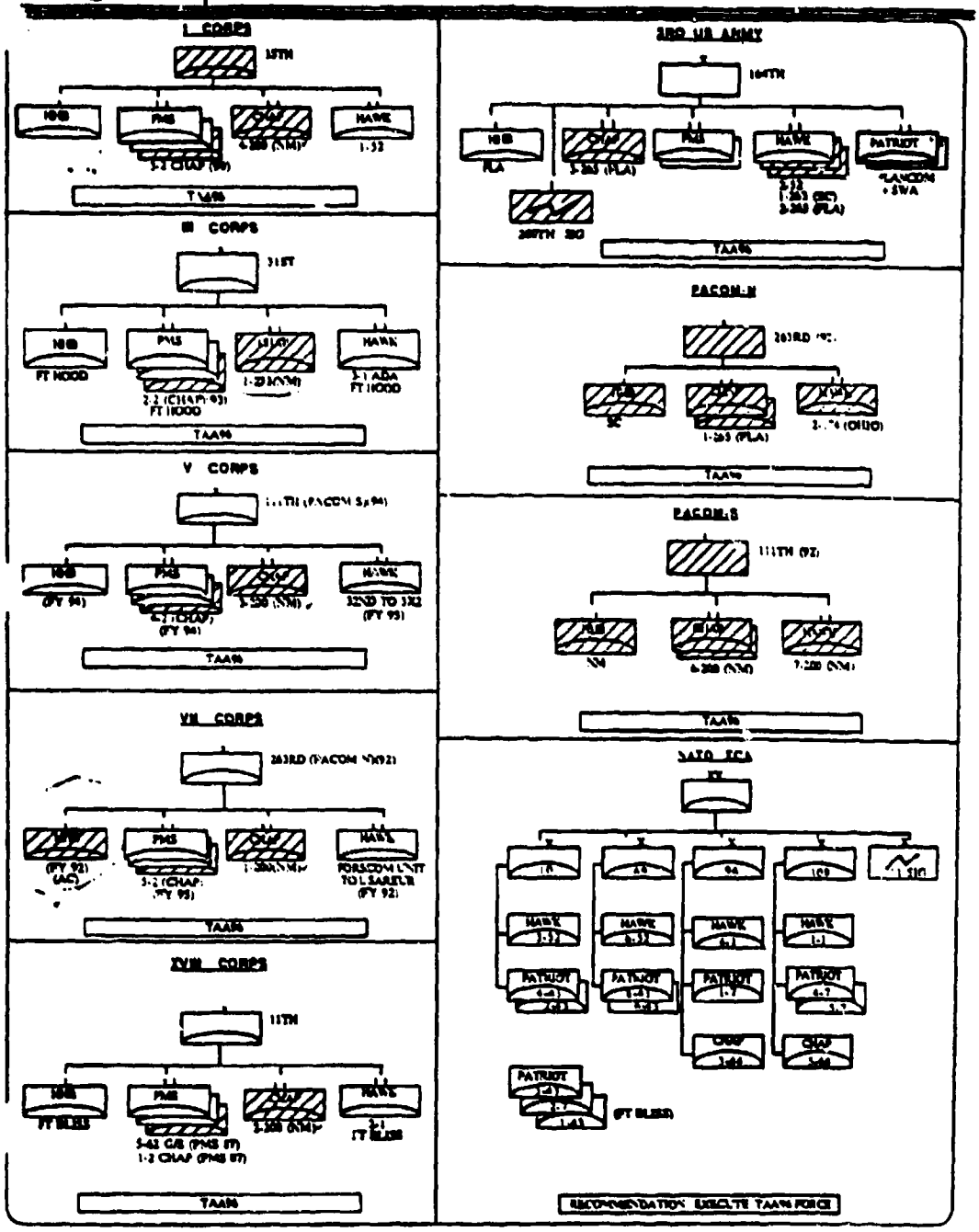
The second limitation concerns the information sources used during my research project. Since I conducted this research while attending the Command and General Staff College (CGSC), I was not able to attend any meetings, seminars, or conferences. Therefore, most information was derived from the Combat Development Center at Fort Bliss, phone interviews with officers in the field, proponent briefings, and the appropriate agencies here at Fort Leavenworth, Kansas. I will discuss the research methodology in Chapter II.

The third limitation concerns the use of classified information. This thesis used only unclassified material. Therefore, I did not include any classified information which has a bearing on the role of the brigade.

Delimitations. The first delimitation involved in this research project involves the actual weapon system composition of the corps ADA brigade. At present it will vary depending on its mission and location. Brigades which have a contingency mission will differ from those found in an established theater. Additionally, the current structure of the brigade is changing due to the fielding of new weapon systems. For consistency, therefore, the brigade organization referred to in this thesis will be the TAA 96 brigade. This represents the long-term target organization desired by the Air Defense Artillery branch. Figure 1-1, which is located on the next page, illustrates the proposed organization for the 1996 corps air defense artillery brigade.

FIRST TO FIRE

REALIGNMENT PROPOSAL



The second delimitation involves the conflict scenario. "The probability of global war/major conventional war is low, but the probability of regional conflict is high." (Airland Battle Future, p.2) "The number of forces world-wide is generally on a downward trend." (Airland Battle Future, p.3) Therefore, I believe that the role of contingency forces will be emphasized during the 1990s. Therefore, I used a contingency force responding to a threat in a regional conflict.

The third delimitation is the characteristics of the battlefield. The battlefield will be one in which there are no definite front and rear boundaries for maneuver units. Maneuver units will be simultaneously responding to threats in their front, rear and flanks.

Throughout the thesis, the term 'brigade' will refer to the corps air defense artillery brigade unless otherwise differentiated.

CHAPTER II RESEARCH METHODOLOGY

A. General.

The research methodology used for this thesis is to analyze the brigade's ability to employ its assets effectively in order to accomplish both its corps and divisional level missions. The focus is on the capability of both the corps and the division air defense elements to handle the anticipated enemy air threat in their respective sectors. Chapter I defined the problem in terms of basic and subordinate research questions. Therein I stated the context of the problem and the delimitations of the study.

In this chapter, I will review the methodology used in conducting research for this thesis. My research consisted of two primary stages. The first stage was a literature review to locate documents which directly commented on the corps air defense artillery brigade and Soviet aviation. The second stage involved researching literature on the employment of Soviet aviation and air defense artillery assets. I conducted interviews with various experts on the Soviet threat and air defense artillery employment to gain different insights.

I conducted each stage of my research methodology in steps. The first step of the first stage focused on locating literature which pertained directly to the corps air defense artillery brigade. This proved to be very difficult and frustrating. There are two sides to conducting research on the corps air defense artillery brigade. On one side, the lack of reference

material available clearly demonstrated that there is a need for additional information on the subject. One the other side, not having a basis of information to start with proved to be a most demanding challenge. This observation led to the second stage, which was to establish a framework of basic information. The first basic question involved the composition of the corps air defense artillery brigade. The FMs which did briefly mention the brigade did not state what the composition would be. To solve this problem, I had to ask another question. What will the corps air defense artillery brigade end up looking like? The force structure of the US Army is currently undergoing change. Therefore, I needed to know what the 'final' desired brigade was going to look like. I went to the Force Development Directorate at Ft. Leavenworth, Kansas. The office provided me with the latest information on the proposed and desired force structure for the corps air defense artillery brigade.

After determining what the air defense artillery assets would look like, I asked what the Soviet air threat would look like. Since, my thesis uses only unclassified material, I cannot list what the actual anticipated threat against a division or a corps might be. With the information concerning the general force structure of Soviet aviation being unclassified, I was able to obtain a general appreciation for the major Soviet elements involved in the Soviet Air Forces.

The compilation of general information on both the corps air defense artillery brigade and the Soviet air forces completed the first stage of my research methodology. The questions which arose during that stage, provided a start point for the second stage.

The second stage was also broken down into steps. The first involved the aircraft employment principles of the Soviet Union. Two questions that I needed to answer follow: How does the Soviet Union use its air forces? How does it control its air forces? My research enabled me to understand better the types of airframes that the Soviets would most likely use against the various targets that the brigade must protect. I then determined that my next step was to evalute the different missions that the Soviet aircraft would receive. This research reinforced my understanding that the Soviets generally have the same goals and priorities for their aircraft as we do for ours. After completing this portion of the research, I knew that mobility was mandatory for the survivability of the brigade on today's battlefield. Additionally, I knew that all portions of the battlefied were going to receive fires simultaneously. Even though a particular maneuver force and its accompanying air forces might be moving along a certain axis, the units on the flanks and the rear would also be engaged in combat.

For the next step, I wanted to know the particulars of the Soviet aircraft. The most important observation taken from this analysis concerns the capabilities of the new generation of both fixed wing and helicopters airframes. I used what I believe are

the most important characteristics of the airframes: general information, the number of the particular airframes found within the Soviet inventory, the standard armament, the speed, and the flying radius. All of these are important to the planning of the corps air defense artillery brigade.

Once I had concluded the research on the Soviets, I turned my attention to the corps air defense artillery brigade. I followed the same steps to evaluate the air defense artillery side as I did for the Soviet aviation analysis. The overriding thought throughout this research was what is the best method to employ the brigade in order to accomplish all of its missions and survive on the battlefield? This question was paramount in my determining the role of the corps air defense artillery brigade. I answered this question from th viewpoint of a commander of the brigade or the air defense artillery representative in the corps G3 section. I asked what the primary missions for the corps air defense artillery brigade were? I determined that the first mission is to provide for means to support the corps commander's intent. The second mission is to develop its own plan for fighting the air defense artillery deep, close, and rear battles. I defined the role of the corps air defense artillery brigade by proposing solutions based upon two key principles: long range planning with the U. S. Air Force and air defense artillery task forces. I also believe that constant mobility is mandatory for surivival since maneuver forces and aircraft target

air defense artillery sites. Having answered my basic research question, I realized that other questions which impacted upon the execution of my proposals had to be addressed.

In the final chapter of my thesis, I present a general conclusion and recommendations for further study.

CHAPTER III REVIEW OF LITERATURE

A. General.

I stated in Chapter I that the first limitation of this project is the extremely limited amount of literature on the corps air defense artillery brigade. Therefore, I conducted my review of literature upon the individual components that have an impact on the role of the brigade.

The purpose of my review of literature is to present an informative overview of the current knowledge and thinking on the subject of the corps air defense artillery brigade. I discussed the primary and secondary sources used to answer the basic research questions in Chapter II, Research Methodology.

The first question involves the composition of the corps air defense artillery brigade. The answer to this question varied greatly depending on the source. The air defense artillery FMs that addressed the brigade's composition only did it in a generic fashion. The majority of FMs merely stated that a corps air defense artillery brigade existed and the brigade's purpose was

to support corps level operations. The TAA 96 Task Force Study (40) managed by the force development officer at Fort Leavenworth, provided me with the answer to this question.

The second question involves the Soviet air threat. There are numerous sources available on this subject. The problem is to reduce all of the available information and focus on the information which directly applies to the thesis. I primarily used U.S. Army field manuals to research the command and control of the Soviet Air Armies. The FM 100-2 series (49,50) and Soviet Army Operations (46) provide much information on the tactics and organization of the Soviet armed forces. The numerous illustrations help to develop an understanding of the Soviet synchronization process. Additionally, the Combined Arms Research Library has numerous unpublished papers written by U.S. Army officers, who attended the U.S. Army Russian Institute, which provided information on the tactics used by frontal aviation units and their ability to overcome our air defense artillery systems. (34,37,38)

Robert Hall (13) explained the interaction between Soviet ground and air components. Dwight Knox (15) discussed the different missions that the Soviet air armies perform. These articles provided important information on how the Soviets use their aircraft to perform missions that their long range field artillery are incapable of performing. The authors provided information that reinforced information found in the FM 100-2 series.

John W. Taylor (10) edited the primary source for information on the capabilities of the individual airframes found within Soviet frontal aviation. Mr. Taylor's editing of Jane's All the World's Aircraft 1988-89 resulted in an extremely detailed profile on all active aircraft as of December 1989. Steven Zaloga, (27,28) who writes for Jane's magazines, provided updated information on the latest Soviet helicopter threat. Keith Jacobs (16) provided recent information on the Hind, Havoc, and Hokum helicopters. Bill Sweetman (22) provided insight concerning the Flanker aircraft and Joe Poyer (18) discussed the newest Soviet weaponry.

I primarily used U.S. Army publications to develop a definitive role for the corps air defense artillery brigade. The Combat Development Department at Fort Bliss, Texas provided copies of proposed chapters which are incorporated within FM 44-71, Corps ADA Brigade. (48) FM 44-71 (DRAFT) was the primary source used to develop the role of the corps air defense artillery brigade. The available chapters include a General Concept of Support for the Air Land Battle, Command and Control, ADA Support of Offensive Operations, and ADA Support of Defensive Operations. Additional FMs were used to research the capabilities of the individual weapon systems. Additionally, Rory Wilson (25), Timothy Tritch (23), Stephen Cork (11) and Helmut Roberts (21) wrote seperate articles which examined the capabilities for different weapon systems to interface in a tactical environment.

The Center for Army Lessons Learned (CALL) was a primary source for information concerning the deployment of air defense artillery units operating against a Soviet threat. CALL provided information concerning early warning, resupply, training, and the augmentation of divisional air defense artillery battalions with corps air defense artillery elements.

CHAPTER IV SOVIET AIR THREAT CAPABILITIES

A. Introduction

I reviewed the Soviet air threat capabilities in four major areas: the methods of commanding and controlling the air forces, the doctrinal principles for employing air assets, identifying the routine missions assigned to frontal aviation units, and identifying the types and capabilities of Soviet rotary wing and fixed wing airframes.

The Soviet Union places a strong emphasis on the air component of its combined arms forces. During the last decade, the Kremlin gave much monetary and reorganizational support to the Soviet air forces. The monetary support yielded new technology which helped in three primary areas. First, new technology has drastically increased the range and payload capabilities of the Soviet frontal aviation units. Second, additional technological developments reduced the requirement for manned aircraft in the pursuit of strategic and operational goals. "The growth in importance of strategic ballistic missiles reduced the relative importance of Soviet strategic air defense,

thereby freeing resources that would otherwise have been committed to that mission." (Soviet Air Forces, p.133) Third, the Kremlin has also invested heavily in laser programs. "It is estimated that the Soviet high-energy laser program is three to five times the United States effort, and that by the late 1980s the Soviets may be able to deploy a variety of weapons." (The Armed Forces of the USSR, p.159) Prior to the drastic changes which have occurred in 1989, the Soviets had met their goals in laser technology. However, recent force reduction talks might effect the future of the Soviet program. Currently, the Soviets have not reduced their forces as a result of the improved technology. Rather, they have reallocated the manpower and aircraft assets to the frontal aviation units. This transfer of assets strongly improves the capabilities of the Soviet conventional air forces and allows for better support of Soviet maneuver forces.

These technological advancements, the increased range for the frontal aviation units, and the use of ballistic missiles and lasers fully support the recent emphasis on the reduction of forces for the air defense of the motherland. Consequently, this reduction of self defense forces has placed a new found emphasis toward support of maneuver forces. For example, the Aviation of Air Defense element of the Troops of Air Defense (Aviatsiya PVO - A PVO) have given approximately one-half of the aircraft previously under their control to the Soviet air force. This transfer of aircraft benefited both the air defense aircraft and the frontal aviation aircraft by providing more aircraft to the

Soviet air force, which enabled the distribution of state of the art aircraft to the Aviation of Air Defense element. Therefore, high tech improvements on the aircraft used for air defense provide the same combat power despite the decrease in aircraft. During 1988, "the number of fourth generation, look-down/shoot-down capable aircraft...has increased by approximately 40 percent." (Soviet Military Power, p.51) Therefore, despite the force reduction of fifty percent, almost half of the remaining aircraft in the troops of air defense element are now state of the art airframes. Therefore, if the Soviets' frontal aviation units received a large number of casualties, their Aviation of Air Defense units could serve as a state of the art aerial reserve.

Frontal aviation aircraft, which are offensively oriented, will concentrate on close air support, battlefield interdiction, and deep interdiction missions. (These missions, which cover the full range of combat from the front to the rear areas of operation, are covered later in this chapter.) This support of maneuver forces also coincides with the Soviet emphasis on "meeting engagements". This emphasis "shifts the focus of tactical requirements to mobile targets rather than area or preplanned targets." (Soviet Air Forces, p.141) Therefore, the battlefield of the 1990s will be characterized by a high tempo air campaign with large numbers of aircraft using highly technical ordnance to destroy targets of opportunity.

While neither the Soviet Union nor the United States wants to have a nuclear war, the Soviets do want operational leverage through complete conventional devastation. "The Soviets believe that high-technology, deep strike conventional systems now under development by both sides will be equivalent to low yield nuclear weapons in their ability to inflict sudden, massive and decisive losses." (p.60 Soviet Military Review). If we accept that the Soviet goal is to establish superiority on a highly lethal battlefield, we must fully understand the methods to be used in achieving this goal. In this chapter, I will explain these methods of employment and in Chapter V I will explain the United States' reaction to the air threat.

B. Command and Control

The Soviet armed forces are divided into five services: strategic missiles forces, ground forces, national air defense forces, naval forces, and the air forces. (Berman, p. 13) The naval forces and the air defense forces have their own air forces. In the air arm of the air defense forces, you will find primarily interceptor aircraft. In the naval forces, you will find maritime strike, reconnaissance, and anti-submarine warfare aircraft.

The Soviet air force is divided into three primary components: Long Range Aviation, Military Transport Aviation, and Frontal Aviation. The organization of these components is based upon the different military missions which are based on operational requirements. Long Range Aviation and Military Transport Aviation have both supporting roles and independent tactical and intercontinental missions. Frontal Aviation provides support for the ground forces and will be the primary threat to the corps air defense artillery brigade. I will discuss these components in detail in the following paragraphs.

Long-Range Aviation (Dal'nyaya Aviatsiya - DA)

In the latter part of the 1970's, the Soviet planners merged long range aviation and certain elements of what had previously been in frontal aviation, into five air armies. (Scott, p.167) These air armies provide support to theaters of military operations as required. This is a powerful air strike force, capable of carrying either nuclear or conventional weapons. (V.V. Reshetnikov, p.91)

The target priorities for the Long-Range Aviation units follow those of the United States Air Force. The targets are 1) nuclear delivery sites, 2) military naval bases, 3) military air bases, 4) industries that support the war effort, and 5) actions that generally support the military actions of the ground or naval forces. (Scott, p. 167)

Military Transport Aviation (Voyenno-Transportnaya - VTA)

The Soviet Union has placed renewed attention on the development of transport aircraft during the last 20 years. During this time, they have developed aircraft which are quite similar to those of the United States Air Force. The An-76 which is similar to the C-141 appeared in 1971. During the latter part of the 1970's, Soviet industries were producing these in large numbers. (Scott, p.170) Currently, the Soviet Union is still working to develop larger, more efficient aircraft to transport men and supplies.

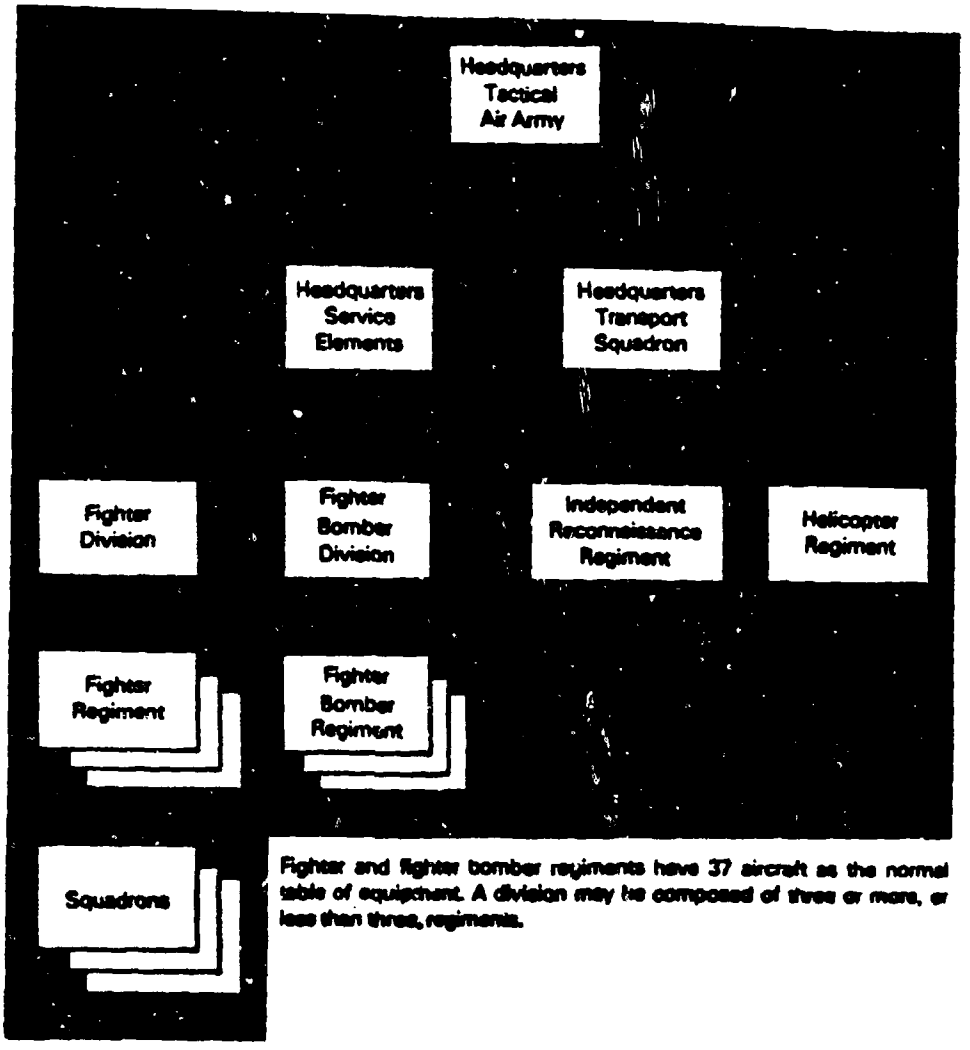
Military Transport Aviation also includes helicopters. These helicopters perform two primary services: troop transport and equipment delivery. The movement of troops has an effect on the brigade in two ways. First, the arrival of an enemy aircraft places a demand on the brigade to engage and destroy the aircraft. Second, troops on the ground, even in small numbers, can directly eliminate the effectiveness of air defense artillery weapons. Therefore, troop transport aircraft, which generally have no significant direct fire capabilities, can have an impact on the effectiveness of the brigade and must be eliminated simultaneously with the fighter aircraft.

Frontal Aviation (Frontovaya Aviatsiya - FA)

Frontal Aviation in the Soviet Union is roughly equivalent to tactical aviation in the United States. Frontal Aviation units have helicopters, interceptors, and ground attack aircraft. Two initial tasks of frontal aviation are to achieve air superiority and to provide air defense over the battle area. (Scott, p.169) Other tasks include "destroy the nuclear means of an opponent, his forces and reserves, air bases, command points, rear area, and transport centers." (Scott, p.169) These missions have a direct impact on the role of the corps air defense artillery brigade, since it will routinely provide air defense for the critical assets listed in the Frontal Aviation target list.

The major operating force for the Frontal Aviation component is a Tactical Air Army. Tactical Air Armies have no fixed organization. However, the two types of divisions are fighter and fighter bomber. A division usually has three air regiments, but may contain from two to five. Each of the regiments is designated by the role of the aircraft. Therefore, the four regiments that usually comprise the Tactical Air Army are fighter, bomber, independent reconnaissance, and helicopter. Liaison, transport, evacuation, and reconnaissance elements found within each regiment contribute towards the mission accomplishment of the regiment. (Soviet Army Operations, p.5-31) Figure 4-1 Tactical Air Army, which is located on the next page, illustrates the organizational structure.

Figure 4-1 Tactical Air Army



Fighter and fighter bomber regiments have 37 aircraft as the normal table of equipment. A division may be composed of three or more, or less than three, regiments.

C. Employment Principles.

The Soviets emphasize that aviation can provide responsive and continuous fire support if its employment is guided by the following principles:

- Early attainment of air superiority (The Soviets use the term supremacy in their doctrinal writings.)
- Coordination and integration with other arms
- Employment in mass
- Strict, centralized control (FM 100-2-1, p.12-5)

Early Attainment of Air Supremacy

"Air supremacy (gospodstov vozduhke) is the necessary and obligatory condition for the effective support of the ground forces and indeed for the operation as a whole." (Hall, p. 327.) The overall Air Operation Plan used by the Air Armies would allocate sufficient forces to gain air supremacy. The number of fixed wing assets used to gain air supremacy will determine the number of aircraft available for the direct support of maneuver

forces. Therefore, the brigade must coordinate directly with the United States Air Force to determine the likely amount of air threat that Army air defenders will be responsible for defeating.

Coordination and Integration With Other Arms

Command posts designate target zones as the primary method of coordinating air support. Commanders assign target zones to all assets capable of delivering ordnance. Therefore, fixed wing, helicopters, and field artillery all use separate target sectors. (FM 100-2-1, p.12-5) Occasionally, attack helicopters are used after a field artillery barrage. The field artillerymen designate a safe time for the passage of the helicopters. Knowledge of this deadly technique is critical to the brigade since it might be attacked by helicopters while recovering from a field artillery barrage. The availability of Stinger teams is imperative to provide local air defense coverage while the primary air defense systems (Chaparral & Hawk) are recovering from the effects of the artillery barrage.

Most air attacks in direct support of ground forces are preplanned. The ground commander identifies the target and the time he desires the attack to begin. The aviation commander then determines the force, ordnance, and method to satisfy the mission. (Hall, p.327) The overall demands of the air campaign will determine the number of aircraft remaining to participate in on-call target missions.

The emphasis on pre-planned targets supports the need for air defenders to keep moving as often as possible. Air defense systems are a constant priority for both the field artillery and air systems of the soviets. The location of enemy air defense systems is a regular mission for all Soviet reconnaissance units. Therefore, once they have determined the location of an air defense artillery weapon system, it is inevitable that the system will be fired upon.

Employment in Mass

The principle of massing aircraft is to establish main air corridors which the Soviets will try to exploit. Mass is absolutely necessary to establish air supremacy. Air defenders have two primary concerns with the massing of aircraft. First, the number of aircraft that we can acquire, track, and kill is limited. Second, resupply of air defense artillery weapon systems in a high threat environment is critical.

Strict, centralized Control

The principle of mass is a corollary of control. The use of centralized control by the Soviets allows for the quick reconcentration of aircraft to a particular target or region. This control allows them to have the assets immediately available to accomplish on call missions. Air defenders must be concerned about the Soviet's ability to attack across multiple axes

simultaneously. Therefore, even though we have a primary target line of reference, our intelligence analysis must be sufficient to allow for our anticipation of threats from all angles.

The Soviet Union fully recognizes that coordination among air, ground, and naval forces is required to be successful on the modern battlefield. In this context, tactical airpower is to be fully integrated into the task of supporting the overall mission. (Soviet Army Operations, p. 5-33) "According to the Soviets, the flexibility and maneuverability of tactical aviation assets provides a major advantage over other combat arms in that it can:

- conduct independent operations.
- execute rapid, wide maneuvers.
- combat enemy air, ground, and naval forces.
- execute missions under diverse tactical and environmental conditions.
- concentrate forces quickly for the execution of unexpected missions.
- be redirected after a launch to a different target." (FM 100-2-3, p.12-1)

The Soviet Union employs aircraft as a means of delivering ordnance similar to that of field artillery. Like artillery, it is a means of delivery ordnance but is capable of longer range. Therefore, Soviet planners integrate air support planning with field artillery planning. "As a result, the phases of air and artillery planning bear close resemblance under the heading of

Integrated Fire Destruction." (Hall, p. 326) The phases support the movement of troops from the rear, the actual battle, and exploitation operations.

The first three phases of the air support campaign will be characterized by aerial preparation of the battlefield. The concept of 'aerial preparation' "involves making simultaneous or consecutive strikes by frontal(tactical) aviation units and formations against objectives located at tactical and close operational depth." (Mason, p.113) The final phase is characterized by aerial attacks in the covering force, main battle, and rear areas of the battlefield.

Phase 1. Fire Cover for the Movement Forward

This phase supports the movement of troops to the battle attack and involves pre-planned targets. Air forces involved in Phase 1 will target air defense artillery sites, command posts, radar, and reconnaissance systems. (Hall, p. 326) The brigade will be providing air defense for all of their designated targets. Therefore, the brigade must prepare for the strong initial wave of attack aircraft during phase 1. I will discuss the brigade's protection of these critical elements in Chapter V, Missions.

Phase 2. Fire Preparation for an Attack

Air support during this phase is done prior to the beginning of the main atta . The planners preplan targets that are out of the range of conventional artillery or are better suited for

aerial strikes. "Air strikes in Phase 2, will generally be used to destroy those targets which cannot be destroyed by conventional artillery and missiles due to distance, mobility, or their hardened nature." (Hall, p. 326)

Air defenders must plan to engage numerous helicopter units during this phase. The helicopters will be used to prepare the target for the ground maneuver forces. These preparatory stages vary in time. The time used for preparation of the battlefield increases in direct proportion to the defensive posture of the defender.

Air defenders at all levels must prepare both tactically and logistically for this phase. Tactical preparation involves the placement of air defense weapons to engage along the likely air avenues of approach. Logistical preparation involves the prepositioning of air defense artillery rounds for rapid resupply between Phase 2 and Phase 3. The brigade must ensure that all weapon systems are operating efficiently and that resupply functions are working properly. The brigade must locate any gaps in the air defense coverage which are a result of the fighting and shift units appropriately to correct the deficiency.

Phase 3. Fire Support

Phase 3 begins with the initiation of the main attack. Phase 3 will conclude after the Soviets have overcome the enemy's first echelon. During this phase, aircraft will strike any target not eliminated during the first two phases. (Hall, p.326-7) Air defenders must plan for attacks from both fixed

wing and helicopter airframes. These airframes will be simultaneously attacking the front and flanks of the enemy. Mobility is key during this phase. Enemy aircraft will attempt to solidify air passage corridors by eliminating known air defense artillery locations. Therefore, movement is critical for survival. The brigade will be primarily operating in a decentralized mode due to the inevitable communications breakdowns that will occur. Therefore, manual (voice) procedures for the identification of aircraft as well as routine reports must be emphasized. Additionally, units within the brigade must remain aware of the safe passage corridors that are established throughout the area of operations. Unfamiliarity with the airspace control measures could lead to fratricide.

Phase 4. Close Fire Support for Sub-unit Offensives in Depth or Accompaniment

The final phase of the air support campaign involves 'air accompaniment'. Air Accompaniment is usually accomplished during "crucial periods of battle, (when troops are overcoming defensive lines at operational depth, warding off enemy counter-attacks, overcoming water obstacles from the march, etc)," (Mason, p. 114) This last phase is characterized by air strikes throughout the covering force, main battle area, and rear areas of the enemy. Aircraft are critical during this phase since most targets are not pre-planned. Air defenders in the rear battle area must be

particularly aware during this phase since ground maneuver elements have penetrated the initial defense and will be attempting to exploit their success.

The brigade will be accomplishing many different missions during this phase of the attack. In addition to providing air defense artillery coverage, the brigade air defense elements will also be reconstituting and reestablishing the security around their air defense locations. The brigade must also ensure that air defense artillery units in support of maneuver forces are being resupplied. Divisional ammunition supply channels do not handle ammunition that is not organic to the division i.e. Chaparral rounds. Therefore, it is the brigade's responsibility to provide the unique ammunition to the brigade units that are reinforcing the division.

D. Missions

Frontal Aviation units perform a variety of different missions such as fighter escort, interceptor, or ground support. Frontal Aviation assets are also used to reinforce the capabilities of the Aviation for Air Defense and the Long Range Aviation forces. Missions are categorized into six primary categories: air cover, air superiority, support of ground forces, isolating the battlefield, air reconnaissance, and free hunting (armed reconnaissance). (Soviet Army Operations, p. 5-33, 5-34)

Air Cover

Fighter units furnish air cover for both ground units and over their operational areas. Soviet fighter units coordinate closely with their ground air defense units when used to reinforce the Aviation for Air Defense units.

Air Superiority

Since air superiority is a prerequisite for ground force maneuvers, this mission is critically important to the Soviet Union. As stated earlier, numerous resources will be used to achieve this goal.

Support of Ground Operations

Air defenders must remember two principle characteristics of the Soviet's support of ground operations. First, helicopters will provide most of the close air support for the Soviet ground troops. Second, Frontal Aviation does not normally use high performance aircraft along the immediate line of contact. However, they are used in support of mountain operations, airmobile assaults, hasty river crossings, and in support of penetrations or exploitations which have outreached their organic field artillery. (Soviet Army Operations, p.5-24)

Isolating the Battlefield

The Soviets isolate the battlefield by attacking enemy surface movements, movement networks (including lines of communication), and command and control. The mission is to delay, disrupt, divert, or destroy an enemy's potential before it can be brought to bear effectively. (FM 100-5, p.48) This definition reflects the intent behind the Soviet's interpretation of interdiction. The Soviet principles for interdiction follow: it is employed across a a wide front, it is centrally controlled, and it is repeated frequently to prevent repair of damaged targets. (Soviet Army Operations, p.5-34)

Air Reconnaissance

"Fighter type reconnaissance aircraft are assigned missions in support of operations along the lines of battle and to the rear of enemy forces. Light, medium, or heavy bomber types may be assigned missions of longer range such as:

- photographic and visual reconnaissance of battle area emplacements, defensive systems, barriers;
- location of assembly, bivouac, and supply areas;
- detection of activities on communication and supply routes
- electronic reconnaissance, especially in adverse weather or at night." (Soviet Army Operations, p.5-34)

The brigade must emphasize movement for its elements. The destruction of air defense artillery systems is a priority for the Soviets. Therefore, both aerial and ground reconnaissance units will continually strive to locate and targets the brigade's weapon systems. To counter the reconnaissance missions, the brigade must establish local security methods to reduce the air defense artillery firing units vulnerability. Additionally, units within the brigade must stress alternate firing positions for its Forward Area Air Defense units and frequent movements for its Assault Firing Units.

Free Hunting (Armed Reconnaissance)

This mission is used when ground commanders do not specify targets. The Soviets do recognize and use targets of opportunity, however, the primary mission of armed reconnaissance is to identify reserves and large targets not previously discovered.

E. Weapon Systems

The support of ground operations will be accomplished using both fixed wing and rotary wing airframes. The fixed wing aircraft such as the SU 17 Fitter and MIG 27 Flogger will perform the majority of the tactical defense and interdiction missions. SU 24 Fencers will provide deep interdiction capabilities to complement the Fitter and Floggers. The MIG 25 Foxbat will be used to provide stand off suppression. The SU 25 Frogfoot will provide close air support and conduct battlefield air interdiction type missions. The MIG 29 Fulcrum is replacing the Fishbed and Flogger aircraft and it will also provide tactical support. Reconnaissance and electronic counter measures can be performed by different versions of the Fishbed, Foxbat, Fitter, Fencer, and Yak 28 Brewer.

The Soviet Union has increased its Army Aviation capabilities; therefore, helicopters will provide much of the direct close air support to the ground forces. "Howard Wheeler, in his book, Attack Helicopters, notes 'The development of Soviet helicopter aviation has been impressive, and it is an integrated part of Soviet close air support and battlefield interdiction doctrines.'" (Jacobs, p.24) The standard attack helicopter for the Soviet Union is the MI 24 Hind. The MI 8 Hip is used to land forces behind enemy lines or for rapid reinforcement of critical positions. All of these helicopters are supported by electronic warfare and command and control helicopters.

The criteria used to evaluate each of the airframes is general information, the number of airframes in the Soviet inventory, the standard armament, the speed, and the flying radius. Unless otherwise annotated, the source used for the information was the 1988-89 edition of Jane's All the World's Aircraft. In the following paragraphs I will provide a brief description of each of the aircraft mentioned.

SU 17 Fitter D/H Ground Attack Aircraft

The Fitter is a variable wing fighter aircraft. The Soviet tactical air forces employ about 1,060 of them, Soviet naval units use 75 more in the Baltic Sea, and a small detachment is used in the Pacific theater. The Fitter uses a Doppler navigation system and a laser rangefinder. The Fitter comes in both fighter and reconnaissance models.

The Fitter has two 30mm guns and has eight pylons which carry approximately 7,000 pounds of arms to include nuclear weapons, rocket pods, and guided missiles. The speed of the Fitter varies from Mach 1 to Mach 2.09. The combat radius of a Fitter with external fuel tanks that starts high, goes low to deliver, and returns high is 685 kilometers. The combat radius of the Fitter that stays low during its entire flight is 445 kilometers.

MIG 23 Flogger B/G/K Air Combat Fighter

The Flogger is a variable wing air combat fighter. The Soviet strategic interceptor force has approximately 250 Flogger B/G/K interceptors and the tactical air force regiments have 1,570.

Floggers use one 23mm twin barrel gun. Additionally, four pylons carry either air-to-air missiles or external fuel tanks. The speed of the Flogger varies from Mach 1.2 to Mach 2.35. The combat radius of the Flogger is from 900 kilometers to 1,300 kilometers with external fuel tanks.

MIG 27 Flogger D Ground Attack Aircraft

Two versions of the Flogger D, an upgraded MIG 23, are currently operating in the Soviet tactical air force regiments. The primary difference between the two versions is that one version has lower standards of equipment and performance. The lower standard model is usually found with the air forces of Soviet surrogates. The Soviet tactical air forces are deployed with about 830 Flogger D's.

In addition to some structural changes, the Flogger D uses a laser range finder and a doppler navigation system. It also has both forward and rearward laser guided munitions capability. The armaments of the Flogger D include a six barrel 30mm gun which can be rotated and used against ground targets. Five pylons carry air to surface missiles including tactical nuclear weapons. The speed of the Flogger D varies from Mach 1.1 to Mach 1.7. The

combat radius of this aircraft is 390 kilometers when equipped with an underbelly fuel tank providing it stays low during the entire flight.

SU 24 Fencer Ground Attack Aircraft

Jane's has recognized the SU 24 Fencer as the best deep interdiction aircraft in the Soviet tactical inventory. It carries a wide variety of air-to-surface missiles to provide suppression and is effective against hard targets. The Fencer is capable of penetrating hostile airspace at night or during poor weather and, under such conditions, deliver ordnance within 180 feet of its target.

The Soviets have over 800 Fencers in their inventory. Tactical Air Armies have 500, ne squadron is with the Naval Air Forces for reconnaissance missions, and the remainder are with the Aviation for Air Defense forces.

Fencers have eight pylons which can carry a total of 24,250 pounds of guided and unguided air-to-surface-weapons. This includes nuclear ordnance. Additionally, it has a 30mm Gatling gun for direct fire capability.

The speed of the Fencer varies from Mach 1.2 to Mach 2.18. The combat radius of the Fencer depends on the altitude at which it travels. If the Fencer stays low during its entire run, its radius is 322 kilometers. If the Fencer starts low and ends high, its radius is 950 kilometers. Finally, if it starts high,

delivers low, and returns to a high altitude, its radius is increased to 1,300 kilometers through the use of two external fuel tanks.

MIG 25 Foxbat Reconnaissance/Interceptor aircraft

The Foxbat is still the fastest combat aircraft used in squadron service. It also holds the altitude record. The Foxbat was designed to satisfy the requirements for a high speed, high altitude aircraft with a radar/missile mix that would permit attack over a considerable range. About 300 Foxbats are used in the Soviet interceptor force, and 105 interceptor and 195 reconnaissance versions serve with the tactical air forces.

The MIG 25 is equipped with doppler radar and has side looking airborne radar capabilities. No armament is carried on the reconnaissance version, B Model. The Foxbat E model has look-down, shoot-down capabilities. The Foxbat F model can launch anti-radiation missiles from long stand off distances. Foxbats carry air-to-air missiles on four underwing attachments. A usual mix includes one infra-red and one radar homing missile under each wing.

The speed of the Foxbat varies from Mach 2.83 to Mach 3.2 depending on the ordnance it is carrying. The combat radius of the Foxbat is 1,130 kilometers for the interceptor models and 900 kilometers for the reconnaissance models.

SU 25 Frogfoot Close Air Support Aircraft

The Frogfoot was used extensively during the Soviet's conflict in Afghanistan. Its primary mission was to work with the Hind helicopter in providing close air support to Soviet ground forces. About 210 Frogfoots were operational by 1986.

The Frogfoot is armed with one 30mm gun and eight large pylons which can carry up to 9,920lbs of ordnance. The weapons used most often include 57mm and 80mm rockets, 500kg incendiary bombs, anti-personnel bombs, and chemical cluster bombs. It also carries air to air missiles for self defense. Chaff/flare dispensers are standard equipment.

The speed of the Frogfoot is .8 Mach or 980 kilometers per hour. The combat radius of the aircraft if it starts high, then provides low close air support, and returns high is 556 kilometers with 4,410 pounds of ordnance, air to ground weapons, and external fuel tanks.

MIG 21 Fishbed Multipurpose Aircraft

The MIG 21 is used by the Soviet Union and 37 other air forces as a multipurpose aircraft. The Fishbed is found throughout the Soviet Air Forces in a wide number of models. The differences in models are affected by the primary role of the aircraft; i.e., reconnaissance, interceptor, or ground attack.

The Fishbed in the reconnaissance role has numerous cameras, electronic warfare sensors, and in-flight refueling capability. The interceptor/ground attack versions have one twin barrel 23mm

gun, four underwing pylons for weapons or fuel tanks. The standard ordnance for interceptors include air to air missiles and radar homing missiles under each wing. These missiles may be replaced by rocket packs which include sixteen 57mm rockets. The standard ordnance for ground attack versions include four rocket packs, two 500 kilogram bombs, and two 250 kilogram bombs. These four bombs may be replaced by four 240mm air to surface rockets.

The speed of Fishbed varies from 1.06 Mach to 2.02 Mach. The combat radius for a Fishbed starting high, delivering low, and returning high with external fuel tanks and four 250 kilogram bombs is 370 kilometers. The combat radius with two 250 kilogram bombs is 740 kilometers.

MIG 29 Fulcrum Air Superiority/Attack Aircraft

The Fulcrum uses look down/shoot down radar which allows day and night, all weather operating ability against low flying targets. This plane is the replacement for the MIG 21 and MIG 23. It represents the Soviet Union's first attempt to close the technology gap with the West. The Soviets currently have over 500 in their inventory. (Soviet Military Power, p.70)

The Fulcrum is equipped with six medium range radar homing missiles on three pylons under each wing. It is able to carry bombs and 57mm, 80mm, 240mm rockets underneath each wing. The Fulcrum also has a 30mm gun for a direct fire capability.

The speed of the Fulcrum varies from Mach 1.06 to Mach 2.3. The maximum range of the Fulcrum is 2,100 kilometers.

SU 27 Flanker Air Superiority/Attack Aircraft

The SU 27 is also a supersonic all weather counter air fighter, with look down/shoot down weapon systems. In 1988, only 10 Flankers had been assigned to Soviet tactical forces. The primary mission of the Flanker is to provide escort service for the SU 24 Fencer during strike missions. Therefore, in addition to its counter air role, the Flanker should be seen as having an alternate ground attack mission.

The Flanker is armed with one 30mm gun and up to ten air to air missiles. It can also carry up to 13,225 pounds of bombs for use in its secondary role.

The speed of the Flanker is Mach 1 at surface level or Mach 2 at cruising level. The radius for the Flanker is 1,500 kilometers.

The discussion of Soviet helicopters is critical to the corps air defense artillery brigade for two primary reasons. First, the large number of attack helicopters used in the Soviet Union will provide a difficult challenge for the brigade. "Over 20 attack regiments have been formed at front or army level with over 800 HINDs and 400 HIPs." (Knox, p.37) Second, the brigade must realize the importance of destroying both the Soviet's troop transport helicopters as well as their attack helicopters. The troop transport helicopters will deliver reconnaissance units and special operation units deep into the corps rear area. These units will have a direct impact on the battle since they can

provide accurate targeting information for the Soviet field artillery and air forces in addition to destroying the air defense artillery systems.

MI 24 Hind

The MI 24 has evolved into a helicopter that is capable of flying nap-of-the-earth, performing as an effective anti-tank weapon, destroying air defense sites, and engaging in air to air combat. The Hind is equipped with "one four barrel 12.7mm machine gun which is slaved to the sighting system, with 2000 rounds of ammunition." (Jacobs, p.22) It carries four anti-tank missiles and a large assortment of rocket packs to include 57mm and 80mm versions. It also has twin 23mm guns and can carry up to 3,300 pounds of ordnance. This ordnance includes both chemical and conventional bombs and mine dispensers. As a result of the Soviet's Afghanistan experience, infra-red jammers, infra-red suppressors, and decoy dispensers were added.

The speed of the Hind is approximately 300 kilometers per hour. The combat radius of the Hind with a maximum military load and two external fuel tanks is 224 kilometers. This range increases to 288 kilometers with four external fuel tanks.

MI 8 Hip

The Hip helicopter is capable of providing close air support and electronic jamming. It can also serve as a troop transporter, and an airborne command post. The Soviet's have produced over 10,000 HIP helicopters. These helicopters are in

service in 39 countries in addition to the Soviet Union. The Soviets have in their service over 1,950 HIPs. The Soviets have 170 Hip E models which provide close air support. This version of the Hip helicopter is armed with a 12.7 mm gun, triple rocket packs on each side of the cabin, which are capable of carrying up to a total of 192 rockets, and four anti-tank missiles which are slaved to the sighting system.

The speed of the Hip helicopter is 260 kilometers per hour. The range of the Hip depends on the particular model, however, the average is approximately 460 kilometers.

MI 28 Havoc

The lethality of the Havoc is found in its ability to deliver lethal fire from a standoff distance of six kilometers! The primary mission of the Havoc is anti-tank. The Havoc is armed with a 30mm gun in the front turret and 16 anti-tank guided missiles. However, "the Havoc can carry 300 rounds of ammunition in two containers on either side of the gun." (Zaloga, p.363) In addition, the Havoc carries rocket packs and tube launched air to air/air to ground missiles.

"According to COL V Moroz in a recent issue of Krasnaya Zvevda, the MI 28 was intended to offer [illegible] to six times the survivability of the MI 24." (Zaloga, p.358) As a result of the Soviet Union's Afghanistan experience, the Havoc contains numerous countermeasures against manportable air defense weapon systems to include flares and an improved exhaust system which reduces the heat signature.

The maximum speed of the Havoc is 305 kilometers per hour and its cruising speed is 265 kilometers per hour. The combat radius is 240 kilometers.

KA 34 Hokum

The primary mission of the Hokum is believed to be air to air with the ground attack role a secondary mission. It carries a wide variety of air to air missiles and a rapid fire gun for employment as a low level helicopter intercept system. It has day, night, and adverse weather capabilities. Survivability is enhanced by infra-red suppressors, infra-red decoy dispensers, and armor protection. "There is no reliable evidence yet that suggests that the KA 34 Hokum is a replacement for the Havoc." (Zaloga, p.357) Therefore, the Soviet Union is developing a strong anti-tank capability through the development of the Havoc and Hokum helicopters. Unfortunately for the elements of the brigade, the ordnance used against tanks can also be directed against the brigade's air defense artillery weapon systems. Therefore, air defenders must be aware of their tactics and place air defense units where they can engage at the earliest opportunity.

The speed of the Hokum is over 360 kilometers per hour. The combat radius is 240 kilometers.

AN 12 Cub Transportation/Reconnaissance Aircraft

The basic Cub model is modified to provide one of two basic missions such as troop transport or electronic reconnaissance. The troop transportation model is used primarily to deliver Soviet paratroopers. The reconnaissance model carries numerous electronic jamming emitters which cover five different wavebands. More than 900 Cub aircraft were made before production was discontinued in 1973. Currently, there are approximately 150 in service. Since the 'offensive' capabilities of the Cub are in the form of electronic warfare instrumentation, the Cub is equipped with only two 23mm guns for self defense.

The speed of the Cub varies from 670 to 777 kilometers per hour. The Cub can travel 3600 kilometers with its maximum payload and no auxilary fuel or 5,700 kilometers with a full fuel load.

IL 76 Candid Transportation/Reconnaissance Aircraft

The Candid is the replacement for the Cub. This aircraft is designed to carry forty tons of freight 5,000 kilometers in less than six hours. It can operate from short airstrips under difficult weather conditions. The Candid can carry from 125 to 140 paratroopers as an alternative to freight.

The Candid has two 23mm guns for self defense. It also has ninety-six 50mm flares for diverting heat seaking surface to air missiles. The speed of the Candid varies from 750 to 850 kilometers per hour. The maximum range of the Candid with fuel reserves is 6700 kilometers.

MI 6 Hook

The Hook is a general purpose transportation helicopter. The Soviets currently have 450 Hooks in service with their ground forces. The Hook can carry from 65 to 90 passengers. As an air ambulance it can carry 41 stretchers. Since it is a transportation helicopter, it is lightly armed with only a 12.7mm gun. The cruising speed is 275 kilometers per hour. The range with a full payload is 620 kilometers. However, with external fuel tanks added the range is increased to 1,450 kilometers.

MI 26 Halo

The Halo was designed to meet the requirement for a helicopter with a greater capacity than the MI 6 Hook. This helicopter has the same lift capacity as that of the United States Air Force C-130 Hercules! This helicopter has many state of the art structural improvements which allow it to operate with maximum efficiency under difficult weather conditions.

The speed of the Halo is 255 kilometers per hour. The range is 800 kilometers with its internal fuel load.

F. Conclusion

In Chapter IV, I have shown the phases of the air battle from the initial fight for aerial superiority through the close air support provided by the Soviet helicopter units. I also illustrated the capabilities of each of the aircraft that the corps air defense artillery brigade could be responsible for destroying during a military conflict. These capabilities allow the Soviet Union to mass large amounts of aerial combat power at the decisive time and place on the battlefield.

I placed emphasis on the Frontal Aviation units of the Air Armies who will be providing support to the ground maneuver forces. The first factor that I need to reinforce from this chapter is the Soviet use of air power as a method to bring deadly fires to areas beyond the range of their field artillery systems. The second factor is the ongoing upgrading of their aerial arsenal. The combination of these factors provides quite a challenge for the corps air defense artillery brigade.

The brigade must employ its assets in order to support the corps commander's intent by destroying enemy aircraft while providing for its own survivability on the battlefield. However, the brigade of 1996 will be facing state of the art aerial weapon

systems. These airframes are capable of engaging targets from long distances with very high accuracy. In response to this, the corps air defense artillery units must be aware of the capabilities of the enemy's airframes and prepare accordingly. Inherent in this preparation, is the ability to read the aerial battlefield, engage and destroy aircraft, and preplan movements and logistical resupply.

In Chapter V, I will discuss the brigade's response to the Soviet air threat. The basic format will be the same as Chapter IV and will include the command and control, employment guidelines, missions, and weapon systems of the brigade.

CHAPTER V CORPS AIR DEFENSE ARTILLERY BRIGADE CAPABILITIES

A. Introduction

I stated in Chapter I that the purpose of my thesis is to identify the role of the corps air defense artillery brigade. The final identification of this role is analyzed in terms of the brigade's interaction with the United States Air Force, corps level field artillery units, and divisional air defense artillery units. Currently, the doctrine is being developed to clarify the methods of fulfilling the many requirements placed upon the corps air defense artillery brigade.

The corps air defense artillery brigade and the divisional air defense battalion, respectively, are the corps and division commanders' primary air defense resources. The employment of these units is an extremely complicated process. For example, depending on the situation, the brigade staff must coordinate with in-place theater level assets such as theater level air defense artillery or the US Air Force or establish an air defense network if in an immature theater. Additionally, the brigade staff must make recommendations on the best way to support the corps commander's scheme of maneuver.

The brigade will not be the only element providing air defense coverage in a corps area of operations. The corps level is the first place that the United States Air Force and Army integrate their assets. The Air Force will be providing offensive (OCA) and defensive (DCA) counterair strikes. Since,

the divisional air defense artillery battalion will be operating within the corps area, coordination between the United States Air Force, the corps air defense artillery brigade, and the divisional air defense artillery battalions is important for two reasons. First, coordination can promote the best use of all assigned assets. Second, since both the US Air Force and the US Army will be operating aircraft within the corps area, coordination will reduce the chance for fratricide. Later in this chapter, I will discuss the command and control procedures necessary to facilitate this coordination.

The brigade will receive many different missions. It must use its assets to provide air defense coverage for both the corps rear area and to supplement divisional air defense coverage. The brigade's ability to provide medium-altitude air defense to the corps' divisions is extremely important. The difficulty lies in the ability to provide adequate coverage for the corps' divisions while simultaneously providing air defense for the corps rear area. The brigade must understand the difficult task of employing its assets to cover the multitude of missions assigned to the air defense artillery. Therefore, it must use some unique employment concepts in order to fulfill its missions. I will discuss proposed employment concepts later in this chapter.

The brigade leadership conducts extensive planning to meet the conflicting demands of air defense artillery resources. Planners must understand that... "the purpose of corps air defense artillery planning is to facilitate corps success, while

killing as many attackers as possible. It is not to kill attackers at the expense of corps success." (FM 44-71 (DRAFT), p.3-30) In order to facilitate the planning process and to support the corps commander's scheme of maneuver properly, the brigade establishes command posts. The three separate command posts all coordinate the deep, close, and rear air defense battles. Each of these command posts have different yet complimentary responsibilities which affect the employment of the brigade. Regardless of the location, the primary mission of a command post is to facilitate the command and control of the air defense artillery units. Therefore, the brigade must search for ways to have an air defense network which quickly responds to new missions. I will discuss later in this chapter a method which allows for better command and control and responsiveness to changing conditions.

The corps commander uses a decision making process to determine his best course of action. After he determines his course of action, the brigade staff recommends an employment plan for the brigade's assets. Once the brigade commander has approved this recommendation, the individual air defense commanders deploy their assigned weapon systems to the appropriate locations. These locations should adhere to the general employment guidelines and principles for air defense artillery weapon systems which I describe later in this chapter. This adherence allows the different weapon systems to support each other in the overall air defense plan. In addition to adherence to the employment principles and guidelines, the

brigade must deploy units so that they can survive and engage aircraft from many different directions at once. To better facilitate engagements from many different directions at once, the brigade must place its units throughout the corps area of operations. My proposal will show how to distribute complete air defense networks throughout the corps area of operation.

The role of the corps air defense artillery brigade must emphasize flexibility and survivability. The brigade must be flexible in order to satisfactorily accomplish all of its assigned missions. The brigade accomplishes flexibility by having both long and short range air defense capabilities throughout the area of operations. To accomplish this, air defense task forces are used which are task organized with Hawk, Chaparral, and Avenger weapon systems. The use of these three different systems will allow a complete air defense network to provide air defense coverage to both maneuver units as well as static critical assets.

The role of the corps air defense artillery brigade must be assessed for the deep, close, and rear battles. To fight the deep battle, the brigade must emphasize long range fires from the United States Air Force to destroy enemy aircraft before they are airborne. Additionally, when the distance permits, the corps field artillery units could target some helicopter airfields or refueling stations. To fight the close battle, the brigade must locate units, which are responsive to the corps commander, throughout the battlefield. Additionally, the brigade must emphasize constant movement to improve the survivability of the

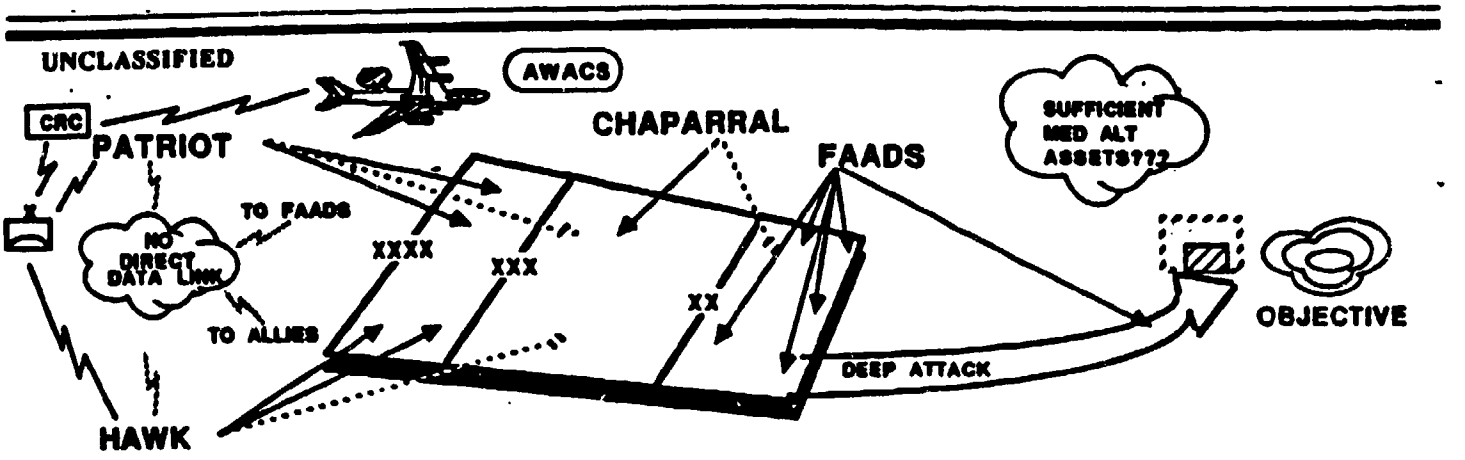
air defense artillery elements. A complete air defense network, which is found in an air defense task force, allows for movement since the different units can better provide mutual support for each other. Furthermore, the brigade must be prepared to fight a rear battle that is just as active as any on the battlefield. It is my opinion that task forces are the key method for defining the role of the corps air defense artillery brigade. The routine organization of task forces provides the brigade with capabilities that define its role on the battlefield.

B. Weapon systems.

The weapon systems assigned to the brigade must be able to engage aircraft at a variety of heights and distances. The commanders of air defense units will locate weapon systems so that they establish an air defense coverage which increases in lethality as enemy aircraft get closer to the defended target. These weapon systems all have the ability to "detect, acquire, identify, engage, and destroy" aircraft. (FM 44-100, p.5-14) The three weapon systems assigned to the brigade are the Hawk, Chaparral, and the Avenger. Information is shown on the Stinger since the Avenger is a mobile Stinger unit. Additionally, Hawk and Chaparral units also use the Stinger system.

The diagram on the next page shows how an integrated air defense network would deploy within a corps area of operations. (Operational Concept, p.B-20)

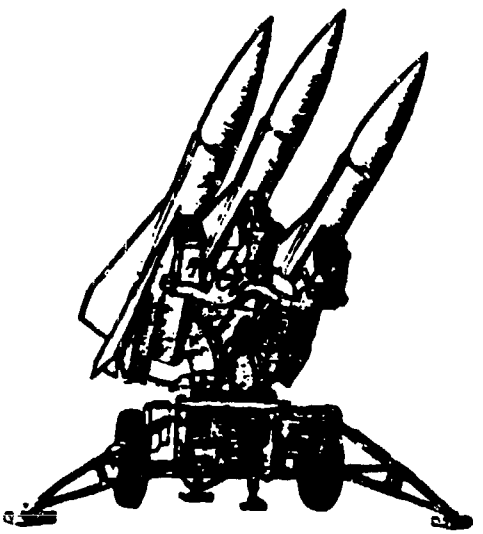
Figure 5-1 Integrated Air Defense Network



HAWK

The Hawk air defense system is a medium range guided missile system which is designed to provide air defense coverage against low to medium altitude aircraft. Hawk is fielded in the towed configuration only. The fact that all major components are trailer mounted gives the system some mobility. The Hawk system is usually deployed by Assault Fire Platoons which allow for improved combat flexibility. Either cargo aircraft or helicopter transport the Hawk system. (FM 44-1, p.B-10)

Figure 5-2 Hawk Missile System

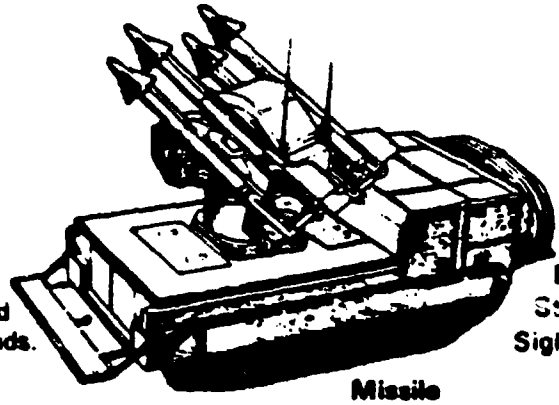


Launcher	
Weight	
Less Missiles	4,610 lb
With Missiles	8,813 lb
Dimensions	
Length (Less Missiles)	
March Order	14 ft, 4 in
Width (Less Missiles)	
March Order	8 ft
Height (Less Missiles)	
March Order	7 ft, 8 in
Full Elevation	12 ft
Maximum Fording Depth	30 in
Maximum Emplacement Slope	10°
Missile	
Type	MIM-23B
Weight	Approximately 1,400 lb
Length	16.5 ft
Diameter	1.17 ft
Wing Span	4 ft
Guidance	Semiactive homing
Warhead	H.E., blast, fragmentation
Motor	Dual-phase, solid propellant
Speed	Supersonic

CHAPARRAL

The Chaparral is a self propelled, highly mobile surface to air missile system which can engage high-speed, low-altitude aircraft. The launching station is a self contained unit, which is capable of operating independently. Although the Chaparral has IFF (Identification Friend or Foe) capability, soldiers employing the Chaparral must be qualified in visual aircraft recognition since these weapon systems are frequently located in high traffic areas of friendly aircraft. In addition to being self propelled, cargo aircraft transport the system. The launching station may be sling loaded by helicopter. (FM 44-1, p.B-9)

Figure 5-3 Chaparral Missile System



Weight
Net, less launching station and missiles - 14,691 pounds.
Gross, w/launcher and missiles - 27,508 pounds.

Traverse	360°
Elevation	-9° to 90°
Storage	8 missiles
Sight (Type)	Reflex

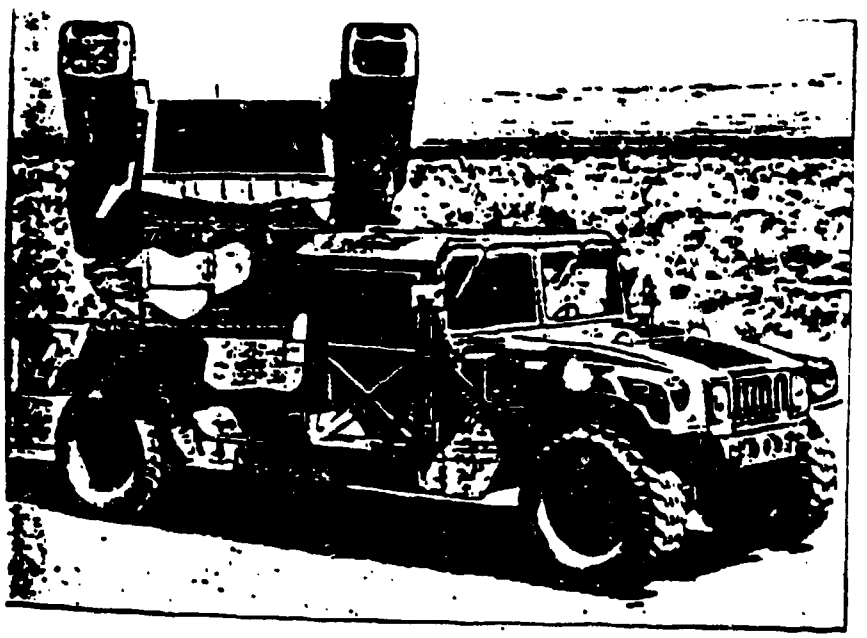
Dimensions	
Length	19 ft, 10½ in
Width	8 ft, 9¾ in
Height (w/o cab cover)	6 ft, 4 in
Performance	
Maximum Speed	
(Highway)	38 mph
(Cross-Country)	10 mph
Cruising Range (25 mph)	300 mi
Turning Radius (Pivot Steering)	14 ft
Maximum Fording Depth	40 in
Maximum Forward Slope	30°
Maximum Emplacement Slope	10°
Fuel Capacity (Diesel)	112 gal
Launching Station	
Number of Launch Rails	4

Missile	
Type	Supersonic, surface-to-air, aerial intercept
Weight	190 lb
Length	9.5 ft
Diameter	5 in
Wing Span	24.8 in
Guidance	Passive infrared homing, proportional navigation, after optical aiming
Warhead	High explosive, fragmentation
Motor	Rocket, solid propellant, single-stage
Performance	Range-5,000 meters (approx.)
Speed	Supersonic

AVENGER

The Avenger is the air defense artillery's most mobile weapon system. The Avenger is composed of a HUMMV with a stinger firing system attached. The system is armed with Stinger air defense missiles and a 40mm twin gun. A .50 caliber machinegun provides additional firepower. State of the art passive sensors, including a forward looking infrared radar, video tracker, and laser range finder provide the Avenger system with target acquisition capability. (PAM 350-6, p.14) The crew also has a remote control console which can operate the Avenger up to 50m away from the system. I will discuss the Stinger characteristics on the following page.

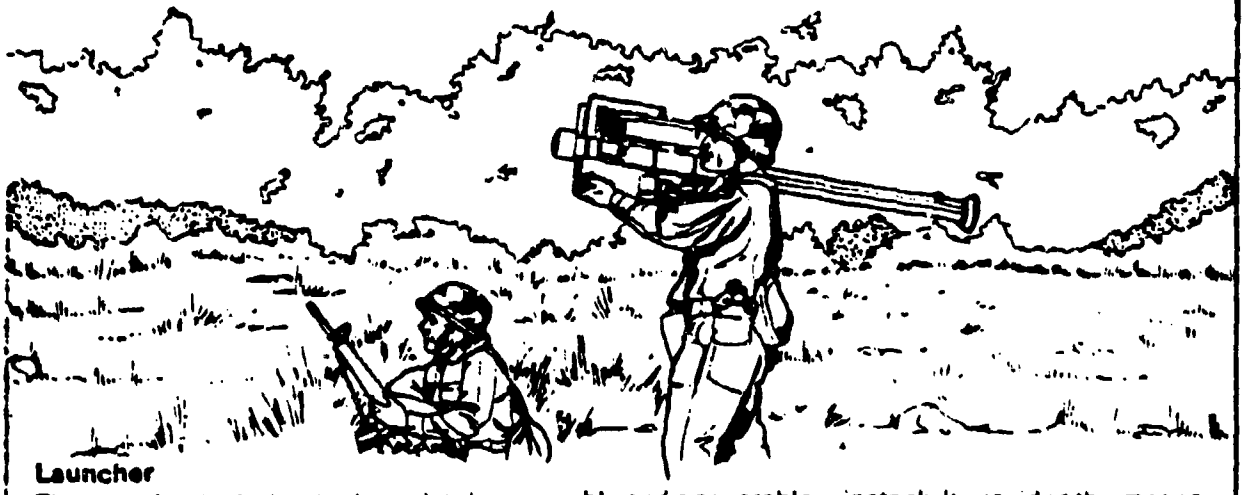
Figure 5-4 Avenger Missile System



STINGER

The Stinger is a short range, man-portable, shoulder fired, heat seaking guided missile system. It is designed to engage high speed, low level, ground attack aircraft. The Stinger is also a lethal weapon against all types of aircraft. The Stinger's mobility allows its deployment anywhere on the battlefield. (FM 44-1, p.B-6)

Figure 5-5 Stinger Missile System



Launcher
The launcher includes the launch tube assembly and a separable gripstock. It provides the means to transport, aim, and fire the missile. The launch tube is discarded after the missile is fired.
Weight of Weapon - 34.9 pounds
Length - 60 inches.

Missile
Type - Supersonic, surface-to-air
Diameter - 2.75 inches
Length - 58 inches
Guidance - Passive infrared homing and modified proportional navigation
Range - Excess of 4 kilometers
Warhead - High explosive
Motor - Rocket, solid-propellant, two-stage (separable launch motor and dual-thrust flight motor

IFF Subsystem
IFF components include the IFF interrogator and an interconnecting cable. To support the IFF subsystem, a programmer/battery charger, shipping and storage containers, and code keys are used. This equipment is located at the section headquarters.

The brigade must use its assets effectively to provide air defense coverage througout the entire corps area of operations. One of the basic tenets of my perception of the role for the corps air defense artillery brigade is the routine task organization of brigade assets into task forces. Air defense artillery task forces can cover the entire area of operations by having Hawk air defense systems operating in both forward and rear areas. The Hawk weapon system will also extend the air defense artillery's influence deeper into the corps area of interest. Additionally, the Chaparral and Avenger units will increase the lethality of the air defense coverage over the maneuver area or critical asset.

I believe that the brigade should augment each maneuver division with one assault fire unit from the Hawk battalion, one platoon of Chaparral, and one platoon of Avengers. Consequently, the Hawk battalion (-) would remain in general support of the corps. This task organization would leave enough air defense artillery units to cover the remaining corps level interests properly, such as the corps reserve, the COSCOM, and other fire support elements.

Air defense task forces will also increase the responsiveness of air defense artillery coverage. Since each maneuver division will already have a complete air defense network, the brigade would not have to make any adjustments if the corps redesignated its main effort. Additionally, any

maneuver unit performing an exploitation mission will already have a long range air defense engagement envelope over its newly acquired terrain.

The symbiotic relationship developed by the use of air defense task forces will also improve early warning capability. Currently, different weapon systems do interface with each other. However, the process of passing early warning is still recognized as a problem due to limited communication assets and differences between weapon systems. Currently, this problem is routinely placed in the 'too hard to handle' box. I believe that the doctrinal use of the air defense artillery task forces will provide unit commanders the need to address this problem to the senior leaders of the air defense artillery community and the United States Army. Therefore, if air defense task forces become doctrine, the senior leaders should provide enough emphasis to help solve this difficult problem.

C. Command and Control

I have divided my discussion of command and control into two sections. In the first section, I will discuss the overall concept of Army Airspace Command and Control (A2C2). In the second section, I will cover the command and control principles which are peculiar to air defense artillery.

1. Army Airspace Command and Control System

Successful battles and engagements depend on how effectively airspace is used. With a high density of friendly weapon systems and aerial vehicles, maximum combat effectiveness is achieved only if these systems do not interfere with each other. (FM 100-103, p.1-1) The system used to reduce interference is the Army Airspace Command and Control System (A2C2). The A2C2 function described below consists of coordinating, integrating, and regulating the use of the corps' airspace. The system also assists in the identification of all air space users.

> "Coordinating is that degree of authority necessary to achieve effective, efficient, and flexible use of airspace.

Through integration, requirements for the use of this airspace is consolidated to achieve a common objective at the lowest possible level.

Through regulation, activities are supervised to prevent real-time conflicts among the various airspace users.

Identification promotes timely engagement of enemy aircraft while reducing the potential of fratricide." (FM 100-103, p.1-2)

Fratricide is a major concern to all elements operating within the corps area of operations. Therefore, coordi ation between these elements is extremely critical. To orchestrate this coordination, airspace planners use key definitions. "The airspace above the joint force area of operations and the Army's area of operations is the airspace control area. An airspace control area is further divided into subelements called airspace control sectors. Air defense organization boundaries are normally formulated to coincide with airspace control sector boundaries." (FM 100 -103, p.1-2)

If we are dealing in a joint arena, the joint force commander (JFC) will assign responsibility and authority for airspace control to a single component commander. The airspace control authority (ACA), usually the area air defense commander (AADC), is responsible for managing the four basic functional activities of airspace control. (FM 100-103, p.1-2) These

activities are command and control, air defense, some aspects of fire support coordination, and air traffic control. (FM 100-103, p.1-3)

In a contingency theater the air defense artillery brigade is the highest air defense echelon. In this situation a command representative must work with the US Air Force to insure that the air defense brigade is well integrated into the corps or theater level management plan. This integration is critical to the deployment of the brigade since the US Air Force will always be operating in a habitual relationship with the Army's air defense regardless of the maturity of the theater.

Both of these services have air defense missions. The US Air Force accomplishes its air defense mission by using interceptor aircraft and by targeting enemy aircraft still grounded. The US Air Force can fight the deep battle for the brigade by eliminating enemy aircraft which are located on airfields deep in the enemy's rear. This destruction of aircraft before they become airborne is critical to the brigade. The brigade must coordinate with US Air Force planners to target grounded enemy aircraft. Therefore, if the US Air Force coordinates with the brigade early in decision making process, the use of scarce air defense artillery assets will be more cost effective.

Standard operating procedures will specify areas of responsibility within the corps area of operation. By means of these procedures, air defense zones will be assigned for both the US Air Force as well as the brigade. Additionally, staff

officers establish areas for the safe passage of friendly aircraft through the air defense artillery brigade's engagement areas. In order to plan this integration, staff officers follow standard rules of engagement and supplemental fire control measures described below. The rules of engagement are directives which dictate when air defense artillery forces can initiate or continue an engagement. The seven components to the rules of engagement are as follows:

- the right of self defense
- hostile criteria
- level of control
- weapons control status
- modes of control
- autonomous operations
- fire control orders

The supplemental fire control measures include the following:

- air defense operations area
- weapons engagement zone
- high-density airspace control zone
- temporary airspace regulations (FM 100-103, p.1-6)

I will discuss these rules of engagement and supplemental fire control measures later in this chapter.

One of the biggest problems in dealing with command and control is the passage of information dealing with the rules of engagement and supplemental fire control measures. The accurate

passage of information is critically important for the proper execution of division and corps operations. Of particular importance to units within the brigade are locally generated messages. Locally generated messages, for example, may detail new intelligence data or designate new air corridors. The air land battlefield is characterized by rapid changes to the current situation. Therefore, the brigade must streamline the method of passing information to all air defense artillery units within its area of operations. The air defense artillery task force is a good organizational structure to streamline this passage of information. The headquarters of the air defense artillery task force will be responsible for passing information to its units. Whenever an air defense artillery unit is providing GS or GSR support to a maneuver unit, that maneuver unit is usually not sure that all of the air defense artillery units providing support know the current situation. The air defense task force provides the advantage of having one headquarters in charge of the entire air defense network.

2. Airbattle Management

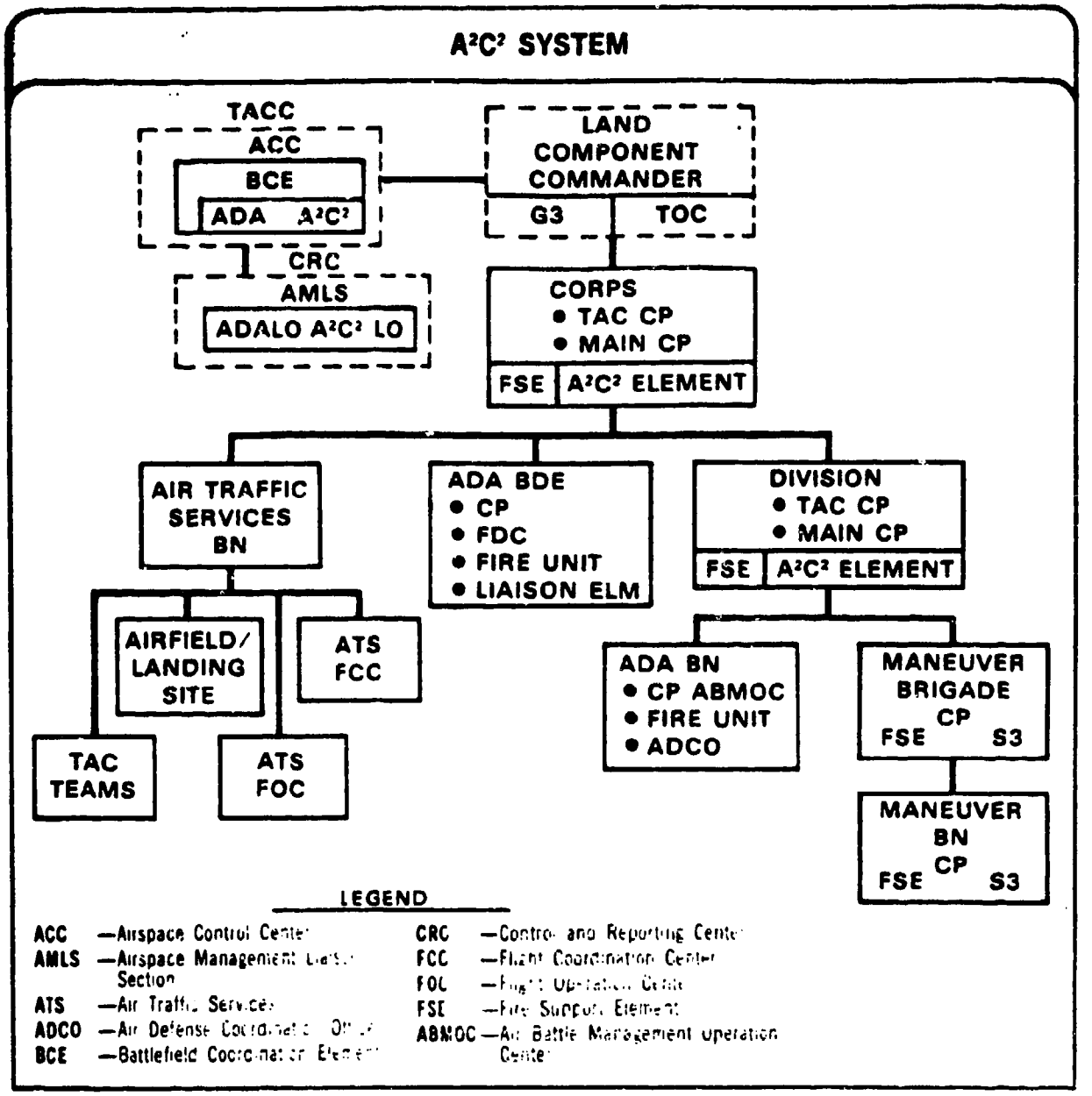
The A2C2 system allows for smart airbattle management. Airbattle management includes airspace control as well as air defense command and control. Two basic methods have been used to accomplish airbattle management. These mutually supportive methods are positive management and procedural management. Positive management relies upon real time data from radars, identification, friend or foe (IFF), computers, digital data links, and communications equipment. (FM 100-103, p.1-6) Procedural management uses the basic tactics, techniques, and procedures such as rules of engagement and weapons control statuses. (FM 100-103, p.1-6) The brigade uses both of these management procedures in its fire direction center (FDC). The FDC coordinates the fires of its long range missile systems using local radars and automated command and control systems. On the other hand short range air defense systems rely on voice communication and procedural management for command and control. (FM 100-103, p.1-7)

As noted in the introduction, the corps is the first level where the U.S. Army and the U.S. Air Force coordinate their resources. Since both components are in the air defense business, the command and control elements of both services must be integrated. "Coordination between aviation and air defense commanders is particularly important, as aviation forces must operate in the airspace over the battlefield and within air defense engagement volumes." (FM 44-71 (DRAFT), p.3-22)

The U.S. Air Force uses the Air Force Tactical Air Control System (TACS). The Tactical Air Control Center (TACC) is the senior air operations element of the TACS. Within the TACC, the airspace control center is the focus for the ACA responsibilities. (FM 100-103, p.1-10) In addition to the US Air Force management cells, the US Air Force also uses Control and Reporting Centers (CRC) to direct the regional air defense efforts. The regional CRC is responsible to the US Air Force for providing mission changes and intelligence information to assigned aircraft. The regional CRC is responsible to the corps air defense artillery brigade to provide threat warnings and positive identification of aircraft, recommend changes in air defense warning status, and specify the weapons control status. Figure 5-6 illustrates the A2C2 framework. (FM 100-103, p.1)

Airbattle management is important to the brigade for two reasons. First, as I stated earlier, the corps is the first level where the US Army and US Air Force coordinate their resources. Second, the brigade could deploy to an unestablished theatre. The brigade would then have to establish a network for airbattle management. Therefore, the brigade must be capable of performing air battle management functions prior to establishment of a A2C2 cell.

Figure 5-6 Army Airspace Command and Control System



3. Airspace Control Measures

Airspace control measures are used to organize the airspace above the corps area. Military officers generally understand the need for organizing the ground during military operations. Ground maneuver commanders designate boundaries and use other control measures to facilitate this organization. In a similar fashion, airspace needs to be organized since it has many users. Consequently, the US Army and the US Air Force use a coordination process which is partially dependent upon airspace control measures. Airspace control measures are used to assign particular routes for aircraft to use and specific zones for which air defense systems are responsible. When established, airspace control measures accomplish one or more of the following:

- Reserve airspace for specific airspace users.
- Restrict actions of airspace users.
- Control actions of specific airspace use.
- Require airspace users to accomplish specific actions. (FM 100-103, p.2-7)

The airspace control authority (ACA) will approve all requested airspace control measures. The A2C2 section along with the TACC's airspace control center coordinates all of the Army's requests. In the following paragraphs, I will discuss the most commonly used airspace control measures that impact on the brigade.

HIGH-DENSITY AIRSPACE CONTROL ZONE (HIDACZ)

Maneuver commanders, normally at division level and above, request airspace for their operations. A HIDACZ reserves airspace and determines which airspace users have access to the zone. This allows the commander to restrict a volume of airspace from users not involved with his operations. The Air Force usually requests that the maneuver commander control the ADA weapons control status. A HIDACZ is usually used when extensive air defense artillery weapons are located within his area of operations. (FM 100-103, p.2-8,2-9)

RESTRICTED OPERATIONS ZONE (ROZ)

The A2C2 cell designates an area to be a restricted operations zone, thereby restricting some or all airspace users from this area until the end of a particular mission. A ROZ helps facilitate air defense artillery operations by preventing friendly aircraft from entering a designated airspace. A ROZ is only temporary in nature and is discontinued at the earliest possible time due to the impact it has on the maneuverability of friendly aircraft. (FM 100-103, p.2-12)

MINIMUM RISK ROUTE (MRR)/LOW LEVEL TRANSIT ROUTE (LLTR)

The two terms, minimum risk route and low level transit route are used synonymously to designate a temporary corridor of defined dimensions which allows the low level passage of friendly aircraft through friendly air defenses and controlled or restricted airspace. (FM 100-103, p.2-12,2-13)

BASE DEFENSE ZONE (BDZ)

The US Army and the US Air Force establish a base defense zone around an air base. The engagement envelope of the short-range air defense weapon systems defending the base establishes the limits of the zone. These base defense zones have specific entry, exit, and IFF procedures which aircrews must follow. (FM 100-103, p.2-16)

WEAPONS FREE ZONE (WFZ)

The US Army and the US Air Force establish a weapons free zone for the protection of key assets besides air bases. The weapons control status of the air defense artillery systems is FREE. Therefore, aircrews must avoid active weapons free zones. (FM 100-103, p.2-16)

AIR CORRIDOR

An air corridor is a restricted air route of travel used specifically by Army aircraft. Its purpose is to keep friendly forces from firing on friendly aircraft. The establishment of an air corridor is standard operating procedure in the United States Army. (FM 100-103, p.2-17)

I have described the numerous airspace control measures to illustrate the complexity of airspace management. Due to the complexity of the modern battlefield, the use of airspace control measures will be emphasized. Therefore, every element of the brigade must understand the impact that each of the airspace

control measures has on air defense artillery operations. The brigade must respond quickly to any change in airspace control measures to prevent fratricide.

In addition to the previously described airspace control measures, the ACA (airspace control authority) will use warning procedures and alert statuses to increase the effectiveness of air defense artillery units. "Air defense warnings (ADW) represent the commander's evaluation of the probability of air attack within his region." (FM 44-1, p.5-12) Any local commander can use ADWs, however, the local warning must never be lower than the overall warning issued by the regional authority. The three ADWs are as follows:

1. ADW RED - Attack by hostile aircraft or missiles is imminent or in progress. This means that hostile aircraft or missiles are within a respective area of operations or are in the immediate vicinity of a respective area of operations and have a high probability of entering the area. (FM 44-1, p.5-12)

2. ADW YELLOW - Attack by hostile aircraft or missiles is probable. This means that hostile aircraft or missiles are enroute toward your area. (FM 44-1, p.5-13)

3. ADW White - Attack by hostile aircraft or missiles is improbable. Depending upon the circumstances the US Air Force can declare this ADW at any time. (FM 44-1, p.5-12)

The ACA designates the Weapons Control Status (WCS) to manage the fires of air defense artillery elements. The ACA designates WCS for all air defense artillery units within his region. Local commanders may increase the WCS for units under their command. (FM 44-1, p.5-14) The three weapons control statuses follow:

1. Weapons Free. Weapons can fire at any aircraft not positively identified as friendly. This is the least restrictive weapons control status. (FM 44-1, p.5-14)

2. Weapons Tight. Weapons can fire at aircraft positively identified as hostile. Positive identification can occur by IFF, visual sighting, or by meeting any designated hostile criteria. (FM 44-1, p.5-15)

3. Weapons Hold. Weapon systems do not fire except in self-defense or in response to a formal order. This is the most restrictive weapons control status. (FM 44-1, p.5-15)

The brigade must react quickly to any change in air defense warning or weapons control status. The brigade can react quickly to changes in air defense warning by having complete air defense artillery networks located throughout the corps area of operations. A lower air defense warning allows certain procedures to occur at the fire unit level. However, the air defense task force would be able to allow for maintenance internally while concurrently providing air defense coverage.

4. Command Posts

The corps commander and the commander of the brigade use different command posts to facilitate command and control of their units. Additionally, the brigade has elements working within the corps command posts to allow for better integration of air defense concerns into the overall corps decision making process. The three command posts are the tactical, main, and rear command posts. These command posts focus on the deep, close, and rear battles of the corps. The brigade liaison officer operates in the corps main command post. The liaison officer plays a critical role for the brigade. I have listed the liaison officer's routine duties later in this section. The liaison officer must be a strong representative of the corps air defense artillery brigade. The liaison officer must stress air defense operations during the corps decision making process. Additionally, the liaison officer must influence the corps commander to use his US Air Force and corps field artillery assets to fight the brigade's deep battle.

The corps air defense artillery brigade's tactical command post coordinates brigade operations. The primary functions of this command post follow:

- control the brigade's close battle execution
- synchronize corps close offensive counter air and defensive counter air defense operations
- maintain current corps and joint counterair situation
- maintain displays/information required to serve the brigade commander's decision making needs
- coordinate with the corps' tactical command post
- monitor deep and rear operations
- operate and maintain appropriate communication nets (FM 44-71 (DRAFT), p.3-6)

The corps air defense artillery brigade's main command post synchronizes the entire corps air defense battle. It focuses upon future operations and also directs the close battle whenever the tactical command post is moving. The primary functions of this command post are as follows:

- coordinate deep operations and plan future operations
- synchronize all corps air defense operations
- coordinate and monitor execution of air defense artillery combat service support
- coordinate with the corps' main command post to identify offensive counterair targets

- coordinate and synchronize the brigade's airspace use with the corps main command post and any joint command and control node, if needed
- monitor corps and brigade deep and rear operations (FM 44-71 (DRAFT), p.3-8)

The brigade has a liaison element working within the corps main command post. This element belongs to the corps air defense artillery brigade, however it functionally operates under the direction of the G3. The primary functions of this liaison element are as follows:

- assist in synchronizing the corps' air defense in deep, close, and rear operations
- develop air defense branches (contingency plans) in support of corps operations
- develop sequels (actions after the battle) to support future operations
- coordinate with the corps air defense artillery brigade's main command post and recommend offensive counterair targets
- coordinate the Army air defense participation in the Army Airspace Command and Control system
- pass along pertinent information to the corps air defense artillery brigade
- monitor intelligence networks for pertinent information (FM 44-71 (DRAFT), p.3-10)

The corps air defense artillery brigade's rear command post focuses upon future operations. It is generally located with the corps' rear command post. The primary tasks of this command post are as follows:

- coordinate logistical support
- coordinate rear area air defense plan, to include terrain management
- inform corps' rear operations commander of the counterair operations supporting rear operations
- inform the corps brigade main command post of any conditions that may influence the corps counterair battle
- monitor close and deep operations.

The corps brigade has a unique responsibility since it must coordinate with the US Air Force, corps field artillery units, corps maneuver commanders, and its organic air defense artillery units. The brigade must ensure that it understands the intent of the supported unit and its priorities for air defense. The basis for this understanding are liaison elements. Liaison elements provide the linkage between the supported unit and the supporting element of the brigade.

D. Employment Principles/Guidelines

Once the commander of the brigade has approved the air defense scheme of maneuver, subordinate unit commanders deploy their forces. The number of units and their locations always depends on the situation. However, some employment principles and guidelines are integrated into the decision making process. This allows for better air defense coverage.

A basic knowledge of the employment principles/guidelines is important for the understanding of the role of the corps air defense artillery brigade. Additionally, the understanding of the employment principles/guidelines is imperative to understand my thesis in terms of task organization.

1. Employment Principles.

Below I define the four employment principles which provide the basis for air defense artillery employment. The balanced application of these principles to the assigned mission will result in both mission accomplishment and survivability of the brigade's weapon systems. (FM 44-1, p.4-11)

MASS

Mass is the concentration of ADA combat power achieved by using enough weapon systems to defend the asset successfully against attack. Short range air defense artillery systems use platoons and larger units to achieve mass. To achieve mass for high to medium altitude air defense artillery units requires a battalion sized unit. (FM 44-1, p.4-1)

MIX

The principle of Mix refers to the balance between air defense aircraft and air defense artillery weapon systems, or between types of air defense artillery weapon systems that offsets the limitations of one with the capabilities of the other. (FM 44-1, p.4-11)

MOBILITY

Mobility is the capability of air defense artillery units to move on the battlefield while still fulfilling their air defense artillery mission. This guideline is critical for three primary reasons. First, units supporting maneuvering forces, such as mechanized infantry or armor, must move at the same rate that the supported element is moving. Second, units defending a static critical asset, such as an airfield, must move to alternate firing positions to enhance their survivability. Third, units

operating in a high threat environment must use mobility as well as their organic air defense artillery weapons for survival. (FM 44-1, p.4-12)

INTEGRATION

Integration refers to the use of air defense artillery assets in conjunction with the other battlefield operating systems (BOS) to achieve mission accomplishment. All BOS complement one another's mission accomplishment and survivability. Additionally, elements of the brigade must establish coordination between lower and higher air defense elements for synchronization of their assets. (FM 44-1, p.4-12)

The brigade must use its assets to optimize the employment principles. The brigade can mass its weapon systems by allocating enough firepower to defend an asset properly. Additionally, the different weapon systems of the brigade can offset the other weapon systems limitations. The air defense task force is composed of a mix of weapon systems that can mass firepower to defeat enemy aircraft.

To better support the maneuver battlefield operating systems, the units of the brigade should be providing air defense coverage from the maneuver units rear boundary to the unit's area of interest. The air defense task force is capable of providing full support to the maneuver commander.

The brigade integrates itself into the battlefield operating systems. For example, the brigade will provide air defense coverage for the corps' field artillery units. Simultaneously, the corps' field artillery units should be firing missions to nullify enemy helicopter sites that are located within their firing range.

The brigade, through the nullifying of enemy aircraft, provides mobility to the corps commander by allowing him freedom to maneuver . The brigade must also provide for the mobility of its own air defense artillery units. Mobility is increased by having enough air defense systems operating in an area to allow for movement of selected systems while other systems are providing air defense coverage. For example, the Hawk system can provide crucial air defense for both the defended asset and the Chaparrals. The air land battlefield requires the constant movement of short range air defense systems from one location to another. The air defense coverage provided by the Hawk missile system is necessary since the Chaparrals are vulnerable during movement.

2. Employment Guidelines.

Six employment guidelines are used to increase the effectiveness of air defense artillery weapon systems. These guidelines are used to form a 'perfect' air defense for a defended asset. Satisfactorily fulfilling all of the guidelines is seldom accomplished. However, emplacements that satisfy several of the guidelines usually assure solid air defense

coverage. I believe that the brigade can satisfy more of these guidelines through the use of air defense task forces. The six employment guidelines are as follows:

BALANCED FIRES

Air defense systems achieve balanced fires when positioned to provide equal defensive fires in all directions. (FM 44-1, p.4-12)

WEIGHTED COVERAGE

Focusing air defense systems on likely air threat avenues of approach or known enemy locations achieves weighted coverage. (FM 44-1, p.4-12)

MUTUAL SUPPORT

The location of one weapon system so that it can fire into the dead zone of another achieves mutual support. (FM 44-1, p.4-12)

OVERLAPPING FIRES

The positioning of weapon systems so that engagement envelopes overlap achieves this employment guidelines. (FM 44-1, p.4-12)

EARLY ENGAGEMENT

The location of weapon systems so that they can engage enemy aircraft prior to the time of their expected ordnance release achieves early engagement. (FM 44-1, p.4-13)

DEFENSE IN DEPTH

The location of weapon systens so that enemy aircraft encounter an ever increasing volume of fire as they approach the critical asset achieves defense in depth. (FM 44-1, p.4-13)

All of these principles and guidelines are important for the mission accomplishment of the brigade. The habitual use of task forces will not only meet these principles and guidelines but air defense task forces will enable the brigade to employ these principles and guidelines better.

Along with the development of task forces, one of the basic tenets involved in my proposed role for the corps air defense artillery brigade lies in the forward deployment of air defense weapon systems. The standard definition of forward deployment involves the movement of air defense artillery weapon systems deep into the divisional area of operations. My definition of forward deployment is the deployment of air defense units to the point where they can engage aircraft at the very earliest opportunity. This point may place these units beyond the

accepted forward positions within the divisions. The forward deployment will not only enhance early engagement, it will also provide better defense in depth.

Although I believe that the division area may be the best location for some brigade assets, I do not believe that the corps air defense artillery brigade should self impose the division area as a boundary. The brigade must evaluate the entire battlefield. By doing so, the brigade can engage enemy aircraft within the corps area of interest as opposed to the corps area of operations.

By extending its area of interest, the brigade maximizes the idea of defense in depth. This forward movement of brigade assets truly makes early engagement earlier.

The brigade must be 'defensive' in name only. By extending the range forward, the brigade is in effect becoming more offensive. The brigade must distribute its forces so that it denies the enemy an opportunity for penetration into the corps airspace. I submit that by locating longer range weapon systems such as Hawk deep within the area of operations this denial is possible. I believe this concept is necessary since the battlefield of tomorrow will be nonlinear in nature. Air and ground threats will simultaneously be engaging assets within the corps deep, close, and rear areas. Since there will be battles at different areas simultaneously, the brigade must have its assets deployed in a manner to best meet all of these challenges. Placing Hawk weapon systems forward would give the benefits of early warning and early engagement, thereby enhancing

the chances for defeating the air threat in all areas. Furthermore, by assigning both long and short range air defense systems throughout the area of operations, the brigade would be able to provide air defense for both critical assets and units operating independently. Additionally, having brigade assets throughout the area would also allow for better exploitation of success by the maneuvering forces.

E. Missions.

The corps air defense artillery brigade has the primary responsibility for air defense of friendly ground forces across the corps area of operation. This responsibility translates into a four fold mission:

- ensure the combined arms team retains the freedom to maneuver
- protect command and control modes
- sustain the battle
- and kill enemy aircraft the first time (FM 44-100, p.3-8)

Air defense artillery is one combat arms which has a clearly defined responsibility from the very beginning of a conflict through the final conclusion. As stated earlier, this thesis deals only with the air defense artillery brigade that deploys as a part of a contingency force. The brigade is initially involved with providing air defense for the point of debarkation found within the corps area within the unestablished theater. As the conflict progresses, the brigade is involved in the deep, close, and rear battles of the corps.

Contingency operations involve the deployment and use of forces at the direction of the National Command Authority (NCA) in support of national policy. The size and mission of the force involved will be determined by the situation. Units with a contingency force mission must be able to deploy worldwide within a short period of time. (FM 44-1, p.6-2) Of primary concern to the brigade during the initial deployment is the departure time of the air defenders relatively early in relation to the rest of the force. Air defenders must be on the first aircraft to deploy. Air defense is critical to the survival of the remaining contingency forces.

The US Army and the US Air Force will both be operating within the contingency area. In addition to the basic transportation mission of the US Air Force, it will also be conducting offensive counterair strikes. Activities in an unestablished theater are characterized by an unsophisticated or unestablished command and control, a lack of a logistics infrastructure, and no forces operating in an established theater. (FM 44-100, p.4-2) Therefore, the brigade will not have the advantage of merely supplementing the air defense artillery units already located within the theater. Consequently, the brigade must establish both a new command and control system and a logistics infrastructure to support its forces. Liaison officers play a critical role in the development of a theater. Liaison officers are extremely vital during the early stages of the campaign since a reliable communication network has not been established. Of primary concern to the brigade is the liaison

officer promotion of the corps air defense artillery brigade. The liaison officer must stress the early use of both the US Air Force and corps field artillery assets to destroy enemy aircraft stationed at enemy airfields. This destruction of aircraft serves to fight the deep battle for the corps air defene artillery brigade. The deep battle must be fought if the brigade is to provide continuous support to the corps.

The commander of the brigade is a key participant in contingency operations since he will probably be the senior Army air defense representative. (FM 44-100, p.4-3) As such, the leadership of the brigade must strive to facilitate the development of the theater. Therefore, the leaders of the brigade must bridge the gap between operational and tactical planning. Bridging this gap between tactical and operational planning can only be achieved by assuming the additional responsibility of serving as the Area Air Defense Command until theater level assets arrive. Therefore, during the initial stage of the conflict, the brigade will be establishing local air defense while simultaneously planning for the arrival of additional air defense units.

The responsibilities of the brigade during a contingency force operation can be evaluated by phases. The three primary phases are 1) lodgement phase, which involves the initial arrival of forces within country, 2) expansion phase, which involves the support of military operations, and 3) the final phase which involves the transition of the area from an unestablished to an established theater.

During the lodgement phase, units of the brigade provide low and medium altitude protection to the assembly areas. (FM 44-100, p.5-11) Stinger units can provide excellent protection during this stage. Additionally, Stinger sections are easier to deploy quickly than are Chaparral or Hawk platoons.

During the expansion phase, units of the brigade must accompany maneuver forces. (FM 44-100, p.5-11) Air defense systems must be highly mobile in order to stay up with their maneuvering counterparts. Therefore, Avenger and Chaparral units will be critically important during this stage. Logistic resupply is also important during this stage. Since the corps is still establishing its logistical infrastructure, air defenders must push for the resupply of their non-common ammunition requirements. Additionally, Hawk units are positioned to provide coverage for both the corps rear area and the maneuvering forces.

Once the brigade has successfully accomplished its missions during the first two phases, the operation will enter the termination phase. During the termination phase, the contingency operation develops into an area with the characteristics of an established theater. During this stage, the brigade integrate theater level air defense units such as Patriot and Hawk into the overall air defense plan.

Throughout the second and third phases of a contingency force operation, the brigade will be supporting the corps commander's scheme of maneuver. This support will require air defense for the corps' deep, close, and rear operations. This

support will involve the coordination with the US Air Force for deep operations, and between air defense artillery units for the close and rear battles.

To support the corps' deep operations, the brigade can shape the battlefield's third dimension. As stated earlier, if the brigade is integrated into the US Air Force's planning, they can shape the battlefield through the use of offensive counterair targeting. By articulating the air defense needs to the corps staff, the liaison officer shapes the battlefield by coordinating long range field artillery fires. The best targets for these long range fires are aircraft on the ground. "If the brigade commander successfully shapes the third dimension of the battlefield with OCA fires and other systems, threat attack options are reduced in number and scope." (FM 44-71 (DRAFT), p.4-5) The air defender decides, the intelligence network detects, and the field artillery or air delivers the ordnance. (FM 44-71 (DRAFT), p.1-2)

Support of covering forces, which provide security for the corps front lines, is also very critical. The brigade should properly augment these forces so that air defense artillery units can destroy enemy aircraft at the earliest possible time. Air defense forces located forward in the battle area also provide an established support base for future operations.

The brigade can support the corps close battle by augmenting the divisional air defense artillery battalion. The corps provides sufficient air defense fire power to ensure success in

the forward area of the battlefield. Additionally, the corps must weight the corps main effort to assure its freedom to maneuver. (FM 44-71 (DRAFT), p.1-4)

The brigade supports the corps rear battle by providing air defense for the corps logistical assets, and the corps main and rear command posts. The focus of air defense in the rear area is to protect the corp's ability to conduct current and future operations. (FM 44-71 (DRAFT), p.1-5)

The corps commander assigns missions to the air defense artillery units in terms of the supported unit and its relationship to the supporting units or the critical asset within an area that needs to be protected.

The brigade can expect to receive the four standard tactical missions which follow:

1. General Support. (GS) "An air defense unit with a GS mission provides support for the force as a whole. It is not committed to any specific element of the supported force." (FM 44-1, p.4-3)

2. General Support Reinforcing. (GSR) An air defense unit with this mission provides coverage for the force as a whole and augments the coverage of another air defense unit. Units with this mission are also not committed to any specific element of the force. (FM 44-1, p.4-3,4)

3. Reinforcing. (R) An air defense unit with this mission augments the coverage of another air defense unit that is committed to a specific element of the force. In this mission, both the reinforcing air defense unit and the reinforced unit are committed to a specific element of the force. (FM 44-1, p.4-4)

4. Direct Support. (DS) An air defense unit with this mission provides dedicated air defense coverage for a specific unit of the force that does not have assigned or attached air defense. The unit providing direct support is committed to that specific element of the force. (FM 44-1, p.4-4)

For example, the brigade will augment the divisional air defense artillery battalion with an air defense task force. The task force can provide reinforcing fires with Chaparral and Avenger fire units and general support reinforcing fires with Hawk Assault Fire Units. The brigade (-) elements will provide General Support fires to both the maneuver force and the corps rear area.

The specific command relationships and responsibilities formed by and inherent to the standard air defense missions are shown in Figure 5-7 which is located on the next page. (FM 44-1, p.4-3)

Figure 5-7 ADA Standard Tactical Missions

	GENERAL SUPPORT	GENERAL SUPPORT-REINFORCING	REINFORCING	DIRECT SUPPORT
Who establishes AB priorities?	The force commander.	1. The force commander. 2. The supported commander through the reinforced ADA commander.	The supported commander through the reinforced ADA commander.	The supported
Who locates the ADA unit?	The commander assigning the mission in coordination with the supported ground force commander.	The commander assigning the mission in coordination with the supported ground force commander.	The reinforced ADA commander in coordination with the supported ground force commander.	The DS ADA commander with approval of the local ground commander.
Who positions ADA fire units?	ADA fire unit commanders in coordination with the local ground force commander.	ADA fire unit commanders in coordination with the local reinforced ADA unit commander and the local ground force commander.	ADA fire unit commanders with approval of the reinforced ADA unit commander and the local ground force commander.	ADA fire unit commanders with the approval of the local ground commander.
With whom should liaison be established?	As required.	As required, but including the reinforced ADA commander.	As required, but including the reinforced ADA commander.	Supported unit commander.
With whom should communications be established?	As required.	As required, but including the reinforced ADA unit.	As required, but including the reinforced ADA unit.	Supported unit.
Where does the logistical support come from?	ADA unit.	ADA unit.	ADA unit.	ADA battalion commander coordinates for some classes of supply with the supported unit.

Notes:

1. The term "locating" specifies the establishment of a broad operating area (commonly, a "goose egg").

2. The term "positioning" specifies the selection of an exact point within the operating area. (Although not addressed in this chapter, the term "siting" specifies the placement of individual items of equipment on selected spots within the position.)

The maneuver commander must establish his priorities for air defense early in his decision making process. As he finalizes his courses of action and evaluates his assets, he must determine where air defense artillery is required. The commander of the unit providing air defense should make recommendations to the maneuver commander to determine air defense artillery's priorities by evaluating each asset for criticality, vulnerability, recuperability, and threat. However, the commander does not necessarily review each factor individually in developing air defense priorities. Depending on the situation,he may weigh some factors more than others. For example, an armored division may be so critical to the success of the corps that, despite its relatively low vulnerability, it would still require a high level of air defense. (FM 44-71 (DRAFT), p.3-21)

CRITICALITY

Criticality is the degree to which the asset is essential to mission accomplishment. Assets are categorized in priority as those which, if damaged, meet the following criteria:

- are capable of preventing the execution of the plan of action
- will cause immediate and serious interference with the execution of the plan of action
- can ultimately cause serious interference with the execution of the plan of action
- might cause limited interference with the execution of the plan of action (FM 44-1, p.4-7)

VULNERABILITY

Vulnerability is the degree to which the asset can survive on the battlefield. Factors considered are the asset's hardness, its specific mission in the overall operation, the asset's mobility, the assets ability to provide its own air defense, and the amount of protection afforded by passive air defense measures. (FM 44-1, p. 4-8)

RECUPERABILITY

"Recuperability is the degree to which the asset can recover from inflicted damage in terms of time, equipment, and available manpower to again perform its mission." (FM 44-1, p.4-8)

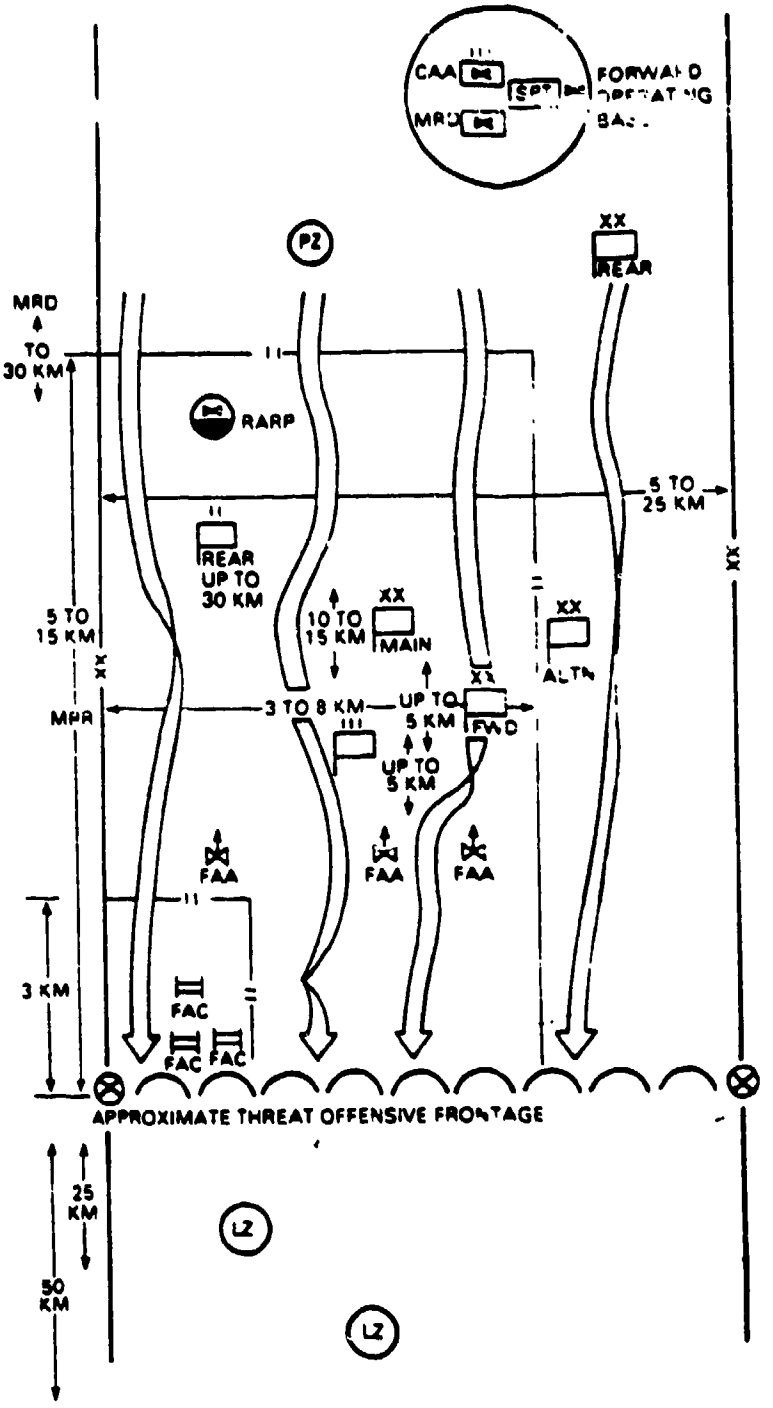
THREAT

The decision making process assesses the likelihood of the asset being attacked by enemy air. The brigade must evaluate current intelligence information, historical records, and enemy doctrine to properly establish a likely threat factor. (FM 44-1, p.4-8)

After this evaluation the brigade gives recommendations for air defense priorities to the maneuver commanders. Once the maneuver commander establishes his priorities, the liaison officer can make coordination with the US Air Force or corps field artillery units, if necessary.

The threat forces attacking a division or a corps area of operation will vary depending on the situation. Additionally, detailed studies which have determined the likely risk are CLASSIFIED and are not used in this discussion. However, the following illustration shows the likely air threat used by the Soviets or a Soviet surrogate. "The brigade fights air forces of the front, and augments divisional air defense artillery battalions to fight army helicopter regiments. (FM 44-71 (DRAFT), p.1-2) The doctrinal template illustrates a motorized rifle division conducting a main attack. I am not stating that this will always be the case, nor am I suggesting that Soviet surrogates or third world countries will deploy this way. My purpose is to illustrate the air threat in a worst case scenario. (FM 44-100, p.A-5)

Figure 5-8 Doctrinal Template Soviet Divisional Aviation



MRD CONDUCTING
CAA MAIN ATTACK

AIRCRAFT AVAILABLE

- 46 HIND D, E
- 26 HIP C
- 24 GENERAL PURPOSE HELICOPTERS
- UP TO 144 FIGHTER-BOMBERS
- UP TO 144 FIGHTERS
- UP TO 144 INTERCEPTORS

(IF DESIGNATED, FRONT MAIN EFFORT)

F. Conclusion.

The commander of the air defense artillery brigade must look at the overall requirements placed upon the brigade. I have identified two major requirements. The first requirement is to support the corps commander's intent, which equates to providing air defense support for his maneuver forces. The second requirement involves air defense coverage for the other critical assets within the corps.

The corps commander could assign the brigade a variety of missions. These may include support of a maneuver division, the armored cavalry regiment, supporting arms such as field artillery, or the logistical support base of the corps. However, the brigade and the divisional air defense artillery battalion are usually collectively tasked to support all of these missions simultaneously. To execute any of these missions properly, the brigade requires the capabilities of all of its air defense artillery weapon systems. Generally, the short range weapon systems are assigned to provide direct support air defense for certain assets and longer range systems provide reinforcing or general support coverage. I believe that the battlefield of the future demands we relook at this concept and employ our forces in a different manner.

The brigade must remember two critical points while orchestrating its air defense battle. The first point is the fluidity of the battlefield. All commanders must understand that major battles occur in all areas of the battlefield. Likewise,

all elements of the brigade must realize that we need to engage aircraft at all distances from anywhere on the battlefield. The second point is that the brigade must be defensive in name only. The brigade must extend its offensive capabilities. The best method to do this is to extend its capability to engage enemy aircraft at the earliest possible time. Movement of long range weapon systems forward would enable us to reach deeper into the enemy's area of operations to destroy enemy aircraft. Our engagement envelope must extend well into the corps area of interest and then become increasingly more lethal as enemy aircraft approach the corps area of operation.

To accomplish the two broad requirements previously described, the brigade must develop an air defense campaign plan. This plan must address means for the brigade to fight the air defense deep, close, and rear battles. This concept would have the air defense elements of the corps fighting their own deep, close, and rear battles while simultaneously fighting the corps' close battle.

1. Air defense artillery's deep battle

The corps air defense artillery brigade must fight a deep battle in order to support the corps commander's intent. My interpretation of the deep battle is not entirely dependent upon the longer range air defense artillery systems. Rather, the air defense artillery's deep battle is fought by using offensive counter air strikes from the U.S. Air Force and the corps' field artillery to destroy enemy helicopters staging areas within their

range. Deep battle is defined as "activities directed against enemy forces not in contact designed to influence the conditions in which future close operations will be conducted." (FM 100-5, p.19) Therefore, I interpret the deep battle as the destruction of aircraft prior to their departure from enemy airfields. The corps by necessity must use its assets to fight the deep battle for its own air defense artillery brigade.

The brigade must orchestrate the use of corps assets by placing a strong emphasis on the liaison between the corps air defense artillery brigade and the units providing the long range fires. The commander of the brigade must send a quality officer to ensure that the desired missions of the air defense artillery are heard and acted upon. Therefore, the brigade must expand the role of the air defense artillery liaison officer with the US Air Force.

In addition to passing along target information to the US Army's air defense units, he must also become directly involved with the target identification of locations which contain enemy aircraft. "Counter air operations are planned in a vacuum without the expertise of the air defense office...In reality, the ADO is brought in only after the plan is formalized placing him in a reactive mode." (CALL, J00135) To correct this deficiency, the liaison officer must understand that his job is to ensure that the US Air Force understands the long term consequences of not engaging these targeted airfields. Likewise, the corps air defense artillery brigade's representative at corps must stress to the corps commander the importance of using long range field

artillery fires against enemy helicopter sites within range of their weapon systems. (FM 44-71 (DRAFT), p.4-2) Paramount in this mission, is the liaison officer's ability to articulate the air defense artillery units' inability to handle the full weapons capabilities of the enemy forces. Therefore, the success of the maneuver battle is critically dependent upon the air defense artillery's ability to use long range fires in its air defense deep battle.

2. Air defense artillery's close battle

Inherent in a discusssion of the close battle, is the understanding that the corps air defense artillery brigade must reinforce the divisional air defense battalion and air defense artillery units operating within the forward elements of the corps. The divisional air defense artillery battalion does not have enough organic fire support to support both the maneuver forces and the critical assets of the division satisfactorily. During a CMTC rotation, observers/controllers identified this need for air defense coverage, "The ACR, as currently authorized, has insufficient air defense assets to meet its requirements...The ACR needs additional air defense assets that it can habitually train with." (CALL, 390156) Additionally, "the battalion commander feels that the ADA umbrella would not protect his unit." (CALL, 350099) Consequently, the commander of the brigade must accept this requirement to reinforce the division

and ACR as an essential task. A better solution for the ACR would be to change their MTOE. However, until the change has occured, the brigade should reinforce the ACR.

In order to fight the close battle, I propose that the air defense artiller, brigade make task forces from its own air defense assets. (FM 44-71 (DRAFT), p.4-3) The air defense artillery brigade should task organize one platoon (assault fire unit) from the Hawk battalion, one platoon of Chaparrals, and one Avenger platoon into a task force. The Hawk assault fire unit will provide long range coverage which will increase the chances of intercepting aircraft prior to their entering the divisional area of operations. Chaparrals will provide reliable air defense for the critical assets within the div sion such as command posts and logistical structures. For an immediate response for air defense, Avenger units will provide a highly mobile air defense system. For example, if a maneuver unit receive's a new mission that requires additional air defense, Avengers can respond very quickly. However, the wheeled Avenger system is not capable of maintaing the speed of tracked vehicles. Therefore, the Avengers could take over the duties of the rear of the division during the movement phase.

The development of air defense task forces would increase the maneuver forces by providing complete air defense coverage throughout the corps area of operations. The forward deployment of long range air defense weapon systems will also provide much flexibility for the corps commander since air defense weapon systems located throughout the battlefield will allow for support

of any newly designated main effort. Air defense coverage for exploitation operations will be immmediately available. (FM 44-71 (DRAFT), p.5-6)

The deployment of air defense task forces will increase the brigade's lethality of air defense coverage throughout the corps area of operations. The development of task forces will promote a habitual relationship between all of the weapon systems assigned to the brigade.

There are also other benefits from the development of these task forces. The first is that cost effectiveness will be increased since the long range acquisition radars of the Hawk weapon system will provide timely early warning to the other air defense weapon systems. This integration of corps and divisional units in not a new concept and has been successfully accomplished both at the NTC and within air defense artillery brigades during field exercises. "The ADA battalion staff experienced no problems in absorbing the corps augmentation and integrating it into the overall air defense plan." (CALL, 000190)

The passage of early warning is still a difficult problem. "Without a doubt, the most common air defense observation at the NTC is ineffective early warning." (CALL, 040051) The development of air defense task forces whose weapon systems routinely work together might be the first step in solving this problem. The air defense task force will help eliminate observations such as this one taken during a CMTC rotation, "The USAREUR I-HAWK battalion supporting the corps did not effectively

interface with the division...They do not interface with divisions except in Reforger exercises. They need to work with divisions in all CPX's and FTX's." (CALL, 000053)

Therefore, I believe that the use of the task force would push the development of a better early warning method. To facilitate the passage of information, the headquarters of the task force commander will be using both electronic and manual methods for the passage of information between air defense units. Liaison officers will be used to pass information from the Hawk unit to the Chaparral and Avenger units via the Manual Shorad Control System. In addition to better early warning, the tendency for different air defense systems to engage the same aircraft might be reduced by the liaison officer providing direct target tracking data to the FAADS units.

The passage of early warning is usually complicated by the distribution of communication frequencies. The early warning net at division level is sometimes used for other reasons due to communication priorities being placed in other areas. Therefore, the air defense artillery task force would be able to designate one of its own frequencies for an early warning net which operates seperate from the divisicnal early warning net.

Another benefit of the air defense artillery task force is better airbattle management. The airbattle management dilemma will be reduced since liaison officers will be able to quickly pass along any new airspace control measures. "The divisional battalion was unable to instantly respond to theater changes in weapons control status." (CALL, 000053) The ability to better

use airspace control measures will also contribute to the flexibility of the corps commander and will reduce the tendency for fratricide.

Another benefit of air defense task forces is that all air defenders in the brigade will gain a better appreciation for all of our weapon systems by being cross trained on all systems found within the brigade. This cross training will have beneficial effects on both the battlefield and the development of our branch. The capabilities of the brigade as well as the individual proficiency of the leaders within the task force will be drastically improved as a result of the air defense task force. The leaders will develop their proficiency by serving as both platoon leaders of selected weapon systems and liaison officers. By serving as liaison officers, the officers will work directly with the other weapon systems. Therfore, these liaison officers as well as the brigade and battalion staff officers will gain an appreciation for the entire air defense network.

The air defense artillery task force will also increase the responsiveness of the brigade. The commander of divisional air defense units will no longer have to wait for corps to supplement its organic firepower since each division will already have an air defense artillery task force. Therefore, air defense artillery will be immediately available for any new maneuver that the corps commander directs.

Increased mobility of weapon systems enhances survivability. Additional weapon systems, which are also suporting a manuever force, can provide air defense coverage while the other air defense units moved, thereby, enhancing mobility.

This thesis cannot address the infinite number of missions and requirements placed upon the corps and division air defense artillery. However, I believe that the brigade has enough weapon systems to supplement the divisions and still provide coverage for the remainder of the corps assets. If we are supporting two maneuver divisions and a corps reserve, we will have enough air defense artillery units remaining to provide adequate air defense coverage for the remaining elements such as the COSCOM, the other supporting arms, command posts, and any other critical assets. The development of these task forces will reduce the need to drastically "weight" the main effort with air defense coverage. If the brigade task organized its assets into task forces, the manuever units as well as the static rear area assets will have adequate air defense.

3. Air defense artillery's rear battle.

I do not see much difference between the close and the rear battle. With the exception of the corps' reserve, the only difference is that the assets that we are defending in the corps' rear area will not be as mobile as the maneuver units located within the division. However, we must realize that air defense is providing coverage for the elements that support the long term

goals of the corps. The enemy will be constantly attempting to destroy the logistical support structure and the command posts of the corps. "The exercise pointed out a total lack of Tac Air, Helicopter Gunship, artillery, mortars, ADA, or radar to support RACO." (CALL, 000050) Therefore, commanders within the air defense artillery brigade must educate their soldiers and overcome the mind set that only forward troops will be actively involved in battles. Air defenders who operate in the corps rear area must realize that they will also be engaging enemy aircraft and fighting ground maneuver forces who are attempting to destroy their air defense artillery sites.

4. Employment Principles and Guidelines

My proposal supports the employment principles I discussed earlier in this chapter. Having a complete air defense network directly supporting the maneuver units will definitely enhance mass by increasing the amount of air defense systems providing air defense coverage. Having both long and short range weapon systems responding to the immediate threat enhances mix. Improving the air defense artillery unit's ability to move on the battlefield while other air defenders provide air defense enhances mobility. Having one primary command and control net for a task force enhances integration among air defense weapon systems.

It also support the employment guidelines I discussed earlier in the chapter. I fully realize that some of the employment guidelines refer to the emplacement of individual

weapon system in relation to each other; for example, the emplacement of four squads of Chaparrals. However, I am looking at this from a broader perspective. I am reviewing this at the air defense network level. Having a long range weapon systems which are capable of reaching far past the division's area of operations enhances balanced fires. These long range fires in conjunction with Chaparrals and Avengers provide equal defensive fire in all directions. Having enough air defense units to strongly reinforce the likely air avenues of approach achieves weighted coverage. Additionally, the early warning from the Hawk acquisition radars enhances the early warning capabilities for the task force. Having all types of weapon systems operating throughout the corps area mutual support. The task force headquarters achieves overlapping fires by placing their weapon systems in the best possible locations to provide the best possible air defense coverage. Additionally, the long range capabilities of the Hawk weapon system in the division area also strongly enhances the air defense engagement envelope. Using the Hawk missile system to extend offensive capabilities greatly enhances early engagement. The task force provides a complete air defense network at the corps and division level and provides for defense in depth. Therfore, every element on the battlefield would have sufficient air defense coverage.

In conclusion, the corps air defense artillery brigade must develop an air defense campaign to fight the air defense deep, close, and rear battles. The brigade's use of liaison officers at the corps and task force level is required to fight the

brigade's plan. I emphasized that liaison officers must stress the importance of using corps level assets to fight the brigade's deep battle. Air defense task forces are used to fight the close and rear battles. The use of task forces improves both the air defense coverage for the corps and the integration between air defense artillery units. The task forces also supports fluidity and an offensive focus for the air defense artillery. Therefore, a strong liaison program and the doctrinal use of air defense task forces enables the air defense artillery to respond quickly to changes in air defense priorities and to nullify the enemy air threat anywhere on the non-linear battlefield.

CHAPTER VI CONCLUSIONS AND RECOMMENDATIONS

The primary objective of this research was to determine the role of the corps air defense artillery brigade. Inherent in this research is an understanding of the major reasons for the development of the brigade. The first reason was to close the gap between the well established theater network and the limited divisional air defense artillery assets. The second reason was the desire to extend the offensive capabilities of air defense artillery.

Therefore, the basic research question is as follows: What is the role of the corps air defense artillery brigade in support of corps and division operations, in view of the numerous corps missions and the need to reinforce the divisional air defense artillery element? In view of the currently developing role of the US Army as a contingency force, I restricted the analysis to a corps air defense artillery brigade serving as part of a contingency force responding to a threat in a regional conflict.

The corps air defense artillery brigade assumes many responsibilities in its role as a contingency force. First, the corps air defense artillery brigade is responsible for

establishing a joint air defense network in an unestablished theater. Second, the brigade must develop an air defense campaign plan that supports the corps commander's intent.

The establishment of a joint air defense network requires intensive coordination with the U.S. Air Force, since both the U.S. Air Force and the brigade perform air defense missions. Therefore, liaison between the U.S. Air Force and the brigade is the catalyst for an effective joint air defense network.

The liaison officer representing the corps air defense artillery brigade plays an instrumental role. The liaison officer must become intimately involved in the corps decision making process. In particular, the liaison officer must articulate the need for the corps commander to use his U.S. Air Force and long range artillery assets to destroy enemy aircraft, which are located on enemy airfields. The Soviets have the capability of massing state of the art airframes against the brigade. They will be simultaneously attacking all areas of the battlefield. Since the brigade is incapable of destroying all of the potential enemy aircraft, the effectiveness of the brigade is dependent upon the destruction of many enemy aircraft before they are airborne. Therefore, the liaison officer must be capable of representing the needs of the brigade to the corps staff and commander. The mission of the liaison officer is to convince the corps commander and staff to use corps assets in support of the corps air defense artillery brigade.

The air defense campaign plan must determine two critcal points. First, the brigade must determine the optimum method of fighting the air defense deep and close/rear battles. Second, the brigade must determine the best method to achieve synchronization of air defense artillery firepower across the corps area of operations.

As stated earlier, the corps air defense artillery brigade should fight the air defense artillery deep battle by destroying enemy aircraft on the ground through the use of U.S. Air Force and long range field artillery firepower. The brigade should fight the close/rear battles by task organizing its elements into air defense task forces. These task forces should be composed of one Hawk assault fire unit, one platoon of Chaparrals, and one platoon of Avengers.

The use of task forces will significantly assist in the synchronization of air defense firepower by having an entire air defense network providing air defense of a critical asset or maneuver force. Additionally, the air defense task force fully supports the air defense employment principles and guidelines.

In addition to improving synchronization, the forward deployment of our weapon systems is necessary to extend the air defense artillery brigade's offensive capabilities. The forward deployment is mandatory for the brigade to engage aircraft deep within the corps' area of interest as opposed to the corps' area of operations. Additionally, the forward deployment of air

defense assets will also assist the corps commander by having air defense artillery positioned to support any exploitation operations.

The development of air defense task forces is beneficial for other reasons. First, if the doctrine of the US Army evolves to the employment of several independent brigades, then the use of air defense task forces will be imperative. Second, air defense task forces will expose air defense artillery officers to many different weapon systems. This exposure might reduce the tendency for air defenders to classify themselves as HIMAD or FAADS. Third, soldiers who routinely operate within an air defense task force might develop an answer to the difficult early warning problem between HIMAD and FAADS air defense elements.

This thesis also attempts to fill the gap in literature by providing some guidelines for the development of doctrine for the employment of the corps air defense artillery brigade. I recommend that doctrine analysis focus on a joint service fought deep battle, and the standard use of air defense task forces. Currently, our doctrine states that we should become involved in the offensive counter air planning of the U.S. Air Force. However, I do not believe that doctrine truly stresses this involvement. Therefore, I recommend that the corps air defense artillery brigade emphasize the deep battle as part of its decision making process. Additionally, I recommend the standard use of air defense task forces. The use of task forces truly enables the brigade to support the corps both in current and future battles better.

Certain areas of the role of the corps air defense artillery brigade need further study. First, the particular requirements for liaison with the U.S. Air Force and the field artillery need review and refinement. Second, development of a better early warning system from HIMAD to FAADS weapon systems.

In conclusion, the Airland Battle Future study stated that "we must make our forces more agile." (p.6) I believe that the use of air defense task forces provides flexibility to the corps air defense artillery brigade and is the key to the corps ability to meet the enemy threat. Additionally, the study also stated that "a strong, simple concept of command must be developed to enable rapid decision making and issuance of orders." (p.6) The air defense task force fully supports this tasking. Considering the third dimension of modern warfare, the corps air defense artillery brigade is destined to play an important role in the future battlefield.

GLOSSARY

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Acronyms and Abbreviations

AAA - Antiaircraft artillery

AADCOM - Army air defense command

AADC - Area air defense commander

ACA - Airspace control authority

ACR - Armored Cavalry Regiment

ADW - Air Defense Warning

ATAF -Allied tactical air force

ALB - Air Land Battle

A2C2 - Army airspace command and control

BDZ - Base defense zone

CGSC - Command and General Staff College

CMTC - Combined Maneuver Training Center

CONUS - Continental United States

CPX - Command Post Exercise

CRC - Control and reporting center

DA - Department of the Army

DCA - Defensive Counter Air

DCSOPS - Deputy Chief of Staff for Operations

(DS) - Direct support mission

FA - Frontal Aviation. (Frontovaya Aviatsiya)

FAADS - Forward Area Air Defense System

FDC - Fire direction center

FM - Field Manual

FTX - Field Training Exercise

(GS) - General Support mission

(GSR) - General Support Reinforcing mission

HIDACZ - High-density airspace control zone

HIMAD - High/medium air defense

IFF - Identification, friend or foe

LRA - Soviet Long range aviation (Dal'nyaya Aviatsiya)

LLTR - Low level transit route

MRR - Minimum Risk Route

MTOE - Modified Tables of Organization and Equipment

NATO - North Atlantic Treaty Organization

NTC - National Training Center

OCA - Offensive Counterair

(R) - Reinforcing mission

RACO - Rear Area Combat Operations

ROZ - Restricted Operations Zone

SAM - Surface to Air Missiles

SHORAD - Short range air defense

TA - Transport Aviation. (Voyenno-Transportnaya Aviatsiaya)

TAA - Total Army Analysis

TACS - Tactical Air Control System

TOE - Tables of Organization and Equipment

USAADASCH - United States Army Air Defense Artillery School

WCS - Weapons Control Status

WFZ - Weapons Free Zone

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