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ARMY ATTACK HELICOPTERS:

CAN THEY SURVIVE ON THE AIRLAND BATTLEFIELD?

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 ARTS AND SCIENCE

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## 19. ABSTRACT

ARMY ATTACK HELICOPTERS: CAN THEY SURVIVE ON THE AIRLAND BATTLEFIELD; by Major Richard L. Throckmorton, USA, 131 pages.

Both the United States, the Soviet Union and their respective allies have placed a great emphasis on Armored and Mechanized formations as the key to winning a major conflict on a modern battlefield. It is a well recognized fact that the Soviet Union and her Warsaw Pact Allies have a great numerical superiority over the US and NATO forces in these types of equipment. The delay, disruption, and/or destruction of these armored forces has consequently become a paramount concern to US operational planners. The attack helicopter has shown itself to be a formidable force against mechanized forces in war games and operational tests conducted by both the East and the West.

First, this thesis traces the historical development of the attack helicopter and looks at recent military conflicts where it has been used as an effective offensive weapon. From these conflicts, an analysis of both the efficacy and the shortcomings of the attack helicopter as a weapon system has been performed.

Secondly, the thesis examines US attack helicopter doctrine as it might be employed against Soviet and/or Soviet type forces in the context on Soviet ground and air defense systems, which are recognized to be qualitatively and quantitatively superior to those of the US. The examination of Soviet air defenses against helicopters raises many questions as to whether or not US attack helicopters can survive on the modern AirLand Battlefield.

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# ABSTRACT

ARMY ATTACK HELICOPTERS: CAN THEY SURVIVE ON THE AIRLAND BATTLEFIELD; by Major Richard L. Throckmorton, USA, 131 pages.

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Secondly, the thesis examines US attack helicopter doctrine as it might be employed against Soviet and/or Soviet type forces in the context on Soviet ground and air defense systems, which are recognized to be qualitatively and quantitatively superior to those of the US. The examination of Soviet air defenses against helicopters raises many questions as to whether or not US attack helicopters can survive on the modern AirLand Battlefield.



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## CHAPTER ONE

### Introduction

One of the nation's foremost aviation magazines<sup>1</sup> describes a growing problem area for the US Armed Forces.

U.S. and Western European combat helicopter crews fighting on future battlefields will face an integrated and sophisticated network of Soviet air defenses.....These will include artillery, surface-to-air missiles, close air support fighters, a hostile electronic warfare environment and nuclear, biological or chemical weapons.

The deep battle concept of the Army's AirLand Battle doctrine supports the commander's scheme of maneuver by disrupting the enemy's forces in depth. Attack helicopters are well suited for this mission because of their mobility and firepower. According to US Army Field Manual 100-5, attack helicopters and their crews may be required to operate deep behind the friendly forward line of troops (FLOT). Many of these operations will require the attack helicopter to operate without supporting fires other than those from like units. As the Soviets and their Warsaw Pact Allies manage their air defense systems along a defense-in-depth doctrine, concern has emerged as to whether or not US attack helicopters can survive on a modern AirLand Battlefield against<sup>2</sup> sophisticated ground and air antiaircraft defenses.

The Soviets have at their disposal a formidable array of forward and rear area air defense weapons systems, including a new family of helicopters that has as either a

primary or secondary mission the air-to-air interception of attack helicopters. Some of the Soviet helicopters are designed to seek, acquire and destroy US attack helicopters before they can accomplish their mission.

Significance of the Study:

The attack helicopter is one of the most versatile weapons systems currently available to a division commander with which he can conduct deep battle operations. While the division commander has some long range artillery assets, a portion of allotted Air Force air interdiction assets, and electronic warfare equipment, he can most effectively influence deep battle operations with an air asset that is directly under his control, immediately responsive to his command and capable of changing its intended target and mission once launched. Additionally, attack helicopters are valuable tools which corps commanders will use to influence future operations, commonly called the "next battle". The Commander's ability to influence the battle through interdiction and destruction of Soviet forces will be greatly hampered, if the attack helicopter itself, or its employment doctrine, is lacking a solid basis in tactics, techniques or technical design.

The Soviets have a growing ability to counter presently fielded US attack helicopters and are now equipping some units with a new generation of attack

helicopter with an exclusive air-to-air mission. These facts require us to take a close look at our attack helicopters to see whether we can discern the survivability and efficacy of the aircraft. Field Manual 1-100, Combat<sup>3</sup> Aviation Operations states the imperative of this question:

As the effectiveness of our helicopters has improved, the Threat has placed more emphasis on their destruction. Attack helicopters may have no air defense protection except their organic weapons systems. Such occasions should cause no role and mission conflicts, for every battlefield participant has the inherent right of self-defense. When opponents meet on the battlefield, regardless of the nature of their vehicles or armament, combat is the logical result. The victor will be the one who is psychologically prepared, properly trained, most suitably equipped, and first to see the enemy.

#### Purpose of the Study

The primary purpose of this thesis is to study the historical basis that establishes the underlying need for attack helicopters. Secondly, assuming that the need is well established, an investigation of the aircraft's performance and survivability under combat conditions is required. As such, this thesis reviewed major armed conflicts where the attack helicopter was used in a significant manner and also where significant antiaircraft defenses were present. Lastly, a review of the current Soviet air defense employment doctrine was undertaken. A study of their tactics, equipment and doctrine that would be

used primarily against helicopters was emphasized during the project.

Areas that were investigated include:

1. The historical development of attack helicopters was researched to discover their underlying military need, if any.

2. The extensive use of attack helicopters by the US in the Vietnam war was watched carefully by many nations. The Soviet Union, especially, noted the aircraft's abilities and shortcomings. The Airmobility concept, with its concomitant requirement for armed helicopters, was developed by the US and copied by other countries.

3. Recent armed conflicts around the world that employed helicopters were studied for trends in tactics, techniques and technological developments.

4. Soviet ground-to-air and air-to-air defense systems were studied. Specific anti-helicopter systems and tactics were investigated to determine the level of the threat facing attack helicopter crews.

#### Assumptions

1. AirLand Battle Doctrine will not change significantly in the next decade.

2. Soviet air defense systems will continue to be quantitatively superior and qualitatively equal to friendly systems.

3. Attack helicopters will remain an integral and important element of combat power for the foreseeable future.

4. US helicopter air-to-air self defense capability will be fielded in the very near future.

5. Soviet helicopter air-to-air systems are in fact presently fielded.

#### Definition of Terms and Concepts:

A glossary of terms, abbreviations and notes will be appended to the end of the thesis. However, a few concepts should be explained immediately to enhance the readers' understanding of the subject material.

Deep operations, or deep battle as it is often called, is adequately explained in Field Manual 100-5,  
4  
Operations:

Deep operations at any echelon comprise activities directed against enemy forces not in contact designed to influence the conditions in which future operations will be conducted. At the operational level, deep operations include efforts to isolate current battles and to influence where, when, and against whom future battles will be fought. At the tactical level, deep operations are designed to shape the battlefield to assure advantage in subsequent engagements. At both levels, successful deep operations create the conditions for future victory.

A functional understanding of the deep battle concept is mandatory in order to understand the next concept, that of cross-FLOT operations. Firstly, FLOT is an acronym for forward line of own troops and is defined as "a line that

indicates the most forward positions of friendly forces in any kind of military operation at a specific time.<sup>5</sup> Cross-FLOT operations simply refer to any military operation that is conducted beyond the FLOT, on the enemy side of the battle area. In the context of attack helicopter operations, cross-FLOT operations may be conducted while still within range of supporting arms, such as artillery, electronic warfare, etc., or may be conducted beyond the range of supporting arms. This thesis will concentrate its discussion on this later area.

Another important term is that of "combat multiplier". Again quoting Field Manual 101-5-5, a combat multiplier is any "supporting and subsidiary means that significantly increase the relative combat strength of a force while actual force ratios remain constant".<sup>6</sup>

#### Limitations:

This thesis will be limited to the study of recent examples of helicopter operations against significant air defense systems. There are several recent historical instances of the employment of attack helicopters in mid or high intensity warfare, where both sides used heavy and integrated air defense networks. The US also conducted assault and attack helicopter operations against the North Vietnamese Army during the later stages of the Vietnam War, in which the enemy employed air defenses in great numbers

and in great depth, consisting of ground-to-air missiles, radar guided guns, shoulder fired missiles and heavy machine guns. A specific example--Lam Son 719--has been analyzed from the US historical perspective. Some of the lessons learned can be projected to the AirLand Battle scenario.

The British employed helicopters against the Argentines in the Falklands and actually lost helicopters to air-to-air operations. Those operations have been investigated for useful information and results as to the effectiveness of both the helicopters and the air defense systems employed.

During the Arab-Israeli "Yom Kippur" war, the combatants were quick to learn that their helicopter tactics were unsuited to the type of warfare being conducted. Some helicopters were initially flown at 3,500 feet enroute to the battle area. These were easily destroyed by both ground fire and by air-to-air interception.

Further, the current Iran-Iraq war has been analyzed for information on the ability of attack helicopters to survive against mainly small arms ground fire. Semi-western tactics on the Iranian side is pitted against the Soviet supported and trained Iraqi forces. Helicopters have been used against armor, troops and other helicopters in that conflict.

Analysis of Soviet attack helicopter operations against the Afghanis has provided insight into their

helicopter employment doctrine and has yielded information useful for consideration. Even though this war may be considered to be of limited intensity, the Afghans have shown themselves to be adept at anti-helicopter operations, using heavy machineguns on the one hand, and man portable air defense (MANPAD) missiles on the other.

Finally, the Chapter Four section on air-to-air operations will be limited to helicopter against helicopter, rather than including jet attack aircraft against helicopters.

#### Delimitations:

The thesis examines the historical development of the attack helicopter from its first introduction to combat operations in Vietnam in the late 1960's, and analyzes its employment, survivability and effectiveness.

Current and evolving US doctrinal analysis will be limited to the AH-1 "Cobra" and AH-64 "Apache" attack helicopters in the context of the AirLand Battle. This study will not investigate the technical aspects of the on board weaponry that is presently in service, such as whether or not the TOW or HELLFIRE missiles are adequate for the missions. Rather, the scope of the thesis will concentrate on the tactical rather than the technical. For clarification, some technical information may be presented within the context of the various chapters.

A further delimitation will be that this study will concentrate on the European battlefield scenario, with the forces of the Soviet Union and their Warsaw Pact Allies. This is necessary to limit the scope of the study and to insure its applicability to the missions that are currently assigned to present day US attack helicopters.

A final delimitation is that this study will concentrate on the mid- and high-intensity battlefield, as opposed to low-intensity conflicts (LIC). This purpose is two-fold. First, little information on attack helicopter operations in LIC conditions, other than the Vietnam War, is available. Second, lessons learned data that is available on LIC operations do not lend itself to a positive transfer to mid- or high-intensity operations.

## CHAPTER ONE ENDNOTES

1.           . "Rotorcraft Gains Will Increase Soviet Threat", Aviation Week & Space Technology (January 14, 1985), p: 63.
2. Edward J. Bavaro. "Running the Gauntlet", Army Aviation Digest, (October, 1986), p: 30.
3. US Army. FM 1-100, Combat Aviation Operations, (September 1984), p: 36.
4. US Army. FM 100-5, Operations, (May, 1986), p:19.
5. US Army. FM 101-5-1, Operational Terms and Symbols, (October, 1985), p: 1-34.
6. Ibid., p: 1-16.

## CHAPTER TWO

### Review of Literature:

#### BOOKS

Many books have been written on the development of the helicopter. The evolution of the attack helicopter, as a fairly recent phenomenon, has been aptly described in only a few instances. Its initial beginnings during the Korean War were graphically described by Lynn Montross in Cavalry of the Sky. This book takes the reader through helicopter combat actions of the early 1950's. Helicopters were primarily used for transportation, especially over the rugged terrain features found on the Korean peninsula. As the helicopter was still in its infancy, there were few chances for it to be used in an offensive role. Extremely underpowered, the helicopter could barely carry its own weight and was not capable of carrying any large amount of ordnance. Aerodynamic stability was also a problem. Yet Mr. Montross tells of many attempts by the pilots in improvisation. The hostilities ended before sufficient numbers of helicopters could be produced to allow innovations that would eventually lead to a helicopter with an exclusively offensive mission.

Lieutenant General (LTG) John Tolson was an excellent source for details on the US Army's programs to develop the Airmobility concept. His informative book, Airmobility 1961-1973, written under the auspices of the Department of

the Army studies on the Vietnam conflict, portrayed the decision cycles taken by the Army in developing the Airmobile tactics that are in use today. The need for a dedicated armed helicopter, as it was then called, was soon apparent. LTG Tolson was involved in many of the early decisions that gave birth to the attack helicopter. His book covers the two most important Army fact finding commissions -- the Rogers Board and the Howze Board -- that outlined the initial force structure and equipment requirements for the US Army's Airmobile and attack helicopter programs.

The various Arab-Israeli wars have been covered extensively by literally hundreds of authors. Gleaning information from those books relative to helicopter operations was not particularly easy. However, COL T.N. Dupuy, in his book Elusive Victory, covered the air operations in sufficient detail to verify other sources. As this was a conflict that lasted for only 19 battle days, there are several complete chronological records. Unfortunately, both sides in the conflict had strong reasons for withholding detailed information on air losses. The Israeli side did not want the Arabs to know just how much damage was sustained and therefore they tended to understate their true losses. On the other hand, the Arabs tended to overstate their claims for numbers of aircraft destroyed.

Chaim Herzog's The Arab-Israeli Wars, War and Peace in the Middle East, was also useful for sorting out the conflicting information. His descriptions of the tank battles, supported by helicopters, artillery and tactical aviation give the reader a true glimpse of the destructive capabilities of modern armored warfare. This description could be a pure microcosm of a much larger US and Soviet AirLand Battle conflict. Finally, Frank Aker's book, October, 1973--The Arab-Israeli War, had an excellent chapter entitled "War in the Air". This chapter devoted a great deal of information on the Egyptian air defense force, its composition, effectiveness and also its shortcomings. Further information was presented on the Israeli air defense system, which was neglected by the other authors.

Of the several books available on the Falkland Islands conflict, two were extremely well written and provided enormous information, to include the names of the pilots on both sides. The authors of the book, Air War South Atlantic, visited both Argentina and Great Britain and obtained detailed firsthand accounts of the battle action. In this manner, they were able to reconcile conflicting claims and the result is a very detailed analysis. In the book The Battle for the Falklands, the authors include details of air action given by ground observers on both sides, but contains a great deal of minutia. A thorough

reading will give one all there is to know about this short term conflict.

US Army Field Manuals have been an important source of material. These manuals outline in great detail the missions allotted to the attack helicopter, the methods to be used to actually fight the enemy, and describe the helicopter as an important component of the combined arms team. There are two keystone manuals.

First, FM 1-100, Combat Aviation Operations, describes the roles and functions of Army aviation and how aviation is organized to fight opposing forces. It covers aviation command and control, the battlefield environment, combat operations, and aviation offensive and defensive operations. It is not one of the US Army's "how-to-fight" manuals, but it is an authoritative source on the US Army's aviation organizational structure. Shortcomings in the Field Manual are that there are only a few paragraphs devoted to attack helicopter operations, and only one paragraph on helicopter air-to-air combat. The Field Manual is an absolute necessity to begin the study, as it outlines the roles and functions of US Army aviation in the context of AirLand Battle.

Secondly, FM 17-50, Attack Helicopter Operations, is an Army "how-to-fight" manual. This manual states directly that attack helicopter units are "combat maneuver elements organized primarily to destroy armored forces".<sup>4</sup> While this

manual is less than three years old, it does not consider the Advanced Attack Helicopter, the AH-64, therefore its chapters on deep attack and suppression of enemy air defenses (SEAD) are somewhat lacking. This manual indirectly recognizes the problems attack helicopters have against enemy air defenses and relegates the SEAD role for them to be "complementary J-SEAD" (joint-suppression of enemy air defense).<sup>5</sup> Engagements in self defense and attacks against targets of opportunity fall within complementary J-SEAD. This manual fails to describe attack tactics that would be necessary for an attack helicopter to survive against concentrated enemy air defenses. The Army's newest series of manuals with large sections devoted to attack helicopters are FM 1-111, Aviation Brigade, FM 1-112, Attack Helicopter Battalion, and FM 1-107, Air-to-Air Combat. These manuals are the latest doctrinal information available, and all fit very nicely into the imperatives and principles of war as outlined in FM 100-5, Operations. A major shortcoming of these manuals is that the question of attack priority of targets has still not been answered. The manuals espouse the theory that attack helicopters are mission oriented towards enemy armored and mechanized vehicles, command and control vehicles and the like. The direct attack against the attack helicopters' largest threat -- enemy air defense systems -- is still considered on the basis of "chance encounters".

## PERIODICALS

Due to the dynamic nature of this subject, coupled with the fact that the attack helicopters have not yet seen battle against the Soviets, much of the current information available is found only in periodicals. Mr. Ed Bravaro, of the US Army Aviation Center, Fort Rucker, Alabama, is the author of numerous articles in the US Army Aviation Digest. His October, 1986 article, "Running the Cauntlet", provides an excellent example of the Soviet "defense-in-depth" air defense employment doctrine that an attack helicopter unit can expect to find on the battlefield.<sup>6</sup> In a January, 1986<sup>7</sup> article, Mr. Bavaro speaks of an "operational window", where attack helicopters can operate with relative safety, due to their greater weapons standoff range capability. The Soviets recognize the existence of this operational window and are actively pursuing means to close it.

Many articles written by Soviet officers prove Mr. Bavaro's contention that the capabilities of US attack helicopters continue to be a major area of concern for the Soviets. An article appearing in the Soviet Military Herald<sup>8</sup> is descriptive:

When organizing an air defense system for motorized rifle, tank and artillery subunits, it should be borne in mind that a small group of helicopters is capable, during just one attack, of knocking a tank element out of action....

While they generally express conviction that the Soviet air defense umbrella is not impenetrable, the officers state

that the air defense forces are capable of interdicting any aircraft that comes within the air defense area of interest. Colonel Ivan Polyakov, USSR, writes on "Antihelicopter Warfare", in the Soviet Military Review, that while attack helicopters present a target profile of only one-half that of a fixed wing aircraft, they can still be engaged and destroyed when one makes "combined use of various types of antiaircraft complexes".<sup>9</sup> The Soviet articles are further interesting because the confidence of the writers is evident in the articles.

#### Methodology:

The methodology used in this study is historical analysis. As previously mentioned, historical research was conducted on the development of the attack helicopter. This historical analysis looked briefly at the evolution of the aircraft from its early beginnings to its latest technological advances of today. The US Army's helicopter experience in the battle of Lam Son 719, which was a mid-intensity conflict, was researched for trends. This battle was fought against a conventional Soviet style air defense system. The helicopters' performance over that period has been debated for many years.

Further, a descriptive method was used to present attack helicopter operations in today's context of AirLand Battle doctrine. The capabilities of Soviet air defense

systems, with particular emphasis on antihelicopter techniques, has been reviewed. Descriptive analysis, based on historical data, is used to research the weaknesses in the Soviet system and attempts to determine whether or not US attack helicopters can use their strengths against those weaknesses?

Chapter One is a definition of the problem central to the study. Its significance is discussed, along with a few key definitions.

Chapter Two is a detailed review of literature of the primary sources of information, and discusses the methodology used in the thesis.

Chapter Three relates the historical development of attack helicopters and begins the discussion of recent helicopter operations against significant enemy ground and air defense systems.

Chapter Four begins an in-depth review of US attack helicopter doctrine and continues to the Soviet air defense systems, both ground and air.

Chapter Five concludes the thesis with a review of the information presented and draws conclusions and recommendations.

## CHAPTER TWO ENDNOTES

1. US Army. FM 1-100, Combat Aviation Operations, (September, 1984), p: 36.

2. Edward J. Bavaro. "Running the Gauntlet", US Army Aviation Digest, (October, 1986), p: 30.

3. Edward J. Bavaro. "Closing the Window", US Army Aviation Digest, (January, 1986), p: 10.

4. Victor Gatsolayev (LTG, USSR). "When Helicopters are Airborne", reprinted from the Soviet Military Herald, in the US Army Aviation Digest, (September, 1974), p: 12.

5. Ivan Polyakov (COL, USSR). "Antihelicopter Warfare", Soviet Military Review, (March, 1985), p: 35.

## CHAPTER THREE

### Historical Development of the Attack Helicopter

No one can state with certainty when the actual first use of an armed helicopter began. However, records from the Korean War reveal that Marines onboard transport helicopters would fire their individual weapons at enemy positions prior to landings. A captured Navy flier owes his freedom to an event performed by one enterprising helicopter crew. Dispatched to the reported location of a downed pilot, the helicopter crew observed that the pilot had already been captured. The helicopter mechanic onboard began firing at the enemy with his rifle, who, apparently caught off guard, fled for safety leaving the flier behind. The helicopter then landed and effected the rescue. On another occasion, an observation helicopter noted the location of enemy automatic weapons positions. Securing phosphorus grenades, the pilot maneuvered over the enemy positions and dropped the grenades on them. The resultant fire drove off the enemy and thereafter, that helicopter company became known<sup>1</sup> as the "Hotfoot Detachment".

Marine helicopter exploits soon became so commonplace that they were deemed no longer newsworthy. By the time the war ended, the other services had adopted Marine tactics, especially in the airlift of casualties, and in the employment of troops in situations requiring immediate

2  
response. Following the Marine lead, the US Army also experimented with vertical envelopment as a tactical means. Again, helicopter firepower consisted of hand held weapons, free fired from the air. The war ended before an inevitable mating of a dedicated weapons system with a helicopter platform. Further, still in their manufacturing infancy, helicopters could not be built fast enough for the demands of the services. The foundation, however, was forged in the crucible of war.

It appears that the French must be given credit for the first truly armed helicopter. According to French Army Major J. Pouget, in the early and mid-1950's, they used US H-21 helicopters, armed with SS-10 missiles, fixed machineguns and free firing machineguns (no doubt the advent of the "doorgunner"-author). The Algerians were to be the test subjects. According to Major Pouget:

3  
The [helicopter] pilot thought he could carry two men with automatic rifles. Moreover, he was barely 5 minutes flight time away from.....where the French riflemen were engaged. Two soldiers volunteered.....and they were firmly fastened on the lateral stretchers, their automatic weapons pointing forward. Twenty minutes later, astonished at receiving direct fire, the enemy pulled out in confusion.

Thus was borne a concept that would revolutionize warfighting.

After Korea, the US Army became more cognizant of this new idea, now termed "Airmobility". In 1954, Major General James Gavin, in a Harper's magazine article

entitled, "Cavalry, and I Don't Mean Horses", indicated the vision some had for the future. LTG (then COL) John Tolson, as Gavin's Director of Doctrine and Combat Development, was initially asked to develop force projections for cavalry units designed around the helicopter.<sup>4</sup> The result of this task was the formation of the Airborne-Army Aviation Department at Fort Benning, Georgia. Using donated helicopter assets, tactics and techniques were developed in a few short months. A new Field Manual, FM 57-35, Army Transport Aviation-Combat Operations, was published. During these studies and testing a requirement for a fixed weapons systems for all transport helicopters was recognized.

Concurrent with the development of this new doctrine, the Commander of the US Army Aviation School, BG Carl Hutton, began experiments with helicopters as weapons platforms. To quote LTG Tolson, "the guiding genius for much of this development was a colorful officer, Colonel Jay D. Vanderpool".<sup>5</sup> Later to be known as "Vanderpool's Fools", the Colonel and his small but dedicated group of men "went to work without a charter, without money, and by explicit direction, without publicity."<sup>6</sup> Colonel Vanderpool, who was not an aviator, led his group to every aviation scrapyard and weapons depot he could find, wherein he begged, borrowed or stole every conceivable type of machinegun and rocket system and anything else that was a possible candidate for the the armed helicopter. Using helicopter assets borrowed

from the Aviation School, COL Vanderpool tested his "wonderous variety of unlikely weapons".<sup>7</sup> Undaunted, his efforts led to successes and in 1958, an Army TDA formed his provisional "Aerial Combat Reconnaissance Platoon" into the 7292nd Aerial Combat Reconnaissance Company (Provisional). Subsequent work and recognition led to briefings to the Army's first Director of Army Aviation, Major General Hamilton Howze. Vanderpool's suggestion of an ARMAIR DIVISION, caught his critics by surprise. Most had been convinced that the helicopter was too unstable to be an effective weapons platform. Others, however, had greater foresight.

Further concept studies led to the establishment of the Army Aircraft Requirements Review Board, which was headed by LTG Gordon B. Rogers. The Roger's Board, long overshadowed by the more famous Howze Board, was most notable for its suggestion of the development of the helicopter turbine engine, which promised to be an answer to the acute engine power problems faced by the helicopters of the 1950's.<sup>8</sup> Although the Army did not accept this report until 1960, the path was already established for the Airmobility concept. Interestingly enough, the concept had the Atomic battlefield in mind. In fact, the Marines had tested the concept with an actual nuclear detonation in the deserts of Nevada. Less than 30 minutes after the explosion, Marine helicopters attacked their objectives in

and around the detonation point area. The implications for lessor degrees of warfighting were readily apparent and would be soon self evident.

By this time, combat units (albeit supporting) were already in the Republic of Vietnam (RVN). The helicopters initially deployed were Korean War vintage and yet, the Army still had no comprehensive plan for the long term as regards modern helicopter acquisitions. A plan submitted by the Secretary of the Army to Robert Macnamara, then Secretary of Defense, was quickly rejected as being too narrow minded. The tyranny of terrain, as first encountered in Korea, had returned to RVN in the form of impenetrable jungle, poor roads and poor lines of communications. If the US was to meet then President Kennedy's goals of support to the RVN government, new modern helicopters, and hundreds of them, would be the order of the day.

Lieutenant General Howze received a mandate from Robert McNamara, then Secretary of Defense, to take a "bold,<sup>9</sup> new look" at the "traditional ties to surface mobility". The former XVIII Airborne Corps and Fort Bragg Commander undertook a wide ranging and indepth study of the Army's Airmobility requirements. Sweeping doctrinal changes were suggested and for the first time armed helicopters were recognized as being essential to success in the tactical employment of this new concept. In addition to the armed

escort helicopters, the Board further suggested the formation of an Air Calvary Brigade with 144 of its 316 helicopters to be armed. "Its mission would be classical --<sup>10</sup> to screen, reconnoiter, and wage delaying actions." Thus, we have the guidance (the Howze Board), the means (Bell Helicopter has developed the UH-1), the funding (from President Kennedy), and the testing ground (RVN) in which to put these new concepts to work.

Messages from combat commanders in the field showed that the first deployed helicopters in RVN increasingly were becoming exposed to hostile fire. To counter this problem, the Utility Tactical Transport Helicopter Company arrived in RVN in mid-1962. Eventually equipped with 15 of the new UH-1A's (later the UH-1B's), these helicopters were armed with four forward firing machineguns, two "doorgunners" and with 38 2.75 inch rockets. Truly, this was a quantum leap forward. Their mission appeared to be simple. Escort the troop ships into the battle area and suppress enemy fire. The mission requirements, however, would soon grow, and their success would prove the concept. LTG Tolson, in his Airmobility 1961-1971, noted that the Air Force took a rather dim view of this encroachment on their mission of close air support. One Air Force General thought it his duty to report any offensive operations to the Military Assistance Command -- Vietnam (MACV) Headquarters, as the armed helicopters were designed only to defend the troop

ships, and supposedly were not to engage in offensive fire support. This Army-Air Force difference of opinion on which service would provide close air support would take years to resolve.

As Airmobility experience was gained, so did the realization for the need of increased capabilities for the armed helicopters. The UH-1 series of helicopters was designed to be troop and supply carriers. When fully outfitted in the combat attack role, the increased drag from the weapon systems, and with the increased weight of the ammunition and armor, they could barely keep up with the helicopters they were supposed to escort. The need for a dedicated attack helicopter was self evident. The airframe that would eventually be developed would be bred from the necessities of war.

While the need for the rapid deployment of a dedicated helicopter was apparent, Army planners decided that an Advanced Attack Helicopter design was needed. Rather than inviting civilian industry to submit proposals on an immediate solution, and cognizant of the fact that the Airmobility concept was European bound, a proposal for an Advanced Aerial Fire Support System (AAFS) was issued. This system was to be absolute state of the art, with full night and low visibility fighting capability, inertial navigation systems, automated flight controls, and other exotic equipment. In looking to the future, the planners did not

want an interim solution to the attack helicopter, but rather a long term solution. None too soon, it was recognized that this aircraft was years away from procurement. Ground commanders in Vietnam wanted more immediate results.

While industry suggested several proposals, Bell Helicopters, the producer of the now ubiquitous UH-1 "Huey" had independently developed a completely new airframe. Designed around the proven power and drive train components of the UH-1, this sleek, 36 inch wide airframe would be the world's first helicopter designed exclusively for an attack role. Sensitive to the ground commanders' requests, and due to the fact that this aircraft was ready to be produced, Army planners agreed to this interim solution.

On September 1, 1967 the first AH-1G "Cobra" armed/attack helicopters arrived in RVN. From the hand held weapons in Korea, the makeshift systems of the 1950's, and to the overloaded, yet successful, armed UH-1's, this was indeed a "giant step".<sup>11</sup> The more readily apparent attributes were 40 per cent greater speed; a 100 per cent increase in armaments; better gunsights; better self protection; better survivability; greater visibility, both for spotting the enemy and for identifying friendly troops. Further, because of similar characteristics to the UH-1, pilot transition training was simplified. Commonality of parts simplified parts stockage. The years would prove the

planners' decision, as this aircraft earned its combat wings in a thousand battles.

With the introduction of the Cobra to combat operations, armed helicopter loss rates dropped significantly, to less than  $\frac{1}{4}$  of 1 per cent.<sup>12</sup> However, this must be tempered with the fact that the skys over the Republic of Vietnam (where the vast majority of helicopters operated) were 100 per cent American. In few cases were there sufficient enemy air defenses, beyond individual and smaller crew served weapons, to alter a course of battle. There was, however, one battle that was different.

The analysis of that battle, known as Operation Lam Son 719, would test the Airmobility concept in general, and attack helicopters in particular, to a degree never seen before. The North Vietnamese Army (NVA) operated a sophisticated and integrated air defense network, established with assistance from the Soviet Union. This system used radar, air defense artillery, ground-to-air missiles (including shoulder fired missiles) and heavy antiaircraft machineguns against a large airmobile and conventional Armor and Infantry operation. The analysis of the effectiveness of that system, and of the lessons learned by US forces, lends itself to contemplative study. How well, or how poorly, helicopters in general, and attack helicopters in particular fared in that battle may portend future results in the AirLand Battle scenario.

## Battle of "Lam Son 719"

This author participated in that battle as a flight operations officer and Cobra Aircraft Commander, assigned to the 4th Battalion, 77th Aerial Rocket Artillery, 101st Airborne Division (Airmobile), at Khe Sanh, RVN. Operation Lamson 719 was a combined US and Army of the Republic of Vietnam (ARVN) campaign, conducted from 8 February to 9 April, 1971. The primary objective of this operation was for the ARVN ground forces to enter in Laos, along the Xe Pon River area, and strike at North Vietnamese staging areas, supply depots, communications centers, etc. This area was considered to be the heart of the so called "Ho Chi Minh Trail". Heavy resistance was expected, and in fact was soon realized. Under the Rules of Engagements then in effect, US ground forces were prohibited from entering Laos. Helicopter companies (and helicopter batteries) from the 101st Airborne were augmented by helicopter elements from the entire U.S. force structure in the RVN. Older UH-1C helicopters were pressed into service to meet the armed/attack helicopter demand. Operational control of these helicopters fell to BG "Sid" Berry, ADC (Operations) of the 101st. This Combined Arms Operation began on 8 February. The enemy immediately reacted by attacking the ARVN elements with infantry, heavy artillery, and armor. As the ARVN ground attack slowed due to increased enemy resistance, decisions were made to use a massive airmobile

insertion on the primary objective, the Laotian town of Tchepone. Over 120 UH-1's, with supporting attack helicopters, lifted 2 full infantry battalions over 65  
13  
kilometers to the objective.

This large combat assault was carried out in what was considered to be the most hostile air defense environment ever encountered in the entire war, yet only one Huey was hit and it made a safe landing in the objective area.

The North Vietnamese soldier enjoyed a considerably greater fire support in Laos than had been previously experienced in South Vietnam.....The 12.7 mm weapons were often employed in triangular or rectangular positions...[on] high ground...1,000 meters from a potential landing zone. The 23mm guns were employed in circular or triangular positions....[and] continually redeployed.

This author recalls that these formations were always mutually supporting, so that it was difficult to attack from any particular direction without having at least two weapon systems trained on the attackers. One way to overcome this tactic was with the use of a heavy section of three or four Cobras (as opposed to the normal two in a flight), attacking simultaneously, so that only one defensive weapon could be fired at the attackers at a time. Also, the aviators quickly learned that to begin their attack formation at 1500 to 2000 feet above the ground was not tactically sound in this high density air defense environment. The aircraft were simply exposed for too great a time period and could be more easily engaged by the air defense system. US Army flight regulations prior to Lam Son

719 strictly prohibited low level flight (nap-of-the-earth or NOE) as being unsafe. The rationale was that helicopters should fly above 1500 feet to avoid small arms fire, which had been the enemy's sole air defense system. To fly less than 1500 feet was to place the helicopter in an area known as the "dead man's zone". This zone was considered to be at any altitude where small arms fire, usually of the 7.63 millimeter variety, was most effective.

While there were losses, heavy at times, it must be recalled that literally thousands of helicopter sorties were flown daily. Under taxing situations, Army Aviation met the test, and learned that operations could be conducted against heavy anti-aircraft fire. Prior planning, route selection, nap-of-the-earth flight, and attention to every preflight detail was an absolute requirement. In a few short days pilots had learned how to attack tanks and tracked vehicles, albeit with limited success. Anti-personnel high explosives bounced off the hulls of the heavy tanks, although the pilots did have some success with the light PT-76 vehicles. Well placed rocket fire could disable the tracks of the heavier tanks, and then either Air Force tactical aircraft or heavy artillery could finish the destruction of the target. Attack helicopters at Lam Son 719 did not have the capability to defeat armor directly. The enemy tankers fought fiercely, at times even firing the main gun at the attacking helicopters. Again, heavy sections of attacking

helicopters were required, with one section using flechette rockets, high explosive rockets and/or 20mm cannon fire against crew served weapons while the other section concentrated on the armor. BG Berry summed up the air/tank

14

battles:

We need tank-defeating armed helicopters. Had we entered Lam Son 719 with a helicopter armed with an accurate, lethal, ...long range anti-tank weapon, we would have destroyed many more NVA tanks and would have rendered more effective close support.

....the helicopter and its crew have proven remarkably hardy and survivable in the mid-intensity and hostile air defense environment...we have lost remarkably few helicopters and crew members in view of the heavy small arms, antiaircraft, and mortar and artillery fires...while conducting airmobile operations...

#### Lessons Learned from Lam Son 719

Lam Son 719 was the first true test of airmobile and attack helicopter operations, in a high intensity air defense environment. It also was the first deep battle for the Airmobile concept. The concept of the deep battle is  
15  
explained as follows:

Deep operations at any echelon comprise activities directed against enemy forces not in contact designed to influence the conditions in which future close operations will be conducted. At the operational level, deep operations include efforts to isolate current battles and to influence where, when, and against whom future battles will be fought.

The Lam Son 719 attack against the stronghold along the Ho Chi Minh trail was a classic example of a deep attack.

The performance of the attack helicopters must be measured against the performance of other helicopters involved in Lam Son 719 so that comparisons of survivability can be measured. Table 3-1 shows the results of those operations.  
16

A review of this table shows that of the over 650 helicopters involved in the operation, the overall loss rate was fourteen percent (14%). The attack helicopters, however, experienced an overall loss rate of seventeen percent. The better armed and more maneuverable AH-1G Cobra, however, had a more favorable loss rate of fifteen percent (15%) as compared to the UH-1C gunships' twenty percent (20%). These figures are for total number of airframes involved only and do not consider the fact that the AH-1G Cobra was involved in more sorties than the UH-1C gunship. If a modest factor of a 50% increase in sorties for the Cobras is inserted into the equation, it becomes readily apparent that the loss ratio per flight sortie for the armed/attack helicopter becomes much less. The ARVN forces involved were in almost continuous enemy contact, and as they were often out of range of supporting artillery fire, the attack helicopters were often the only means of direct fire support.

\*\*TABLE 3-1

| Type<br>A/C | Total No.<br>Involved | Total No.<br>Damaged | No. Damage<br>Incidents | Total No.<br>Lost | %<br>Lost |
|-------------|-----------------------|----------------------|-------------------------|-------------------|-----------|
| OH-6A       | 59                    | 22                   | 34                      | 6                 | 10        |
| UH-1H       | 312                   | 237                  | 344                     | 49                | 16        |
| UH-1C       | 60                    | 48                   | 66                      | 12                | 20        |
| AH-1G       | 117                   | 101                  | 152                     | 18                | 15        |
| CH-47       | 80                    | 30                   | 33                      | 3                 | 4         |
| CH-53       | 16                    | 14                   | 14                      | 2                 | 13        |
| CH-54       | 10                    | 1                    | 1                       | 0                 | 0         |
| OH-58       | 5                     | No Data              | No Data                 | No Data           | No Data   |
| TOTAL       | 659                   | 453                  | 644                     | 90                | 14        |

Attack Helicopter Totals

|     |     |     |    |    |
|-----|-----|-----|----|----|
| 177 | 149 | 218 | 30 | 17 |
|-----|-----|-----|----|----|

\*\*Fulbrook, Jim E. (CPT, USA). "Lam Son 719-Part III: Reflections and Values", US Army Aviation Digest, (August, 1986), p: 3.

The enemy employed a tactic known as "hugging", whereby the attackers would remain in extreme close contact with friendly forces. This tactic caused Air Force close air support to lose some effectiveness, because their ordnance became a danger to the friendly troops on the ground. The normal armaments carried by Air Force tactical fighter/bombers could not be used closer than several hundred meters from the friendly forces. Attack helicopters, however, could deliver their ordnance accurately at distances of a few meters. AH-1G's rapidly became the weapon of choice for the ARVN forces, and as such, the Cobra's were constantly in the air.

At the beginning of Lam Son 719, multi-ship operations from landing zones (LZs) and pickup zones (PZs) had been the rule -- this had been the common practice during the war to date. The attacking North Vietnamese Army (NVA) forces were quick to learn that heavy machinegun emplacements could inflict great damage on these multi-ship operations.<sup>17</sup>

On 3 March a battalion of [ARVN] 1st Infantry troops was helicopter assaulted into LZ LOLO. This was one of the darkest days in Army Aviation history. Eleven UH-1 Huey aircraft were shot down in the immediate vicinity of the LZ that day. The air mission commander actually instructed the follow-on aircraft to, "Land to the burning aircraft!"

An old adage is that tactics should never be cast in stone. They must be flexible, allowing for change when the situation dictates. The principle of war that requires mass

in space in time did not envision the speed with which Airmobile operations can be conducted. Mass multi-ship operations, with flights of twenty to thirty aircraft landing simultaneously, could no longer be safely performed -- tactics had to be changed.<sup>18</sup>

....[on the 6th of March] two battalions of the ARVN 1st Infantry were airlifted into LZ Hope near Tchepone on the largest helicopter combat assault in the history of Army Aviation! An armada of 120 UH-1s departed Khe Sanh in a single-ship, 30 second separation formation on the 50+ mile round trip. A score of helicopter gunships and fixed wing, tactical aircraft flanked the UH-1s on that assault. Only one helicopter was shot down on an approach into LZ Hope with a few others receiving "hits" from enemy fire.

This operation into LZ Hope, conducted in daylight against a massive, integrated air defense network proved that airmobile operations could be conducted successfully in a high density air defense environment. However, it must be recalled that nearly total air superiority was maintained over the battle area. Complete, total and dominating US (and Allied) air supremacy has come to be expected. As we shall see in future chapters, the addition of air-to-air combat against attack helicopters, coupled with an integrated and sophisticated ground-to-air network, may lead to different results.

#### British-Argentine Falklands Helicopter Operations:

A study of the Falklands conflict, from a standpoint of both attack and transport operations, has yielded some

very interesting insights into the use of helicopters in a sophisticated air defense environment. During this conflict in 1982, helicopters were used in every conceivable military operation, and were engaged (and some destroyed) by almost every type of air defense weapon system. British Army attack helicopters, the Gazelle and the Scout, were brought down by air attack, machine guns, cannon, and missiles. Argentine helicopters were destroyed on the ground by fighter bombers, forced out of the sky by jet aircraft slipstream, and destroyed in the air by cannon and machine guns. The methods used and evasive actions taken are most noteworthy of study and reflection.

It is interesting to find that helicopters from the British Navy fired some of the first shots of the Falklands conflict. An Argentine submarine was spotted by a British Navy attack helicopter near the Georgia Islands and it was engaged with missiles, rockets and depth charges. The severely damaged machine limped to shore and beached itself. Later the same day, a British Sea King helicopter was fired upon by an Argentine patrol ship. The Sea King's radio calls for assistance were answered by a Westland Lynx attack helicopter, which fired missiles and destroyed the patrol craft.<sup>19</sup>

The vignette above shows that helicopters are beginning to reach maturity on many battlefields, including ones at sea. While Army attack helicopter pilots may look

with some disdain on Navy helicopter pilots (as far as attack helicopters are concerned), there is no doubt that Naval helicopter operations will almost always be conducted against sophisticated defenses. As a matter of course, combatant vessels are usually equipped with air defense radars, radar guided guns (from 20 millimeter up to several inches in caliber), air-to-air missiles, and frequently jet fighter escorts or "caps". These vessels are, in fact, a miniature battlefield in and of themselves. Attack helicopters operating against them do not have the luxury of "masking" behind terrain obstacles. In order to succeed, one must have superior weaponry, tactics, and pilot skills.

Neither party to this conflict had developed attack helicopter doctrine on a scale equal to the US or to the Soviets. However, the very nature of rugged terrain, few roads, poor weather and general untraffability of the islands demanded that helicopters be used by both sides. Many major modifications to British helicopters were made enroute to the Falklands. Ad hoc rocket systems, machine guns and fire control sight systems were added to both the Gazelle and to the Scout. The British installed the SNEB unguided rocket system on the Gazelles while at sea. Pilots would learn to use the new systems in combat. The Scout aircraft had been previously fitted with "SS-11 missiles, waist mounted 7.62 mm machineguns, Infrared Counter Measures shields.....floor armor and camouflage covers." <sup>20</sup> This

force would operate without an established attack helicopter doctrine. Its mistakes, while in some cases paid for in lives, would lead to a more advanced understanding of the role of attack helicopters in the future.

The air defense systems employed by both sides were of current Western design. The effectiveness of the systems, and their employment doctrine, is aptly described  
21  
as follows:

The air war in the South Atlantic demonstrated both the power of the defense and the continuing need for an articulate strategy. The high attrition rates, particularly among Argentine aircraft, showed that the defense tends to predominate over the offense in aerial warfare when the defense is well equipped with technologically sophisticated weaponry operated by skillful technicians. [emphasis added] Harriers using AIM-9Ls and 30mm Aden cannon accounted for twenty confirmed and three probable kills. Antiaircraft guns and small arms totaled seven confirmed and one probable. Clearly the high-tech weaponry of the British demonstrated its usefulness.

While Argentina possessed less sophisticated defensive weapons, they still performed well; Argentine antiaircraft fire and surface-to-surface missiles downed five Harriers and four helicopters. Further high-tech weaponry accounted for the loss of ten helicopters.....

The Argentines achieved partial air denial with their intense antiaircraft fire. That is to say that they prevented the British from continually doing whatever they wanted to in the skies over the Falklands.....courage and valor are no match for superior weaponry effectively employed.

With this view of the air defense systems of both sides, we will now take a look at some of the engagements where helicopters were destroyed, damaged or had their missions aborted due to effective defenses.

One of the first light attack aircraft to fall victim to the US supplied Stinger MANPAD missile was an Argentine Pucara. The Pucara is a small twin engined, two seat aircraft designed for counterinsurgency duties in Argentina. It is armed with two 20mm or 30mm cannon and four 7.62mm machineguns and is capable of carrying 3,300 pounds of stores on three external wing pylons. It is a relatively slow flying machine with good maneuverability, ideal for anti-helicopter combat.<sup>22</sup> It has a mission of close support and aerial reconnaissance. On just such a recon mission, a Pucara unexpectedly overflew an advanced British SAS patrol, armed with the Stinger. "I never saw the missile. I was flying at a very low altitude."<sup>23</sup> The pilot safely ejected after the missile impacted, and enjoyed a long walk back to his base. An obvious lesson here is that small patrols, armed with MANPAD weapons, can ambush aircraft with relative ease.

Nap-of-the-earth flying is the present tactic used by helicopter crews when operating in a high density air defense environment. This type of flying reduces exposure time, which makes it more difficult for ground troops to sight the helicopter and more difficult for higher flying aircraft to visually observe the low flying helicopters. There are problems with this tactic, however, when not performed correctly. Two Sea Harrier pilots, flying at

8,000 feet over the Falkland Sound, discovered a mistake  
24  
made by Argentine helicopter pilots.

....Lieutenant Morgan glimpsed rotating helicopter blades close to the water at Shag Cove inlet. Earlier in his career, Morgan had flown battlefield helicopters, and it was clear to him that the pilot below had made a fundamental blunder. "If there is one thing you learn when doing nap-of-the-earth helicopter flying, that is to avoid passing over water features if you can possibly avoid it. If you do go over them, you can be seen above for miles."

The two Sea Harriers descended for a closer look and discovered a flight of four Argentine helicopters, three larger troop carrying Puma helicopters, and an Augusta A-109. (The Augusta is a commercial Italian helicopter, which can be converted to an attack helicopter role when equipped with rockets and machineguns. In this case, it would appear that this Augusta was an attack helicopter, escorting the troop carriers.) The lead Harrier passed just over the top of the first Puma at high speed without firing. As it turned to get into firing position, the Puma was observed "smashing into the ground in a ball of fire". The crews of the other helicopters landed their aircraft and departed. The Sea Harriers strafed them and left them burning. As to  
25  
the crashed Puma:

Neither pilot had fired at the Puma: either the slipstream from Morgan's Sea Harrier had sent it out of control or the pilot had lost control trying to evade.

Nap-of-the-earth flying has its inherent dangers. One of those dangers is that at extreme low altitude, there is

little margin for error. Abrupt control movements, whether in response to changes in terrain or in reaction to a jet aircraft slipstream, can lead to disastrous results. Interviews with several current US Air Force pilots have indicated that the slipstream effect may be an effective weapon against low flying attack helicopters.<sup>26</sup> This tactic is more easily accomplished when the attack helicopters have little or no self defense capability.

The British also escorted their larger helicopters with attack helicopters, and they too had difficulties. Shortly after British ground forces made their initial landings, transport helicopters began ferrying in ground-to-air missile defense systems, such as the Rapier. On one mission, a Sea Knight transport helicopter (which was carrying an under slung Rapier launcher) was escorted by two Gazelle attack helicopters. Their mission was to install the air defense system on surrounding high ground. British ground forces, who were aware of a retreating contingent of Argentinian infantry, were unable to warn the flight that it was about to overfly an enemy position. (The British infantry did not have the appropriate radio frequencies on which they could talk to the helicopters.) The results of this error in tactical technique is described as follows:<sup>27</sup>

At this opening moment of the battle, there was a theory that armed helicopters could usefully escort cargo aircraft. Two Gazelles were therefore accompanying the Sea King. Pike and his men [the British infantry] were not linked to the helicopter radio net, and were unable to warn the pilots.

Impotent, they watched the brief tragedy that followed. The big helicopter seemed to see the enemy first; it shed its load and ducked hastily below the horizon. Small-arms fire hit a Gazelle a few minutes later. It crashed into the sea.....the second Gazelle....was also hit within seconds, and crashed into the sea. The Argentinians enraged the British by firing upon the crews even as they struggled in the water. Three of the four men were killed...The Argentinians made good their escape.

In this instance, we find that helicopters were dispatched to an area that was supposedly cleared of the enemy. In a few short minutes, the heavily armed Gazelles were brought down by small arms fire. Again, operating in unknown territory, with insufficient intelligence and poor air-to-ground coordination can often yield disastrous results.

Air battles raged throughout the remainder of the first week after the British landing. The Argentinians lost several more troop carrying helicopters to Sea Harriers, who were by now becoming quite adept at spotting their targets. Twenty millimeter cannon fire from above was deadly against low flying helicopters, who had very little natural cover from the barren terrain. By the end of the week, the Argentinian helicopter forces were decimated.

The later battle for Goose Green would give the Argentinians their first helicopter air-to-air victory. The British Scout attack helicopter has the capability to carry litter cases. After offloading its rockets, a Scout responded to an urgent call for medical evacuation in the Darwin area. Approaching the destination, and apparently unaware of any impending danger, the aircraft was attacked

by an Argentinian Pucara. "The enemy aircraft dived steeply, firing at the helicopter. There was a sudden ball of smoke, and the remains of the Scout crashed to the ground." <sup>28</sup>

On another similar occasion, two Scouts, escorted by two Gazelles, were enroute to recover casualties when the Scouts were attacked by two Pucararas. One Scout was caught by a burst of cannon and machinegun fire and destroyed. The other was able to escape back to an area of air defense coverage (the so-called air defense umbrella). According to <sup>29</sup> a British aviation officer:

This incident was watched by the crews of the two Gazelles who were flying only 1,500 meters away but they were unable to assist as their aircraft did not carry an air-to-air self-defence weapon.

The author of this article continues his lessons learned by stating that the surviving helicopter pilot could not have avoided destruction were it not for the aid of his aircrewman. The crewman could keep searching for the attacker, while the pilot concentrated on extreme evasive maneuvers, or "standing it on its ear!" The other point made was that there would have been no possibility for the pilot to use an air-to-air self defense weapon during the violent evasive maneuvers. This suggests that aircraft should operate as pairs, with both equipped with air-to-air <sup>30</sup> systems for mutual support.

One reason that the available light attack helicopters were not used more often in a pure offensive

role was the fact that 10 Wessex helicopters and 3 large Chinook helicopters were lost at sea earlier when the Atlantic Conveyor was destroyed. This led to an acute shortage of helicopters for normal troop and supply transport. As the British attack helicopters were merely reconfigured light observation or light utility helicopters, they were pressed into service for their former roles more often than not. (We see this philosophy in the Soviet design system also, as even the Hind helicopter can carry troops, supplies or casualties. On the other hand, US attack helicopters are designed from the ground up as offensive weapons platforms and do not have the capability to perform a dual role.)

In the final assault on Port Stanley, British attack helicopters were used in the pure attack role. Three Royal Marine Scout attack helicopters, fitted with four SS-11 TOW missiles, were employed against Argentinian bunker and artillery positions. Using nap-of-the-earth tactics, and keeping high terrain to their rear (which makes visual detection more difficult), the Scouts placed extremely accurate missile fire into the bunkers. One of the bunkers held an Argentine 105mm howitzer, which was totally destroyed by the missile. Other missiles found their targets before being finally answered by a unique air defense tactic. Argentine artillerymen began firing high explosive shells, fuzed for air burst, over the heads of the

low flying Scout helicopters. In the words of one of the <sup>31</sup> pilots, "It was time to make a tactical withdrawal".

Another interesting area to be explored is the loss of aircraft to friendly fire. There are many technical reasons for this phenomenon, however many incidents can be blamed on tired and frightened antiaircraft crews. The US action in Vietnam saw very little to no helicopter losses to friendly fire. While there was an occasional loss due to artillery mishaps, the dominant air supremacy enjoyed by the US simply meant that ground troops were never worried about attack from the sky, and therefore never fired upwards in anger. In the Falklands conflict, however, both sides operated helicopters (at least at the beginning), and many were of the same type and model. As British troops advanced on Port Stanley, forward observation teams had for several days noticed a large number of Argentine vehicles gather outside a certain building at the same time each morning. Suspecting that this was a command headquarters, a plan to <sup>32</sup> attack the building was put forth.

With astonishing gallantry, an anti-submarine Wessex pilot had accepted an SBS proposal to fly unsupported against Stanley and attempt to strike direct at the enemy's orders group. He fired one missile which missed its target..... then he turned away to escape, as every gun in the area opened fire. It was a great source of pleasure to the British that, while the Wessex pilot came home intact, the Argentinians shot down one of their own helicopters approaching over the harbor.

In total, six Argentine aircraft were lost to "operational accidents". This term refers to aircraft that

were brought down by their own air defense weapons. In the small area of the Falkland Islands, with average sortie rates in the hundreds of aircraft, one can wonder that there were not more friendly losses. It will not be difficult to project the difficulties in the positive identification of aircraft, both friend and foe, in any future scenario pitting the US and NATO allies against the Soviets and her Warsaw Pact allies. In that scenario, we can expect that daily sortie rates for both sides may be in the thousands. The concomitant difficulties with positive identification will be compounded many times over to the British-Argentine experience. It is one thing to be engaged and defeated by your enemy on the battlefield. It is quite another to be engaged and destroyed by your friends.

In a final analysis of the Falklands battles, Lieutenant Colonel W. A. Swan of the United Kingdom sums up  
33  
the experience succinctly:

The enemy air threat was a new experience and does have implications as far as other theaters are concerned. No new lessons were learned and current tactics do work, but the need for a self-defence weapon against slow aircraft and helicopters and the tactics of operating scout aircraft in mutually supporting pairs has received added emphasis. The continuing problem of forward airspace and AD [air defense] weapon control has not been satisfactorily answered and still needs a great deal of study.

## Arab-Israeli Helicopter Operations -- October, 1973

The term "Arab" within this narrative refers to the forces which opposed Israel during the October, 1973 conflict. Egypt, Syria, Iraq and, to a small extent, Jordan were involved on the Arab side. Israel faced these opponents alone, except for some technical and intelligence data provided by the US. The US also resupplied Israeli losses during this short conflict.

While there are only a few recorded instances of attack helicopters being used during the October, 1973 Arab-Israeli war, it is important to investigate this operation for several reasons. First, the air defense network employed by both sides took a heavy toll on helicopters and attack aircraft in general. The reasons for these losses have applicability to the helicopter survivability question. Next, in addition to having had one of the strongest air defense systems in the world, the Egyptian network was patterned after the Soviet system and employed the latest Soviet hardware. The successes and failures of that equipment must be analyzed if one is to infer the effectiveness of the current Soviet equipment and doctrine. Lastly, the Israelis utilized almost all US and Western air attack and air defense systems, and in so doing, took an exacting toll on Arab equipment. This conflict presents an opportunity to study Soviet air defense weapons systems in a

combat environment, which was also employed against a US patterned offensive air attack system.

A major research report on this conflict sums up the  
34  
Arab air defense network:

Basically, the Egyptians and Syrians followed Soviet air defense doctrine on the organization and employment of air defense systems and deviated only slightly on the deployment of organic weapons. This air defense system accounted for nearly all the Israeli aircraft destroyed, and denied air superiority over the forward battle area to the much vaunted Israeli Air Force. Above all, it greatly deflated the myth that advanced, supersonic airborne weapons platforms or aircraft had made conventional antiaircraft means obsolete. In doing this, it forced the United States and NATO to turn their attention once more to the tactical battlefield, where lessons learned in the Middle East needed to be applied.

Soviet air defense fundamentals were deeprooted within the Egyptian armed forces. The assault troops that crossed the Suez Canal on 6 October, 1973 carried SA-7 Strella missiles  
35  
with them. This was the first indication that the Arabs intended to extend an air defense umbrella over every operational area possible. The Israelis responded to the invasion with air power immediately, but as described below,  
36

there were many problems:

All the [Israeli] attacks were effectively countered by a dense air defense barrage from the west bank [of the Suez] consisting of the older and known SA-2s and SA-3s, as well as the relatively unknown SA-6s. In front of this high level and intermediate shield thrown up by the long range missiles, was a low level shield of Strella SA-7s and lethal ZSU-23-4s.

At least half of the first attacking Israeli planes were shot down by the unexpectedly accurate and devastating Egyptian antiaircraft fire.

Colonel Dupuy also states that while the SA-7 Strella missile was surprisingly accurate, it still was ineffective at times. On several occasions the missile was observed flying up the tail pipe of Israeli aircraft. The warhead charge, however, turned out to be too small to cause substantial damage to the rugged American manufactured aircraft and they simply continued their mission, or limped <sup>37</sup> home. We can imagine the results if the Israeli forces were as attack helicopter oriented then as were US forces. A single engined attack helicopter, such as the AH-1 Cobra, will not survive an SA-7 explosion in the tail pipe. Substantial, if not fatal, damage is also likely should an SA-7 strike the tail pipe of a twin engined helicopter, like the AH-64 Apache. Total losses of Israeli aircraft in the first 24 hours of the conflict are disputed, but the accepted number appears to be around 30. Considering that only 400 sorties were flown during those first 24 hours, this is a very high loss rate for the Israelis. In fact, some observers tell of much higher Israeli air losses, as <sup>38</sup> recounted by one report:

According to an Israeli newsman, one soldier commented with grim humor about the [radio] reports. "We have taught the Egyptians how to fight, and they have taught our radio announcers how to lie".

Some US sources have indicated that as many as 80 Israeli aircraft were brought down in those first 24 hours, but the actual numbers will likely never be known.

That the Egyptian/Soviet system was effective is best  
39  
described by the following account:

In particular, the combination of the SA-6 Gainful SAM system with the ZSU-234-4 Shilka accounted for the largest proportion of destroyed Israeli aircraft. According to one source, the ZSU-23-4s destroyed so many Israeli A-4s attempting to attack Egyptian air bases that the Israelis stopped the attacks for three days while they reevaluated their tactics. Most sources credit the Shilka with 1/3 to 1/2 of the aircraft destroyed by all means.

The Egyptians, it appears, were ready for the expected Israeli counterair attacks and by all accounts performed well in those first few days. Yet, they appear to have discounted Israeli air defenses when, in the early morning hours on 7 October, they launched a flight of seven troop carrying helicopters, without armed escort, on a cross FLOT raid. The purpose of this raid was to insert ground troops in the Israeli rear (in the Sinai) with a mission of destroying surveillance radar systems, command and control sites and airfields.  
40  
The helicopters pierced the FLOT while under their own air defense umbrella at a predesignated crossing location flying at an altitude of 3,500 feet. The results were easily predictable. Four of the Egyptian helicopters were destroyed by Israeli aircraft and the other three by air defense artillery (ADA) and machineguns. These losses were accompanied by a serious loss of life for the Egyptian commandos who were on board. In this case, failed tactics was the prime contributor to the loss, rather than as a loss to superior weapons. A

British Major-General comments further on the Egyptian  
41  
helicopter raids:

The helicopter force was used both for lifting commandos into the Sinai desert during the early part of the war and for the Deversoir battle, as well as for anti-tank flights under command of artillery HQ. There were very heavy losses in the commando operations, mainly because of lack of adequate fighter cover.

While the Egyptian attacks were apparently aimed at installations, the Syrians concentrated on the Israeli forces themselves. On 8 October, the Syrian 7th Division was attacking in the Golan Heights area against the Israeli 7th Armored Brigade. The already exhausted brigade was defending against attacks from all directions, awaiting reinforcements, when 10 or more Syrian Mi-8 attack helicopters appeared on the scene. Lacking air superiority in this sector, and flying in close formations, the Syrian helicopters were easy prey to the guns of the 7th Armored Brigade. Had these helicopters proved more effective, the outcome of the entire battle, and perhaps of the war itself, could have been much different. At the moment of this attack, the 7th Brigade was in danger of collapse, and had the Brigade been broken, the 7th Syrian Division could have made a massive penetration to the Israeli rear, where reinforcements and reserves were already in short supply. As it happened shortly thereafter, the 7th Division withdrew  
42  
from the field and the battle was over.

From these accounts it can be determined that air defense systems on both sides of the conflict exacted a heavy toll. However, these examples have primarily referred to battles against fixed installations. The Israelis were already in static positions for the most part, and except for their later incursions across the Sinai and west of the Suez, were by then well protected by their air superiority. The Arabs, on the other hand, enjoyed an effective air defense cover only when their forces were also static. One writer explains the situation thusly:

43

The heaviest [air] losses were suffered in attacks against static air defences, missile batteries firing salvos rather than single missiles, coupled with radar-directed guns. However, despite the mobility of the SAM-6, SAM-7, and the ZSU antiaircraft guns, they did not provide adequate protection on the move and once outside the range of their static air-defence envelopes, Arab columns sustained heavy damage.

This was an important lesson learned for both sides and portends an area that must be exploited on any future battlefield. As mobile forces become extended and disorganized during and immediately after an offensive operation, they become more vulnerable to air attack. Attack helicopters, using superior mobility, should be able to exploit this disorganization to their immediate advantage. The US Army's Air Defense Artillery Magazine reports a similar finding worthy of note:

44

The Egyptians were able to maintain near air supremacy over their ground forces during the early days of the 1973 Yom Kippur War with only ground air defense units. They did all the right things, but

began to lose when their tactics didn't call for redeployment of air defense assets to match the forward momentum of their ground forces. The Egyptian air defense shield was broken when Israel's Maj. Gen. "Arik" Sharon crossed the canal and destroyed air defense units with tanks....Sharon punched a large wedge in the Egyptian air defense umbrella. Once this wedge was opened, the Israeli Air Force was able to destroy isolated air defense batteries.

Firing at standoff ranges, without a fear of concentrated air defense, tanks and armored vehicles will be at a distinct disadvantage as attack helicopters roam the battlefield at will.

Some writers have indicated that they feel too much is being made over the air defense umbrella that seems to be a requirement for heavy forces. In his book, October, 1973,  
45  
Frank Aker suggests that:

The Israelis succeeded in scoring hits on Arab fighter-bombers simply by sending up a large volume of fire. Numerous enemy aircraft, especially of older vintage, were reportedly brought down by by Israelis firing small arms, mainly machineguns. Standard antiaircraft batteries were also effective.

Such experience raised serious doubts concerning the cost effectiveness of surface-to-air and air-to-air missiles. It certainly became evident that they had not completely negated the airplane as a combat weapon.

The Israelis were, in fact, able to penetrate and eventually defeat this missile umbrella by a variety of means that go beyond the scope of this thesis. One unsuccessful method, involving helicopters, is noteworthy, however.

An electronic countermeasures (ECM) campaign was started that had good success against the Soviet SA-2s and

SA-3s. However, the more sophisticated SA-6 was difficult to counter. Helicopter spotters, operating beyond the FLOT, were used to watch for the tell-tale puffs of smoke from SA-6 launches. This launch notification was radioed to attacking jet aircraft, who would then use special evasive flight maneuvers to avoid the missiles. As reported by the Historical Evaluation and Research Organization, however, "so many helicopters were destroyed by SAMs or by the ZSU-23-4 that this tactic was quickly abandoned". Again, it can be shown that the helicopter is a fragile system when operating beyond its own covering umbrella of supporting arms.

#### Iran Iraq Helicopter Operations

As this war enters its 7th year, both Iran and Iraq have seen a tremendous drain on both its military and economic resources. This has led to a reduction in air operations to a point that baffles many Middle East observers. While Iraq is known to be able to launch 350 to 400 combat aircraft and 150 attack helicopters at any one time, she has shown a reluctance to do so in any militarily responsive way. In fact, both sides have shown a reluctance as of late in using any air assets in support of ground operations, preferring to use their jet aircraft assets in a reserve and defensive role.<sup>46</sup> On the other hand, attack helicopters have supplanted tactical jet aircraft as the

preferred system for ground support.

Equipped with the Soviet Mi-24 Hind, among others, the Iraqis have used this attack helicopter sparingly. Force structured along the Soviet model, the Hinds belong to the Iraqi Air Force, and as such, are not immediately available to a ground commander. Recognizing this shortcoming, a newly formed organization, the Iraqi Army Air Corps (IAAC) has had better success.<sup>47</sup> Now equipped with a large variety of helicopters, including the Mi-8 Hip, the IACC is the almost exclusive source of ground attack support.

According to Western analysts, the Iraqis have converted the French Gazelle, the German BO-105, the German/Japanese MBK 117, and perhaps even the US Hughes 500 to an attack role. Fitting these helicopters with anti-tank HOT missiles, the Iraqis have enjoyed considerable success against Iranian tanks, trucks and patrol watercraft. With this somewhat modified group of smaller attack helicopters now able to perform the anti-armor role, the Hind has been relegated to a sort of long range, mobile artillery weapon, which uses its machine guns and cannons for soft targets, and then uses its considerable supply of rockets against harder targets. (Compare this with the now disbanded US "Aerial Rocket Artillery" of the Viet Nam era. In that type of unit, AH-1G Cobra attack helicopters were used in a similar manner. Their command and control was in strict

artillery channels, and the helicopters responded to calls for fire support through artillery forward observer channels.) The prime reason for this differentiation of missions between the Iraqi Hinds and the other attack helicopters appears to be centered on the question of battlefield survivability. The large Hinds are vulnerable to ground fire from the heavily defended Iranian positions. Lacking in maneuverability (and some sources report, lacking in confidence by the Iraqi pilots), the Hind must be protected by the umbrella of supporting arms fire on its side of the FLOT. Without this protection, the Hind appears to be extremely vulnerable. Current Iraqi tactics for the Hind have the helicopter firing at standoff range behind the Iraqi line of troops. This tactic is mute testimony to the effectiveness of Iranian short range air defenses, which consist primarily of small arms, light machineguns, and heavier machineguns. More sophisticated systems, such as Iranian Hawks, Rapier and Tigercat air defense missile systems have not been used against Iraqi helicopters to any great extent. The Iraqis simply do not conduct helicopter cross FLOT operations, therefore, the Iranian missile systems are primarily used against tactical fighters and fighter/bombers.

At the beginning of the Iranian revolution, the Iranian helicopter forces were fast becoming the model of Western military thought. Fueled by the Shah of Iran's

domestic and regional policies, and paid for with an abundance of oil revenues, the Iranian Air Force had a veritable blank check in modernizing both its Tactical Air Force and its helicopter forces. Bell Helicopter-Textron, Incorporated, of Fort Worth, Texas, was hired as a prime contractor to develop both military and civilian helicopter assets in Iran. As part of this blank check philosophy, the Iranians purchased the very latest in attack helicopters of the time -- the advanced series of AH-1 Cobras. However, with the fall of the Shah of Iran, Bell Helicopter was ordered to leave the country and upon leaving took its skilled pilot instructors, maintenance and tooling teams, and spare parts supply contracts with it. Now, this once powerful force of advanced attack helicopters, numbering in the hundreds, has been reduced by attrition, and by lack of repair parts to less than 30. Further, purges conducted by the new regime decimated the experienced pilots, who were either killed outright by the vengeful mullahs or simply left the country, often taking their aircraft with them.

At the outset of the war, Iranian attack helicopters scored impressive results. With no shortage of targets from the Soviet styled armor and mechanized forces of Iraq, Iranian helicopters were able to roam the battlefield at will, destroying targets at random. This success can be attributed to a number of factors. First, even though equipped with Soviet style air defense weapons, the Iraqis

were never able to effectively coordinate the actions of its various arms. Thus, the protective umbrella afforded by air defense systems can be penetrated once command and control begins to break down. Here is an important lesson for the future. While the Iraqi air defense system was subjected to infighting from their own poor chain of command, rather than subjected to destructive attack, the end result was the same. Air defense systems must be tightly controlled, with rigid application of doctrine, in order to be effective. Breakdowns in that tight control will lead to gaps, through which attack helicopters can funnel their combat power with devastating results.<sup>48</sup>

#### Soviet Afghani Helicopter Operations

Perhaps the most widely used element of Soviet air power in their war in Afghanistan is the helicopter. Reliable estimates are that there may be between 500 to 650 Soviet helicopters in Iran, of which approximately 250 are Mi-24 Hind attack helicopter models.<sup>49</sup> The Hind is used primarily in a close air support role in Afghanistan, as would be the case in this type of limited intensity warfare. As reported in Aviation Week and Space Technology magazine, the Mi-8 Hip is also used in Afghanistan. "The Hips tend to be used in a stand off role, firing 57-mm unguided rockets as their main weapon."<sup>50</sup> The report also states that the Hinds, as more resistant to small arms fire, can fly closer

and lower than the Hips, which are more easily brought down. The insurgent Afghanis, or mujahidin, are infantry guerilla type forces only, and as such, do not operate mechanized vehicles in their battles against the Soviets. However, as the Mi-24 Hind is the most heavily armored attack helicopter in the world today, we may draw conclusions on its ability to survive against the rudimentary air defenses of the mujahidin fighters, and from those conclusions infer probable results of its capabilities against a more sophisticated air defense network.

Organic attack helicopters are a recent addition to Soviet Tank and Motorized Rifle Divisions, as they were formerly located only at the Army and Front level.<sup>51</sup> While technically a part of the Soviet Air Force, helicopters respond to the orders of the Soviet ground force commander in a manner not unlike the US Army relationship with the US Air Force,<sup>52</sup> as described below:

Other information on Hind tactics indicate that a closer relationship between air and ground arms has been a major aim of the Soviet force development (the helicopter is part of the Soviet Air Force). Hinds are the primary Soviet close air support weapon in Afghanistan. They not only strike enemy forces in contact with Soviet troops but sometimes carry out attacks as much as twenty to thirty kilometers forward of the forward edge of the battle area. This tactic is apparently an attempt to increase responsiveness, tactical flexibility, and integration with ground forces.

From this we see that the Soviets also conduct cross-FLOT operations with their attack helicopters. Let us now examine the mujahidin defense against the Hinds.

Initially equipped with only light small arms and a few heavy machineguns, the mujahidin were particularly vulnerable to air attack from the Hind attack helicopter. Without heavy weapons or MANPAD missiles, the mujahidin usually were forced to leave the area of engagement and wait  
53  
for another day.

The Hind is heavily armored, but it is not invincible.... To be honest, small arms fire and even light machineguns don't have much of a chance in downing a Hind.....12.7mm or .50 caliber machineguns can do more....A proper anti-aircraft gun, from 20mm on up, can shoot down a Hind with a good group of hits...The Hind cannot continue [its mission] with one engine shot dead. The power requirements of the Hind are such that both engines are necessary for normal flight.

Even though the Afghans initially were unable to destroy the Hind attack helicopter, they discovered that the helicopter crews could be distracted by large volumes of  
54  
ground fire. As reported in Military Review:

Even the feared Soviet Air Force has its critics. Although the heavily armed Hind gunship remains the most feared weapon, many eyewitnesses have noted that even the primitive air defenses of the resistance (mostly machineguns) will cause Soviet pilots to take evasive actions which severely degrade the effectiveness of their bombing or strafing runs.

Surely procedures that prevent attack helicopter crews from accomplishing their mission are only second best to the actual destruction of the helicopter. As will be discussed in greater detail later, a Soviet tactic against US attack helicopters is the rapid and concentrated fire of all available small arms and vehicle mounted machineguns at attacking helicopters. Even though this fire may not hit

the helicopter, the psychological effect upon even the best trained crews can cause the mission to be aborted at best, or cause the attack helicopter gunner to lose concentration on his target at the worst. This loss of concentration will provide the time for dedicated air defenses to engage, destroy or drive off the attackers.

With the introduction in 1980 of Soviet made SA-7 ail MANPAD missiles (purchased from Egypt, China and the U.S.), the mujahidin began to have greater success against the Hind and Hip helicopters. More recently, the US has supplied Stinger MANPAD missiles to the resistance fighters. This system, utilized in Soviet style "ambushes", where the Stingers are employed in conjunction with heavy machineguns, has at last given the resistance fighters a weapon that can bring down the formidable Hind, as well as other attacking aircraft. Again citing US government statistics, the resistance has destroyed over 600 Soviet aircraft, of which<sup>55</sup> over 100 have been the Hind attack helicopter. In fact, eight Mi-8 Hip attack helicopters were shot down on one operation in 1983. At least some of these helicopters have<sup>56</sup> been brought down by the SA-7 and the Stinger.

Adding to the weapons now available to the mujahidin, China has recently supplied an improved SA-7; the Swiss the Oerlikon 20mm cannon; the British the Blowpipe MANPAD missile. These new weapons, coupled with improved tactics, show that attack helicopters, even operating under the

dominating air supremacy enjoyed by the Soviets in Afghanistan, can be effectively engaged by only a rudimentary air defense system. The Afghanis, while perhaps lacking in overall training and state of the art equipment, have shown themselves to be capable of defending themselves against, and even destroying, the formidable Soviet attack helicopters.

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## CHAPTER FOUR

### U.S. Attack Helicopter Employment Doctrine

Doctrine, tactical employment, and target engagement priorities are aspects that affect survivability of attack helicopters. On board weaponry, pilot training and proficiency, enemy countermeasures, equipment malfunctions and many other variables also have an important impact. The first section of this chapter will look at current doctrine and its impact upon survivability, while subsequent sections review some of the other considerations.

As the most mobile of all forces, helicopters have the unique ability to perform a wide variety of missions. FM 1-100, Combat Aviation Operations, characterizes the<sup>1</sup> missions for the attack helicopters as follows:

1. Destroy enemy armor and mechanized forces by aerial firepower.
2. Destroy enemy Air Defense (ADA) assets.
3. Provide limited aerial fire support to maneuver forces.
4. Coordinate and adjust indirect fires when tactical air and artillery are employed.
5. Provide aerial escort to support aerial assault missions.
6. Destroy enemy helicopters that pose an immediate threat to the mission.
7. Destroy enemy communications and logistics assets.

The successful completion of these missions is

obviously of great importance to the ground maneuver commander, and he will expect his attack helicopter assets to accomplish these mission requirements successfully. As will be discussed later in greater detail, the Soviets have a wide variety and great quantity of sophisticated air defense assets designed to protect his forces from air attack, and designed to prevent the attack helicopter crews from accomplishing their assigned missions.

A widely accepted premise is that Soviet armored and mechanized forces outnumber US and Allied combatants by almost two-to-one.<sup>2</sup> (see table 4-2) At the risk of using an overworn cliché within the military, this "target rich environment" will present difficult choices for attack helicopters crews in target selection and engagement. As previously cited, FM 1-100, Combat Aviation Operations states that the primary mission for attack helicopters is the destruction of enemy mechanized forces. FM 1-112, Attack Helicopter Battalion, states the same premise that "the destruction of an enemy force" should be the primary purpose. However, the greatest threat to the attack helicopter is, of course, those air defense assets designed to destroy them. FM 1-112 outlines the engagement and target priorities as follows: (see Table 4-1)

**\*\*TABLE 4-1\*\***

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**TARGET PRIORITIES FOR ATTACK HELICOPTERS**

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|                           |                     |
|---------------------------|---------------------|
| Tanks                     | Command Vehicles    |
| Antitank Vehicles         | Attack Helicopters* |
| Mechanized Troop Carriers | Artillery           |
| Air Defense Artillery     | Troops in the Open  |

\*only when they oppose a threat to mission accomplishment

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**ENGAGEMENT PRIORITIES FOR ATTACK HELICOPTERS**

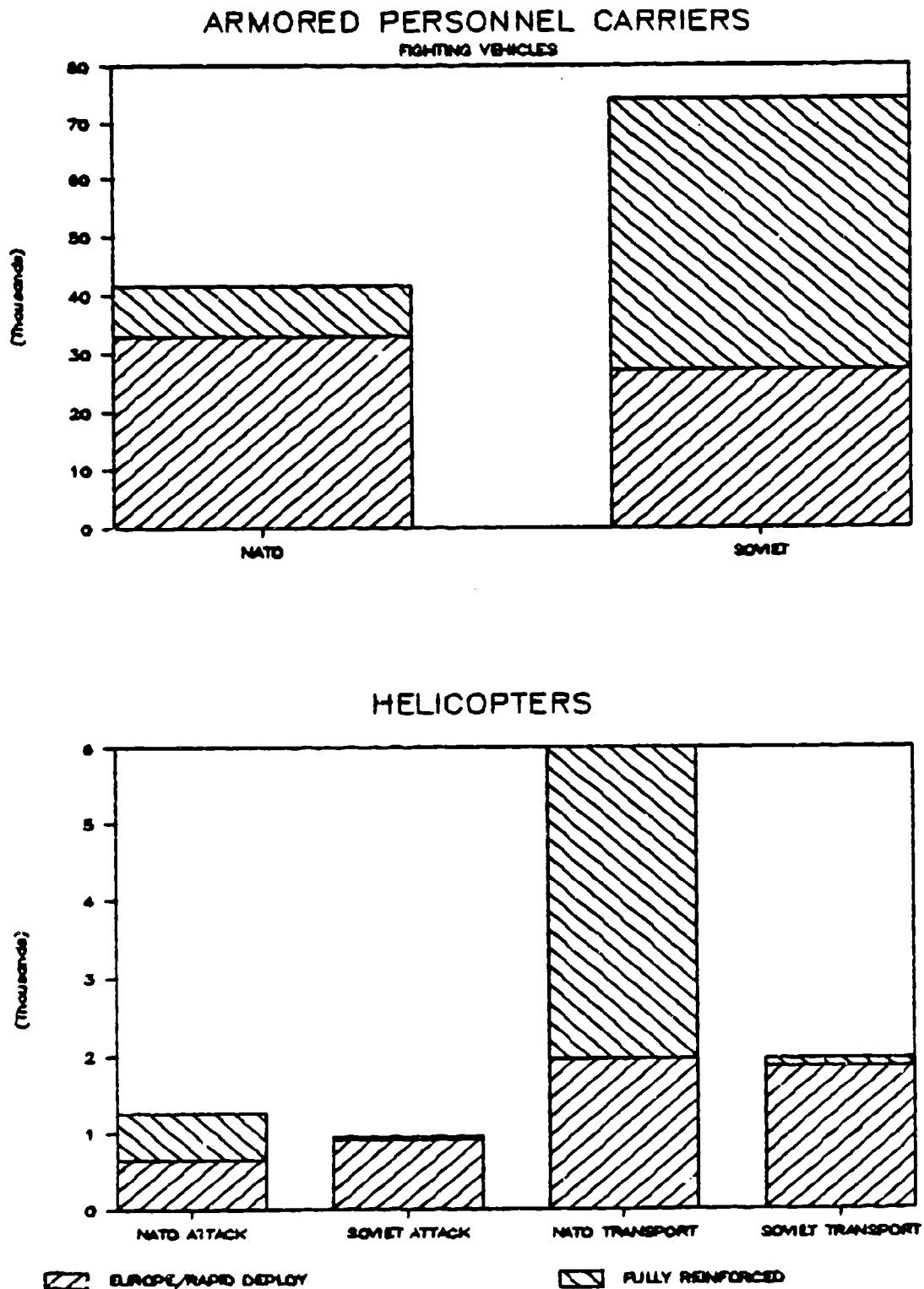
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1. Immediate threat to self
2. Immediate threat to team members
3. Immediate threat to friendly ground force
4. Other targets in priority

\*\*US Army Field Manual 1-112, Attack Helicopter Battalion, (July, 1986), p: 3-7.

**\*\*TABLE 4-2\*\***

**NATO-WARSAW PACT COMPARISON**



From an analysis of these tables and of the explicit guidance given in these two Field Manuals, one can find a perplexing situation that is forced upon attack helicopter crews. That question appears to be, "Do we accomplish our prime mission to destroy enemy armor and mechanized forces and avoid the AD weapons, or do we first attack our greatest threat, enemy AD weapons, so as to make our prime mission easier?" The manuals give this information and guidance to the crews.<sup>3</sup>

Modern AD weapons enable enemy forces to detect, acquire, engage, and destroy helicopters under all conditions of weather and visibility. Therefore, aircrews must effectively use the terrain, day or night, for cover and concealment during aerial movement. To survive, attack helicopter units must avoid detection by using proper operational techniques. If detected, they must deceive and degrade the Threat by using aircraft survivability equipment. If this is not possible, the units must destroy the Threat with organic or supporting fires.

Thus it appears that, doctrinally, attack helicopters may easier survive on the battlefield through avoidance rather than through offense. As we shall see later, the Soviets will make avoidance a very difficult task, indeed.

The preceding discussion has been directed primarily towards enemy ground based air defenses against US attack helicopters. An increasing threat, however, is enemy air-to-air actions. Those considerations are covered later in this chapter.

For the foreseeable future, US and Western Allies must then look to the one area where the Soviets do not have

a large quantitative or qualitative advantage -- helicopters. In addition to an overall three-to-one numerical advantage in total numbers of helicopters, US and Allied forces maintain a two-to-one advantage in attack helicopters. Over 50% of US and Allied attack helicopters are forward deployed within the North Atlantic Treaty Alliance (NATO) operations area, whereas the Soviets maintain a much smaller number. (see Table 4-1)

This Western Allied advantage is recognized on both sides as a major factor in any future conflict, and is discussed openly in the Soviet media.<sup>4</sup>

War games in both the Soviet Union and the West have confirmed the effectiveness of the anti-tank helicopter, a development that may eliminate the tank as a viable weapon of war.

Successful trials of anti-tank helicopters sparked debate in the Soviet Army's General Staff concerning the survivability of tanks; the reverberations of this debate reached the Mil' Design Bureau [major Soviet helicopter production company]. Soviet military doctrine relies heavily on the massive use of tanks in war, and since World War II, the Soviet Army has concentrated on increasing both the quantity and quality of its tanks. The appearance of the new anti-tank weapon threatened the very existence to its much vaunted tank armies.

The Soviets have recognized the growing effectiveness of advanced attack helicopters and are clearly planning for advanced countermeasures (see Soviet Air-to-Air Defenses, this chapter)

Field Manual 100-5, Operations, is the US Army's keynote field service regulation for the conduct of the AirLand Battle. This manual prescribes the current doctrine

for all Army forces and provides the framework within which the sister services develop their supporting doctrine. The current premise is that the combined arms team, employing all branches of arms, such as artillery, infantry, armor and aviation, is the most effective means of accomplishing the AirLand Battle mission. This may not, however, be the proper employment of air assets, and especially not the best utilization of attack helicopters, as concisely stated by  
5  
Lieutenant General Robert W. Riscassi:

Traditionally, we have tied attack helicopters to support of ground maneuver elements by employing them as part of the battalion combined arms team or as a "fire brigade" to react to a rapidly developing enemy threat. However, tying attack helicopters to ground elements may lead to less than optimal employment for several reasons.

First, it does not allow commanders to take maximum advantage of the helicopter's greatest assets--agility and mobility. Further, it causes the attack helicopters to operate in the forward line of own troops [FLOT] environment where it is more vulnerable to concentrated [enemy] air defense artillery and [to conventional] artillery.

Thus, we can recognize that there are still differing opinions on the employment of the attack helicopter. A basic tenet in AirLand Battle doctrine is "to bring friendly strength against enemy weakness" such a way as to have the needed mass, in space and time if not in totality, to overcome a numerically superior enemy. "Fight outnumbered and win" is the expression of the day.

The following paragraphs discuss the previously described missions outlined by FM 17-50:

Mission -- Destroy enemy armor and mechanized forces by aerial firepower

As we have learned, this is the primary mission of attack helicopters under the AirLand Battle scenario. However, attack helicopters are normally not well suited for direct attack against the leading edge of an enemy formation. Soviet doctrine calls for attacking elements to be a combined arms team, heavily supported by organic air defense systems, ranging from MANPAD missiles to fully tracked, mobile antiaircraft guns and missiles. This air defense team will be on full alert for aircraft of all types, and especially for helicopters, as they recognize its potential destructive effects. A Soviet three star general<sup>6</sup> describes their abilities as such:

When organizing an air defense for motorized rifle, tank and artillery subunits, it should be borne in mind that a small group of helicopters is capable, during just one attack, of knocking a tank element out of action and even a forward detachment.

This assessment has led to the Soviet air defense system of today, which is employed on the doctrine of mass and<sup>7</sup> defense-in-depth.

Favorable results can be realized when combat power is placed against the enemy rear area and against forces that are not yet in contact. These forces, enroute to support, relieve or exploit, are generally more vulnerable and should be easier to attack. As a result, attack

helicopters may employ the principles of war most appropriate -- those of surprise and concentration. According to FM 17-50, "no other combat force on the modern battlefield possesses the potential to apply the principles of economy of force, mass, maneuver and surprise as well as the attack helicopter unit".<sup>8</sup> Recognizing the inherent vulnerabilities, this field manual further states that attack helicopters can rarely accomplish this mission alone. It must be supported by friendly units which can suppress air defenses, enemy ground fire and enemy aircraft. The full spectrum of friendly supporting fires must be used, such as smoke to obscure enemy gunners' vision, artillery to keep armored crews buttoned up and to strip away air defenses, electronic countermeasures to confuse and disrupt communications, and air support to counter enemy aircraft. With all these assets coming into play simultaneously (or doctrinally -- synchronized), the attack helicopter appears to be a formidable system. However, if we assume these assets are now an absolute necessity for the conduct of attack helicopter operations, we then assume inter alia that the limit of the helicopters' zone of action becomes dependent upon the range of the supporting assets. Using nominal artillery ranges as an example, attack helicopters would seem to be limited to within perhaps fifteen (15) to twenty (20) kilometers of the FLOT. Operating beyond the range of supporting fires will place increased risk on

attack operations, as crews will be exposed to the full array of air defense systems found at every echelon within the Soviet Army.

Soviet doctrine calls for the echelonment of forces. The first echelon would consist of an advance guard, forward detachments, and then the main body of a Motorized Rifle Regiment or Armored Regiment. The first echelon is a main attack force and will contain the majority of the combat power of the formation or unit, with a mission to penetrate or defeat enemy forward defenses.<sup>9</sup> The second echelon, whose combat power is at least equal to that of the first echelon, is located at a distance behind the first which is sufficiently close for immediate commitment but yet far enough away to allow for maneuver and protection. While not fixed, this distance is normally from 15 to 30 kilometers behind the trailing units of the first echelon. The first echelon itself will occupy a depth from 5 to 15 kilometers.<sup>10</sup> As previously mentioned, if we accept that, at best, supporting operations for friendly attack helicopters reach out to only 20 kilometers, we can readily discern that the mission of attacking second echelon forces will most likely be made without supporting artillery fires. The earlier destruction of first echelon forces could, however, cause the Soviets to commit their second echelon prematurely. This would allow attack helicopters to continue their fight while remaining under the protective

umbrella of friendly supporting assets, as previously mentioned. This fact underscores the importance of defeating the first echelon either within the covering force area, or by denying their penetration into the main battle area (MBA).

Mission -- Destroy Enemy Air Defense Assets

This mission is an ancillary, yet important, assignment for US attack helicopters. Soviet ground air defense systems are designed to keep prevent US air assets from accomplishing their assigned missions. As targets in and of themselves, the destruction of Soviet air defense equipment is of little concern to a maneuver commander. Their importance lies in the fact that these systems can protect their supported arms from direct air attack, as evidenced by a Soviet Air Defense Officer:

The purpose of the air defense units is to rule out the effect of helicopter fire on the ground troops, to prevent them from conducting reconnaissance and shifting of air mobile groups and tactical landing parties.

By this doctrine, attack helicopters should therefore direct their fires against antiaircraft elements only when those elements pose an immediate threat. The attack helicopter appears to be much too vulnerable to the Soviet systems when on a one-on-one basis. Other offensive systems, such as tactical air and long range artillery, can be more effective and present less risk. If, however, the attack helicopters

are operating outside the range of supporting fires, enemy air defenses may need to be attacked directly. The Soviet ground air defense system is described in greater detail later in this chapter.

#### Mission -- Destroy attacking helicopters

This mission is also limited by the caveat of destroying only those attacking helicopters that impose an immediate threat to the accomplishment of the mission. Why do we have this limitation? Current models of US and Allied attack helicopters have only a rudimentary self-defense capability against other attack helicopters. (As of the time of writing this thesis, neither the US Army, nor the NATO allies, have deployed a dedicated air-to-air system on its helicopters. The US Marines have taken the lead in this area and have outfitted their attack helicopters with both Stinger and Sidewinder type air-to-air missiles. The US Army is expected to follow the lead shortly.) Even after eventual deployment of helicopter air-to-air missiles, electronic detection systems, such as airborne radar, will not be installed on Allied helicopters. Therefore, visual detection of hostile aircraft will be the only means available. (This is not to assume that enemy attack helicopters cannot be detected electronically by fixed air defense radars and the information subsequently transmitted to friendly systems. Even with that knowledge, the intruder

must then be located visually prior to a preventive attack.) Over a dozen years ago, the US Army Aviation Center recognized the potential threat that exists from enemy helicopters in an air-to-air engagement.<sup>12,13</sup>

Attack helicopter elements (formations) will be vulnerable to attack by enemy air elements anytime.....generally, engaging enemy aircraft is a chancy thing -- best avoided if there is not a threat to mission performance.

and:

In other words, it's getting late; now is the time to develop and test helicopter air-to-air combat tactics, techniques, procedures and appropriate weaponry.

While this shortcoming was recognized years ago, and was reconfirmed by the British in their Falklands campaign, the US has taken these years to field only an interim solution. In fact, the new family of light helicopters (LHX) that is being designed will not be available for battle for at least another 10 years. An air-to-air defense system for the current family of attack helicopters will be comprised of "off-the-shelf" components. Soviet helicopter air-to-air capabilities will be discussed in greater detail later in this chapter.

#### Mission -- Destroy enemy communications and logistics assets

The Soviet logistical support system is concentrated at two levels, <sup>14</sup> Front and Army. By assigning these responsibilities to higher levels, Soviet and Soviet style tactical units are much smaller than their US and Allied

counterparts. Thus, there are fewer logistical support activities, fewer maintenance repair centers, fewer supply depots and the like that can be found in the main battle area (MBA). Attack helicopters must then go well beyond the FLOT to acquire, attack and destroy those support systems. A consequence of this Soviet "support from the rear" concept is that a larger number of supply and repair vehicles will be transversing from enemy rear areas to the MBA. Again, the Soviet antiaircraft "defense in depth" doctrine insures that air defense coverages exist from the MBA through the rear areas. As attack helicopters penetrate that area in search of logistic and communication centers, the Soviet air defenses will be ever "thickened". As previously depicted, current operational doctrine states that the attack helicopter should operate under the protective umbrella of friendly artillery, electronic countermeasures and air support to be most effective. The mission of destroying logistical and communications centers will require attack helicopters to operate beyond the umbrella of supporting fires and, as such, will require extensive planning and coordination. Enemy air defenses will have to be avoided for the helicopter crews to arrive over their targets undiscovered and fully armed for their mission.

## Soviet Ground-to-Air Defenses

The Soviet inventory of tactical air defense weapons includes a variety of missiles, guns and support equipment. There are air defense weapons at every level of organization. As with other weapons systems, the Soviets have incorporated recent technological developments into newly designed air defense weapons while improving older weapons already in production. They have developed a wide diversity of air defense missiles while continuing to develop antiaircraft artillery (ADA).<sup>15</sup>

Overall, Soviet air defenses are based on three distinct phases. First, it is preferable to destroy enemy aircraft on the ground, by preemptory strikes as part of the element of surprise. Second, enemy aircraft should be destroyed in flight while still some distance from Soviet ground forces. Next, actions to destroy aircraft and helicopters that have penetrated into Soviet air sectors constitute the third phase. Assuming attack helicopters can be protected from destruction on the ground, and again assuming that low level and nap-of-the-earth (NOE) flight will protect them from destruction in the air until near the Soviet ground forces, we will now concentrate on this third

phase of Soviet defenses that will most likely confront friendly attack helicopters.

There are three principles under which any air defense force must operate -- that of detection, identification and interception. First, opposing aircraft must be detected. The Soviets employ a wide assortment of systems to detect attack helicopters. Long range radars -- fixed, mobile and airborne -- will cover the battlefield to great depths. Also, visual sightings from front line troops who also may have been alerted by the aural signature will be passed to the air defense headquarters. Direction of travel, type and number of aircraft, and similar information will be disclosed. Spottings by other tactical aircraft can also be expected to be forwarded. All these methods will tend to negate the element of surprise on the AirLand Battlefield. In fact, the aural signature previously mentioned may be a greater deterrent to surprise than will be a visual sighting, as sight must necessarily follow a straight line. Sound, on the other hand, can have a tremendous range and can reveal the attack helicopter's general location even when unseen and undetected by radar. Further, different models of helicopters have a distinct sound signature. Troops on both sides of a conflict will quickly become adept at identifying helicopters by sound.

The second requirement is for air defense forces to identify the aircraft. It pays few dividends continually to

report friendly aircraft to air defense headquarters. Soviet troops receive many hours of training in visual aircraft identification. While radar identification of aircraft is classified and beyond the scope of this thesis, suffice to say that if the helicopter is observed on radar for more than a few minutes, its identification as to friend or foe will soon be known.

The third requirement, after a correct identification of an aircraft has been made, is that the aircraft must be intercepted, engaged and destroyed or neutralized. The Soviet air defense forces are designed to do just that.

Signifying the importance placed on the air defense forces, the Soviets have formed a separate branch of the Soviet Ground Forces, the troops of air defense of the Ground Forces (voiska protivovozdushnoi oborny Sukhoputniykh Voisk, or abbreviated as PVO SV).<sup>16</sup> The formation of this special branch was largely due to two developments. First, the Soviets recognized the danger to their armored and mechanized forces from tactical airpower and from attack helicopters. Second, by increasing their reliance on ground air defenses, the Soviets were able to lessen the air defense role of tactical aviation at the Front level, leaving those aircraft free for air attack missions. With that background in mind, a discussion of the ground air defense system is now possible.

The ground system is designed around the defense-in-depth principle as previously discussed. The first element of the defense that the attack helicopter will likely encounter will be the soldiers themselves. Already highly trained in aircraft identification, Soviet soldiers "are trained to engage all enemy aircraft, especially<sup>17</sup> helicopters" with their individual weapons. Antiaircraft machineguns mounted on tanks, armored vehicles and wheeled support vehicles will also be directed at attacking helicopters. Main guns on tanks and armored personnel carriers, loaded with high explosive rounds, will also be fired at the attackers (see analysis of Lam Son 719, Chapter Two, for an example). While many, if not most, of these weapons may prove to be less than accurate against aerial targets, the heavy volume of fire can keep the attack helicopter from performing his mission. As the British discovered in the Falklands campaign, and as the Afghanis practice against the Soviets, even the best trained crews can be effected psychologically by intense ground fire.

Following next in the Soviet line of ground air defenses are the two formidable weapons most likely to confront the attack helicopter -- the SA-7 Grail, and the ZSU 23-4 Shilka. The SA-7 is a shoulder fired, MANPAD missile now in use by the Soviets and their Warsaw Pact Allies. Various models of this missile have been produced since 1969. The Grail is a heat seeking, surface-to-air

missile that has a range of approximately 3,500 meters. The effectiveness of this system depends on the missile's ability to lock on electronically to the heat source of the attacking aircraft. The Grail has seen extensive service in other combat theaters and is being continually upgraded. The defense against this missile consists of passive measures, such as infrared suppressors and jammers installed upon the helicopter. Also, as the helicopter engine is the largest source of heat, a pilot has a better chance of evading this missile if he can avoid exposing his tail to the missile gunner. The gunner is limited in that he must have a line of sight to his target and thus he is exposed to defensive fires from the helicopter or from supporting fires. The Soviets recognize the limitations of this missile and counter them by employing the missiles in mass. One major limitation is that the missile will not "lock on" to its target unless the target is flying at least 50 degrees away from the gunner. Also, the missile can only engage targets flying above a minimum intercept altitude of 50 to 100 feet.<sup>18</sup> Each Motorized Rifle Company in a Soviet type organization will have three SA-7 gunners, each with five missiles. The total number of missiles in a regiment exceeds 100. To further offset the limitations of this weapon, ambush techniques have been developed, wherein groups of missile gunners will position themselves on likely helicopter avenues of approach. The gunners will detect,

identify and engage the attack helicopter from their position of relative safety within seconds. The only defense against this ambush technique is that of selecting flight routes and profiles that avoid likely enemy areas of concentration.

The most fearsome of weapons that will face the attack helicopter is also the most ubiquitous on the battlefield -- the ZSU-23-4. The ZSU-23-4 is a fully integrated, self propelled antiaircraft system with four liquid-cooled 23 millimeter automatic cannons mounted on the front of a large, flat, armored turret. It has a capability of rapid fire of up to 2,400 rounds per minute, but is usually fired in bursts of 40 to 200 rounds. It can acquire and track low flying aircraft targets at an effective range of around 2,500 meters. It is also capable of firing on the move because of its integrated radar/gun stabilization system.<sup>19</sup> The ZSU is combat proven and scored deadly successes against Israeli aircraft in several encounters (see Chapter Three--Israeli Helicopter Operations). A major<sup>20</sup> research institute describes the weapon thusly:

This is a most impressive and highly dangerous weapons system. Firing two types of ammunition, an HE round for use against aircraft, and an API round for ground targets, the weapon gives the "firehose" effect when fired, as all rounds have a tracer base.

The ZSU-23-4 uses a high frequency "GUN DISH" radar system that operates on a very narrow beam, provides excellent tracking and is at the same time very difficult to

detect or evade. This feature leads to a rather limited acquisition range, but the Soviets compensate for this limitation by linking the system to other long distance acquisition radars.<sup>21</sup>

The onboard radar performs search, detection, automatic tracking and determination of range and angular position, while an internal computer solves the target/projectile intercept problems. It is also equipped with an automatic navigation system that gives accurate map coordinates to the crew. Day and night capability is possible through the use of infrared sites on most of the older models and with thermal sites on later versions.

According to FM 100-2-3, the Soviet Army -- Troops, Organization and Equipment, an attack helicopter crew will find at least one battery of four ZSU-23-4s per Motorized or Armored Regiment and at least 16 per division. The ZSU is not found in Soviet Army organizations above the division level and that is perhaps one major reason that attack helicopter engagement priorities need to be reevaluated. In the regimental first echelon, there would likely be only two platoons of two ZSUs each each. Those platoons must cover the other 118 armored vehicles in the regiment, spread out over 10 kilometers square. Thus, for every ZSU destroyed, approximately 30 armored vehicles would then be unprotected. As the ZSU is the most effective weapon against the attack

helicopter, its destruction would give the attackers a free  
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hand on the battlefield.

One possible shortfall of this weapon that may be exploited is the small amount of ammunition onboard the vehicle. The 2,000 rounds carried as part of its basic load of ammunition could be fired in less than 45 seconds. The dedicated supply trucks that follow the ZSU's are normally located 1,500 to 3,000 meters behind them and are not nearly as mobile. Continuous attack helicopter operations could cause the system to become depleted of ammunition and make it extremely vulnerable to destruction or neutralization.

Commanders should consider this vulnerability when determining the type of attack helicopter offensive principles that are appropriate. As an example, if the entire attack helicopter assets are employed at one time, then the maximum destructive power of the organization can be realized. With this technique, however, there is no sustaining power. Success or failure will depend on one single engagement. A phased operation, on the other hand, with only a portion of the available attack helicopters employed, can bring direct pressure over a longer period. Perhaps only one-third of the aircraft should be committed at any one time. Subsequent flights can be phased to arrive over the battle area so as to relieve the first flight as its fuel and/or ammunition is exhausted. This may be the appropriate method when considering an attack against Soviet

air defense systems that have only a limited ammunition supply, especially in the offense. Only the most skilled and disciplined of air defense soldiers can be expected to discipline their fire control and ammunition expenditures. Subsequent flights may arrive over the battle area to find<sup>23</sup> the fearsome ZSU-23-4's "defanged".

The Soviets also employ antiaircraft missiles, ostensibly designed against high performance aircraft, that could be used against attack helicopters. Flight tactics such as contour flying and extremely low NOE should hinder most of the Soviet air defense acquisition radars that feed information to the larger antiaircraft missile systems. However, within the past few years, several new systems have been developed to fill the gap between the ZSU-23-4's, heavy antiaircraft artillery guns and the high performance missiles found at Front and Army headquarters.

At the Soviet regimental level, attack helicopters will find two new short range missile systems. The SA-9 and the SA-13 are infrared homing missiles, launched from vehicles that are as mobile as the maneuver units they support. The SA-9 system consists of a cannister launcher mounted atop a wheeled vehicle, modified from the BRDM-2 series. The cannister holds four missiles that have a range of six kilometers and can reach an altitude of 15,000 feet. The target must be tracked visually prior to firing and the missile, once locked on to the target, will then home on to

the target's heat source. This is similar to the SA-7, but is not a derivative. The vehicle itself does not possess an internal radar, but rather is command linked to air defense headquarters. The helicopter's best defense against this weapon is in detection avoidance. Also, the vehicle is very light skinned and could be easily destroyed with machinegun and/or rocket fire.

The SA-13 system is a follow on variant to the SA-9, but it is mounted on a tracked chassis. It also carries 4 missiles, but its seeker warhead is much improved. Using a cooled infrared tracker, this missile is able to distinguish between active countermeasures, such as flares. Target tracking is again visual until launch of the missile.

At the Soviet division level, two radar guided systems capable of tracking and engaging helicopters can be found. The SA-6 is a track mounted vehicle that carries three missiles. These have a maximum range of 24 kilometers and may be fired at targets as low as 50 meters above ground level. The missile homes in on reflected radar energy, therefore the best defense for the attack helicopter is to remain at extreme NOE altitudes and/or remain behind terrain obstacles to avoid giving a radar signature. The SA-11 is now replacing the SA-6 at division level. The main improvement in this missile is that it carries its own onboard radar. Should the attack helicopter be tracked and identified, and the missile fired while the target is still

being tracked, the internal missile radar will be difficult to avoid as it has a look down capability. Again, the best defense against this system is to remain undetected.

The SA-8 is the other division level system. It is mounted on a six-wheeled vehicle, carries four missiles and has an internal radar system. This weapon is accurate to a low altitude of only 10 meters. The SA-8 system is amphibious and slightly more mobile than the SA-6/SA-11. As with most Soviet missile systems, the SA-8 can not be fired on the move and is especially vulnerable at that time. All of these tactical missiles are extremely fragile to artillery fire and will normally be employed outside of US artillery range. This is one more reason to suggest that attack helicopters will have more to face on deep attack missions than their intended targets. To capulate this discussion, a quote from the Army Aviation Center is relative:  
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[The] recapitulation of the Motorized Rifle Division organic air defense assets reflects that the [Soviet] division fairly bristles with protection. Maneuver divisions' air defense systems have both point and area defense elements. Their air defense regiments, SA-6s/8s/11s, are primarily the area defense assets. The remaining air defense assets of the divisions' subordinate elements are predominately point systems. As evident from the number of air defense assets, conducting close-in and deep strike operations means running a fearsome quantlet which can reach out and slap an allied combat or service support element down even though the allied unit may be somewhat removed from the FLOT.

The author asks, "Can American forces run this quantlet, avoid unacceptable attrition in so doing and still be an

effective force on the Battlefield? Obviously they can....by virtue of their mode of employment and their technological equipment." <sup>25</sup> Mr. Bravaro proposes five effective countermeasures against the Soviet PVO SV troops and their ground air defense systems that are worthy of consideration.

\*Terrain Flight--frustrating line of sight systems

\*Superior Weapons--outranging tank main guns, cannons and guided missiles

\*Night Operations--denying visual systems such as the SA-7/9/13

\*Aircraft Survivability Equipment--which provides a level of immunity from radars, lasers, heatseekers, small arms, and

\*Suppression of Enemy Air Defenses--using artillery, tactical air, attack helicopters in mass, etc.

These proposals can be effective against the enemy's ground air defense forces when intelligent planning is used. Perhaps the list should include the one item learned from Lam Son 719, that of avoidance. Meticulous planning in route selection, careful use of terrain masking, and the use of weather can be major factors in deep operations against a sophisticated, integrated air defense network. Those lessons were learned over 15 years ago and are as valid today as then. Even with these factors in mind we will be unable to avoid the ground gauntlet entirely. But using the factors mentioned may make the benefits outweigh the risk and keep losses to an acceptable minimum.

## Soviet Helicopter Air-to-Air Defenses

Aviation Week and Space Technology reports that the Soviets have long noted the US and NATO's extensive use of helicopters to conduct combat operations and of their urgent need to counter this threat. In addition to their increased reliance on ground air defense capabilities, a high priority program has been launched in the Soviet Union.<sup>26</sup>

Their tests have no doubt shown, as ours have, that the most effective antihelicopter weapon is another helicopter. The prospects of chance encounters coupled with a strong likelihood of aggressive air-to-air antihelicopter Soviet tactics constitutes a very vivid potential threat to our helicopter forces.

In addition to this very real threat of air-to-air helicopter engagements, the equation could be enlarged further by the likelihood of fixed-wing attack against helicopters (see Chapter Three, the British Falklands Operation). For the purpose of the thesis, however, this chapter's discussion will be limited to helicopter against helicopter.

The premise that helicopters should be given an air-to-air mission is rapidly gaining acceptance around the world. In his article "How to Fight Helicopters", Soviet Major General M. Belov states:<sup>27</sup>

Just as tanks have always been the most effective weapon against tanks, helicopters are the most efficacious means of fighting helicopters. Use of helicopters by both warring sides will inevitably lead to clashes between them. Like tank battles of past wars, a future war between well equipped armies is bound to involve helicopter battles.

The delay, disruption and/or destruction of enemy mechanized forces remains the primary mission of US attack helicopters. US Army Field Manual 1-107, Air-to-Air Combat,  
28  
states:

aircrews may have to engage enemy aircraft in ATA combat to protect themselves and to defend other members of the combined arms team. Once the enemy aircraft have been destroyed or forced to withdraw, aviation units can continue their primary mission. [emphasis added]

From this we can determine that the the engagement of enemy helicopters is only a secondary concern of US operational planners. Unfortunately, it now appears that the early destruction of US attack helicopters is a primary mission of Soviet attack helicopters. Articles in Soviet military journals make it clear that Soviet helicopters will be used  
29  
in ATA combat as well as in traditional roles.

Use of helicopters by both warring sides will inevitably lead to clashes between them. Like tank battles of the past wars, a future war between well equipped armies is bound to involve helicopter battles.

In all these cases, combat helicopters may fulfill missions to destroy aerial targets, cooperating either with the land forces or with each other. If combat helicopters are used to destroy similar enemy machines, they can operate from ambushes by waiting under cover for an enemy air raid in order to take off and make surprise missile launchings.

In addition to stating that Soviet helicopters will be used to engage US (enemy) helicopters, this article also tells us that "missile launchings" will be the preferred means of engagement. The Soviets apparently have been equipping

their helicopters with air-to-air missiles for a number of years, while the US has just recently begun to do so.<sup>30</sup>

The Soviet helicopters most likely to be encountered by US attack helicopters (in the near term) are the Mi-8 Hip, and the Mi-24 Hind. These helicopters have been in the Soviet inventory for a number of years and have been modified and upgraded several times. All Soviet helicopters pose a potential threat but at present these two are the most prevalent models that would likely be encountered in any ATA role.

The Soviets have generally departed from the US/NATO helicopter design methodology of specialization of types, such as attack, utility, transport, heavy lift, etc.<sup>31</sup> Soviet helicopters are designed for multi-mission roles. Under this design philosophy, the Hip is primarily used for assault and general cargo missions, but is often equipped with a variety of weapons systems. The Hip was originally designed for the air assault and troop carrying missions, but was outfitted for an attack role in later models. The "E" model has been called the "world's most heavily armed helicopter". Its armament can include a 12.7mm nose mounted machinegun, six 32 shot 57mm rocket pods ( or a combination of bombs), and four AT-2 Swatter anti-tank guided missiles.<sup>32</sup> As the Hip was originally designed as a troop transport, it is not heavily armored and thus is more vulnerable to small arms fire than the Mi-24 Hind.<sup>33</sup>

The Mi-24 Hind also has a troop carrying capability, in addition to its attack function. "It combines the functions of scout, transport, and attack helicopters", but its most obvious mission is in the attack role.<sup>34</sup> It is heavily armor plated, and as previously mentioned in Chapter Three, it is difficult to knock down with small arms fire or even heavy machine guns. Even the six-barreled 7.62mm "mini-gun" found on some US attack helicopters will not be particularly useful against the Hind.<sup>36</sup>

The most effective weapons at short range are turret-mounted guns and cannon, the 30mm chain gun of the Apache having excellent penetration, accuracy, and explosive effects out to 3,000 meters and the 20mm gun of the Cobra being useful out to 1,500 meters.....The 7.62mm machine gun is not effective beyond 1,000 meters and may well not penetrate Soviet helicopter armor even at ranges shorter than this.

The main armament systems on both Soviet and US attack helicopters are designed to defeat tanks and mechanized vehicles. Their enormous explosive power would obviously have catastrophic results against a thin-skinned helicopter. As such, both parties have conducted tests of their anti-tank armament against helicopter targets. TOW missiles, such as found on the AH-1 Cobra and on some NATO helicopters, as well as the Hellfire laser guided missiles found on the AH-64's, have been test fired at aerial targets. The results have been promising, but as these missiles were designed to be flown into their targets in a relatively straight line, their effectiveness against a target conducting rapid evasive maneuvering (EVM) in all

four axis of flight (pitch, roll, yaw, altitude) remains to be seen. Lateral mobility of the missiles is limited, as this was not a design criteria for use against armored vehicles. The advanced missiles have a higher speed than the wireguided TOW and can thus allow a lower exposure time to the helicopter crew. As recounted by COL Everett-<sup>37</sup> Heath:

The faster times of flight are of course conducive to the well-being of the helicopter and its crew because exposure to enemy view is reduced -- and it is detection that is the key to survivability. It is a well proven dictum in aerial combat that he who sees the enemy first can normally get into a position to fire first and will be the victor.

Both the Hip and the Hind are also equipped with advanced anti-tank missiles that could be used in ATA combat. The Hind "D" model carries four Swatter missiles, which use a radio guidance system for tracking. These missiles have a range of around 4,000 meters and a maximum time of flight of 21 seconds. The Hind "E" model is equipped with four Spiral radio guided missiles. Their maximum range is 5,000 meters, but with a much higher terminal velocity, they can cover that distance in 10 to 11 seconds.<sup>38</sup> One obvious disadvantage of these types of radio guided munitions is that they are prone to electronic jamming. Also, as with US systems, the helicopter must become "unmasked" before it can fire its weapons and remain unmasked until the missile impacts. (\*Note -- the AH-64 Apache may fire its missiles and immediately mask behind

terrain if laser tracking guidance is provided by another helicopter or by a ground based laser system operating on the appropriate laser frequency codes.)

As previously mentioned, US helicopters have not been designed exclusively for an air-to-air combat role. The Soviets, on the other hand, have apparently been working on two advanced models that either will be exclusively dedicated, or can be configured quickly, to the ATA mission. First, the Mi-28 Havoc, which has been seen in small numbers in Afghanistan, is beginning to show up in the Soviet helicopter inventory. Only a small amount of unclassified data on this advanced helicopter is available, but most<sup>39</sup> reports are that it is very similar to the AH-64 Apache.

In addition to the new Havoc attack helicopter, information on a completely new design -- the Hokum -- has recently become available. This helicopter uses a relatively new main rotor blade design system that will give it a great speed advantage over all other helicopters now in production. The concept is known as the ABC, or advancing blade concept. First designed by Sikorsky Helicopters of the US, the Soviets have used the design to overcome an inherent speed limitation in conventional helicopters. The ABC design allows a cruise speed approximately 50 per cent higher than conventional helicopters. This fact, along with the other information available on the Hokum, "may give the Soviets a significant rotary wing air superiority

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capability". This helicopter, indeed, may be a greater threat to US attack helicopters than the Soviet ground-to-air defense system. With the US Army's future helicopter system -- the LHX -- still on the drawing boards, any near term conflict may find US helicopter crews at a severe combat disadvantage.

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## CHAPTER FIVE

### Conclusions and Recommendations

The Soviet Union has developed and produced the largest air defense system in the world today. It is quantitatively and qualitatively superior to any system available or even planned in the US. The air defense forces, or PVO SV, is integrated, well trained, and motivated to perform the mission of destroying any enemy aircraft that comes into its acquisition range. The system consists of the full gamut of hand held small arms, vehicle mounted light and heavy machineguns, shoulder fired "MANPAD" missiles, antiaircraft artillery, and several models of very sophisticated and very mobile missiles. These are further supported by a radar and electronic intelligence network, designed to provide the early warning information needed to integrate the system into a formidable and efficacious organization.

The Soviet air defense system is of the highest technological standards, and they are continually investing in high technology weapons. There is a myth that seems to exist that Soviet weapons must be made "soldierproof" and are therefore less sophisticated than Western designed weapons. A British Soviet expert, Christopher Donnelly states that, "In some respects, by use of good engineering techniques and clever design, the Russians produce better

weapons systems than we do with high technology.<sup>1</sup> Further proof of Soviet technological prowess lies in the previously described ZSU-23-4 Shilka. This AAA gun system, introduced in 1972, has the highest state-of-the-art electronics, which allow it to fire on the move at a moving helicopter. The gun platform is fully stabilized, and the weapon is configured with an electronic navigation system. This could hardly be described as "antiquated". The Soviets have recently tested an even more sophisticated follow-on model, called the ZSU-<sup>2</sup>X. The US still has not fielded a forward area air defense gun system with the capabilities of the ZSU-23-4, let alone its successor, the ZSU-X.

With all these capabilities, we must, none the less, state unequivocally that there are weaknesses in the Soviet system. These weaknesses must be exploited if attack helicopter crews are to be expected to complete their missions without unacceptable loss rates. As previously mentioned, normal battlefield attrition must be expected and managed. But, as catastrophic losses can neither be managed nor afforded, we must, therefore, place our "strengths against their weaknesses". From Chapter Three on the Soviet ground and air defense systems, we found that the majority of the weapons that will be directed against attack helicopter crews are visually aimed during some portion of the target acquisition and engagement sequence.

The first layer of defense is obviously that of the individual soldier, armed with his personal and crew served weapons. While highly trained in aircraft recognition and engagement, he will be unable to track an aircraft that he cannot see. During the daylight hours, smoke from either battlefield fires or from deliberate emplacements through artillery, mortars and aircraft can be expected to reduce battlefield visibility and hence enemy antihelicopter effectiveness. Smoke, however, can not be all-pervasive on the battlefield, and it will affect helicopter crews as well as enemy soldiers, unless the helicopter is equipped with special low-visibility equipment.

Next, MANPAD missile gunners, armed with SA-7 Grails and their variants, are likewise required to visually detect and then identify their targets before firing. While the missile itself is immune to battlefield obscurants after "locking on" to its targets, it has no way to discern the identification of its intended victim and will track a friendly aircraft just as easily as one from the opposing force. Thus, the best survivability feature against MANPAD missiliers for an attack helicopter is detection avoidance.

Further, the most fearsome weapon, the ZSU-23-4 Shilka has visual tracking shortcomings. While the ZSU has its own onboard radar detection and tracking system, it is very limited in range and can not be expected to detect a

well flown low flying NOE helicopter until the very last moment. With literally hundreds of helicopter sorties from both warring parties coming within tracking range of the ZSU, the final determination to fire will be made only after a positive visual determination of aircraft hostility has been made. Again, battlefield obscurants will greatly hamper mission success for the ZSU crews.

In Chapter Four, several additional missile systems were discussed that have even more sophisticated radar and/or heat seeking tracking systems that, while ostensibly designed against higher flying fixed wing attack aircraft, could be used against helicopters. The radar tracking systems are, of course, limited to an electronic line-of-sight that will prove of little use to the well flown, NOE helicopter. "Avoid the radar and avoid the missile" will be the catchword of the day as an active, inexpensive and simple defense against those advanced missiles. As Mr. Richard Bavaro states in his article on The Operational Window,<sup>3</sup> "we will have to prop that window open." The window is any area that is not covered by an enemy target acquisition system or technique.

Next, we should consider the best "stick" to use to prop that window open. As discussed above, the weapons most likely to be used against helicopters will be dependent at least to some degree upon visual tracking. Since the presence of battlefield obscurants can neither be assured

nor relied upon, attack helicopters must exploit the next best thing. Night fighting will be the key to survivability against visually tracked weapons on the near to mid-term high intensity battlefield.

A British Navy test pilot sums up the rapid innovations that are quickly turning once<sup>4</sup> dreaded night operations into the routine:

Ten years ago, I was invited to fly a Sea King at low level using no outside references other than a monochrome TV monitor in the cockpit displaying images from a daylight TV vidicon camera bolted to the side of the helicopter. After only 30 minutes I had made a balanced professional judgement -- NO WAY! Yet three years later I was flying that Sea King at 100 feet above the ground in overcast starlight conditions over unfamiliar routes.

The US Army's AH-64 Apache has an advanced integrated sensor system called a TADS (Target Acquisition Designation Sight) that works with a FLIR (Forward Looking Infrared Radar) and other PNVS (Pilot Night Vision System) components that "will allow the pilot/or gunner to accurately search, detect, recognize and engage targets at significant standoff ranges. The PNVS provides the pilot with real-time thermal imagery of the terrain, permitting combat in total darkness."<sup>5</sup> This system will give a great advantage to attack helicopter crews by allowing a great strength -- night fighting -- to be used against a Soviet weakness -- visual target tracking and engagement. The short and near term problem for the US is that there are so few of these Apaches available or even planned for acquisition. An

interim solution may be forthcoming, however, with the production decision on a "C-Night" system for the AH-1 Cobra attack helicopters.<sup>6</sup> This night vision and target acquisition system will give similar night fighting capabilities to the large number of Cobra attack helicopters that are presently deployed in Europe. While this night fighting capability is long overdue, it will also bring a new uncertainty to sustained operations.

These types of advanced electronic, or "visionic", systems greatly increase the complexity and maintenance requirements of US attack helicopters. The primary method used to keep high operational rates for these helicopters are through what is known as "the Black Box" approach. Therein, all the sophisticated electronics are modularized and packed within electronic boxes. A self-diagnostic system is incorporated into these boxes that can give mechanics and avionics repair personnel clues to problems. These personnel are, for the most part however, unable to repair the components, but are trained merely to replace the entire box with a spare. In a mid- to high intensity conflict, where repair and replacement boxes may not be sufficiently available for the expected combat damage, the supply system will be sorely pressed to keep all the attack helicopters in a "fully mission capable" status. The only alternative will be to accept a degraded level of performance. It will likely be the night fighting

capability which will be lost first, for it is the most dependent upon fully functional electronics.

In addition to the increased demands on electronic repairs and/or replacements, the increasingly sophisticated night vision systems require a high degree of pilot proficiency. This proficiency can only be obtained by realistic and continuous training, for once the electronic night vision skills are mastered, they must be practiced regularly, or they will be lost. In peacetime training over the past five years, over 37 people have been killed in night training accidents. The percentage of night accidents involving night-vision goggles has increased dramatically in recent years. The US Army Aviation Center states:

The key, though, is to understand the limitations inherent in the night-vision devices, in our aircraft, and in ourselves. We need to understand that night-vision devices do not turn night into day. They greatly enhance our ability to fly at night, but there are limits.

The limits to these devices must be recognized and either the devices must be improved or the training changed. If lives and equipment are lost in peacetime training, then we can only imagine the greater losses that could be attributable to the devices in war.

Another area that should be investigated further is the requirement for communications in attack helicopter operations. Soviet same forces routinely train in employing effective techniques and equipment to jam navigation and communication systems. Efficient communications are an

absolute necessity for attack helicopters and their supporting aircraft teams, for without the voice command interchange, teamwork will cease and helicopter battles will denigrate to uncoordinated one-on-one engagements. How then, if all this be true, can the Army's attack helicopter expect to survive and perform its mission in this hostile environment?

Overall, we know from recent historical examples that helicopters in general, and attack helicopters in particular, can operate in a mid-to-high density air defense environment. The early models of the AH1-G Cobra attack helicopters had an excellent survivability record in the Viet Nam conflict. As we saw in Chapter Three, on the Lam Son 719 Battle, the North Vietnamese Army had constructed a massive integrated air defense network in Laos. The system employed the latest Soviet hardware, including radar guided guns, and were advised by Soviet PVO SV officers. Still, helicopter airmobile operations, supported by thousands of attack helicopter sorties, were conducted. To be sure, tactics had to be modified, and many shortcomings were noted. Those lessons learned, as mentioned in Chapter Three, have now become a cornerstone of present day aviation doctrine. Nap-of-the-earth flying, once thought unsafe, is now the accepted technique. Infiltration tactics after meticulous planning is used to penetrate the forward edge of the battle area (FEBA) and the forward line of troops

(FLOT), so that missions can be conducted deep behind the enemy lines. The now oft stated dictum of "Strike Deep and Win" was proven in the Lam Son 719 Battle, when over 120 helicopters flew 100 kilometers into strongly held enemy territory and accomplished a brilliant and daring operation.

Shortcomings to those operations were noted and the resultant corrective measures are now part and parcel of routine operations. Whereas the Viet Nam attack helicopter pilot was primarily restricted to day and visual flight conditions, the AH-64 Apache pilots can fly in almost any weather, day or night. Whereas the Israeli helicopter pilot flew over miles of trackless sand by visual or "dead reckoning" navigation, today's pilots use sophisticated Doppler Radar and inertial navigation systems to find their target areas with pinpoint accuracy. And finally, while British pilots on the Falklands had to hover their helicopters in the fog and during the dark, starless nights to locate their targets from close range, today's attack helicopter pilots use Forward Looking Infrared (FLIR) systems, Night Vision Goggles (NVG) and other sophisticated devices to see before being seen, to fire before being fired upon, and to leave the area in a mission accomplished status, before the enemy knew they were there.

In modern warfare, whether the forces are ground or air borne, there is a dictum that states "he who sees his opponent first, wins". Today's sophisticated weapons are

increasingly becoming "one shot -- one kill".<sup>9</sup> Recalling the three major goals of air defense systems -- that of detection, identification and interception -- the attack helicopter crew who is able to avoid early detection will have the greater advantage.

Field Manual 17-50, Attack Helicopter Operations<sup>10</sup> states that one must "avoid detection and gain surprise". In any encounter, "the aircraft getting his licks in first has the advantage".<sup>11</sup> As we have seen in repeated instances, any helicopter that can be detected can be engaged and a helicopter thus engaged must then disregard his primary mission and battle to survive. With the enemy's overwhelming superiority in air defense weapons, the only viable alternative is to develop the techniques, the tactics and the technology that will allow attack helicopters to avoid and/or delay early detection on the battlefield.

One technique that must be seriously considered is the use of carefully prepared and reconnoitered ingress and egress routes as an absolute necessity for attack helicopters on the modern AirLand Battlefield. Some writers have compared the helicopter's ability to use terrain to its advantage much as would infantry soldiers or mechanized forces.<sup>12</sup>

In a manner relative to the foot infantry, helicopters can infiltrate through a conventional air defense network, taking maximum advantage of terrain and vegetation for cover and concealment. Also, in a manner relative to mechanized infantry, helicopters

have the capability for swift movement with a large payload. Stated directly, helicopters are air vehicles that can operate in the ground environment. It is this unique capability that requires special considerations to defend against helicopters.

The maximum use of terrain, whether valley or ridgeline, river or forest, or simple "folds in the earth", must be stressed to the absolute maximum in training pilots to survive on the AirLand Battlefield. Staff officers must also be knowledgeable in the use of that terrain, for only in their Intelligence Preparation of the Battlefield (IPB) analysis can effective pre-mission routings be developed. In the rapidly changing battlefield situation that will likely be encountered, face-to-face meetings between mission pilots and ground maneuver commanders will be the exception rather than the rule. Thus, aviation staff officers assigned to corps, divisions and lower must be thoroughly cognizant of the factors of METT-T when advising ground maneuver commanders on the employment of attack helicopters, as their advice may spell the difference between mission success and failure. These officers must also be fully versed on Soviet air defense tactics. The most likely avenues of approach will also be known to the enemy, and his use of ambush tactics may preclude the use of the best terrain.

Target attack priorities must be firmly established and adhered to by attack helicopter crews. These priorities must be flexible and reflect the current situation. Many US

Army doctrinal manuals, as we have seen earlier, state rather simply that enemy armored and mechanized forces are the primary concern of attack helicopters. Air defense systems are only engaged when they appear to be a "direct and immediate threat" to mission accomplishment. One might postulate that, with the Soviet's overwhelming superiority in air defense assets, any flight beyond the friendly air defense umbrella would constitute a direct and immediate threat to attack helicopter crews. Crews may indeed find themselves more concerned with surviving than fighting. A reasonable alternative is a combination of assignments for attack helicopter crews.

A company sized element will most likely be the smallest formation used in attack helicopter operations. This element will consist of four scout helicopters and six to seven attack helicopters, and may be further task organized into platoon sized formations of various configurations. (Battle damage and maintenance requirements will conceivably preclude a full 4:6 or 4:7 ratio and a 3:5 ratio will be more common.)<sup>13</sup> Rather than assign this fighting element a single task, such as attacking enemy command and control vehicles, or attacking tanks as the first priority, the company should "mission organize" by assigning one fire team to engage enemy ADA while the others attack the primary targets. Obviously, as part of the pre-mission planning, armament loading for the different

missions should be considered. In this manner, approximately the identical amount of type ammunition would be carried by the company, albeit on different aircraft. In other words, three or four of the attack helicopters would carry strictly antiarmor weapons (such as TOW or Hellfire missiles), while the remainder would carry weapons that are more effective against thin-skinned ADA systems and troops, such as 20mm or 30mm cannon ammunition or 2.75 inch FFAR rockets with "Flechette" warheads. Thus, these now "dedicated" counter air defense teams will be more mission capable as to their ordnance payloads, the crews will be more attuned to their primary mission, and supporting fires<sup>14</sup> will be available to the primary "tank busters".

Additional technological work must continue in order to develop Aircraft Survivability Equipment (ASE) that can meet the increasing "smart" weapons being developed. The<sup>15</sup> purpose of ASE is five-fold:

1. Reduce the aircraft signature/ detectability.
2. Provide an alert to the aircrew of a threat.
3. Provide a means for the pilot to weaken the threat function of acquisition or firing.
4. Provide a signal that decoys a weapon.
5. Provide an airframe design that can withstand a degree of damage without mission degradation.

While a great deal of inherent survivability has been built into the AH-64 Apache, such as low infrared detectability, IR jammers, radar chaff dispensers, and radar detectors and jammers, much work remains to be done to meet<sup>16</sup> continued Soviet developments in smart munitions. The

advanced SA-7 Grail MANPAD, that is now being produced, has a filter in its seeker warhead that can discriminate between an engine exhaust and extraneous heat sources, such as flares, battlefield fires, and even the sun. (Jet fighter pilots are well aware that at the altitudes normally flown by interceptors the sun is a major "target", on which heatseeking air-to-air missiles can lock.)

In addition to the ASE installed on attack helicopters, additional training emphasis must be placed on pilot proficiency with that equipment. Much of the equipment is complex and somewhat prone to failure. Also, there is often little opportunity to engage in force-on-force training that will exercise the full spectrum of a typical threat environment for attack helicopter crews. This proficiency can be increased by ASE Trainers that are now being developed. With these trainers, pilots will have an opportunity to practice tactics and techniques that will enhance their survivability on the battlefield. Unfortunately, these trainers are not yet available for in-flight proficiency practice, as those have yet to be procured. As the sister services have their "Top Gun" training centers, so must the US Army develop a training school whereby attack helicopter pilots will be able to garner the "experience necessary to obtain the skills of a seasoned combat aviator without the risk of loss of life or equipment".<sup>17</sup>

Finally, the US Army must decide on the proper role of helicopter air-to-air combat. As we have seen, the Soviets have been equipping their attack helicopters with air-to-air missiles for a number of years, and yet, at the time of this writing, only the US Marine Corps has fielded an air-to-air missile on its AH1 series of Cobra attack helicopters. Still to be decided in the Army is the question of whether or not dedicated ATA combat helicopters will be necessary, or whether an "add-on" system for self-defense is all that is required. The answer to this question should be readily apparent. Paraphrasing Soviet General Belov, "just as tanks are the most effective weapons against tanks, so attack helicopters are the best weapon against other helicopters". The Soviets have designed and are now producing two advanced attack helicopters, with one seemingly designed exclusively for an ATA role. (See Chapter Three.) This air-to-air requirement has been recognized for many years within the US Army, but, for reasons mostly unknown, has only recently gained the long overdue attention that will be required to counter the growing Soviet threat.<sup>18</sup>

The Soviets have recognized three basic military principles in their approach to ensuring victory against US/NATO forces.<sup>19</sup> First is the principle of "negate the negation". Any weapon system that appears to have a negative effect on a Soviet system must be itself countered

by a superior system. The second principle is of the total coordination of all arms, or a commitment to the combined arms philosophy. Writing in the classified Soviet journal Voyennaya Mysl (Military Thought), LTG Ivan G. Zavyalov<sup>20</sup> notes:

...each Soviet weapon is developed in relation to the capabilities of all other weapon types, in close coordination with them, and in such a way that the weak points of one are compensated for by the strong points of another.

The third major principle is to utilize attacks based on<sup>21</sup> "overwhelming forces at the outset of hostilities". As is well known, once the Soviets have decided that a particular weapon system is needed a mass production order for the system is planned. Thus, US attack helicopter crews will find the "target rich environment" so often quoted (see below) and will also find that they are being actively hunted by Soviet attack helicopters.

The Soviet principle of mass will guide them to produce large numbers of attack helicopters. The US Army, on the other hand, has drastically reduced the number of required AH-64 Apache helicopters from 1,206 to 593.<sup>22</sup> This reduction is ostensibly designed to save money for the more ambitious LHX (Light Helicopter, Experimental) project, which by all reasonable estimates is still ten years away from production. What is urgently needed is more, not fewer, attack helicopters. As previously cited, US/NATO

forces are outnumbered by a two-to-one conventional  
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superiority, as further described below:

.....the 100 divisions the Warsaw Pact can throw against West Germany contain 30,000 tanks and about the same number of armored personnel carriers and self-propelled artillery. An Air Force official calls it a "target-rich environment", and then adds, "just like the one Custer faced".

In order to answer the challenges that face attack helicopter crews today, the following recommendations should be considered, and appropriate corrective action taken:

- \*\* Training with force-on-force to accomplish the "train as we fight" imperative.
- \*\* Use smoke to simulate realistic day/night combat conditions.
- \*\* Training of aviation staff officers in selection of terrain for ingress, egress and masking.
- \*\* Training in use of the "operational window" for detection avoidance.
- \*\* Doctrinal analysis for target engagement priorities.
- \*\* Increase acquisition of ASE equipment.
- \*\* Increase authorized numbers of Apache helicopters.
- \*\* Air-to-air capability now.

If attack helicopters are to have a fighting chance of success on the AirLand Battlefield, they must have the correct equipment for the air-to-air battle, the correct doctrine for target engagement and the correct tactics and techniques for acceptable battlefield survivability. As Custer discovered, there will be no second chance, and the Major Reno LHX will not arrive in time either.

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