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Air-to-Air Defense for Attack Helicopters

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Fort Leavenworth, Kansas 66027

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A Master of Military Art and Science thesis presented to the faculty of the US Army Command and General Staff College, Fort Leavenworth, Kansas 66027

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In view of current Soviet emphasis on armed helicopters, is there a need for an air-to-air defensive weapon system for U.S. attack helicopters?

The Soviet Union is moving into the area of helicopter employment with a great deal of enthusiasm over a relatively short period of time. Doctrinally, the Soviets have emphasized airborne operations to the rear of enemy forces. This doctrine remains valid, with emphasis being placed on airmobile operations

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rather than on parachutists. An advanced attack helicopter that is designed for antitank operations has been introduced into the Soviet inventory. This attack helicopter is armed with additional weapon systems.

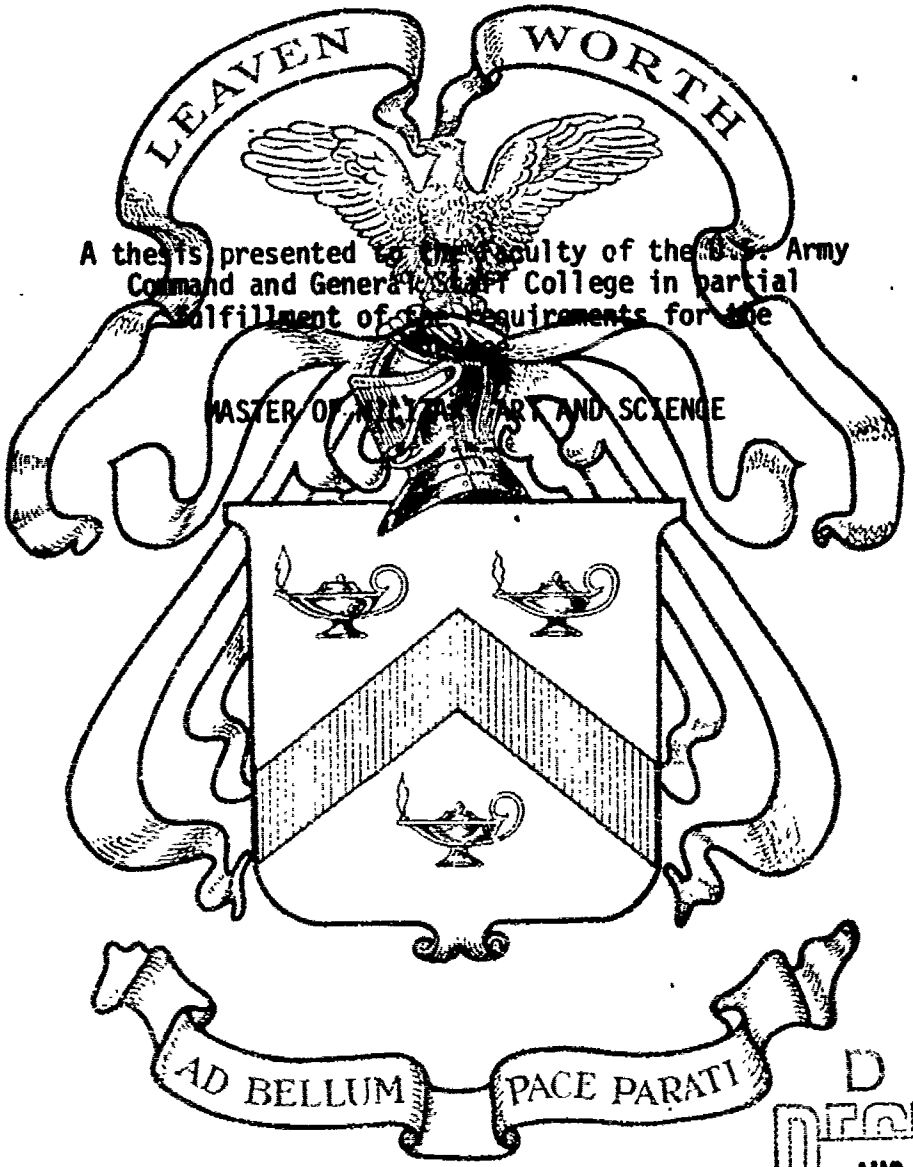
European weather phenomena will provide excellent periods during which attack helicopters can be employed. Past tests and experiments have proved that detection of helicopters by high- performance aircraft would be extremely difficult even during periods of unlimited ceilings and visibility. Weather data compiled in Europe indicate that prolonged periods of ceilings of less than 1,000 feet occur frequently.

US and Soviet doctrine is focused on using weather as a means of increasing the survivability of attack helicopters. During periods in which ceilings are reduced, attack helicopters from the United States and the USSR will operate on the battlefield. The tactics which will be employed by both nations will be similar. In addition the basic characteristics of the helicopters will be the same. These aircraft will be capable of moving over the same terrain and performing the same maneuvers. Only within the area of weapon systems does an obvious gap exist.

The gap that currently exists in the area of air-to-air defense for attack helicopters must be filled if the US is to continue its lead in attack helicopter operations.

Classified appendixes located at the classified library, US Army Command and General Staff College, Fort Leavenworth, Kansas.

AIR-TO-AIR DEFENSE FOR ATTACK HELICOPTERS



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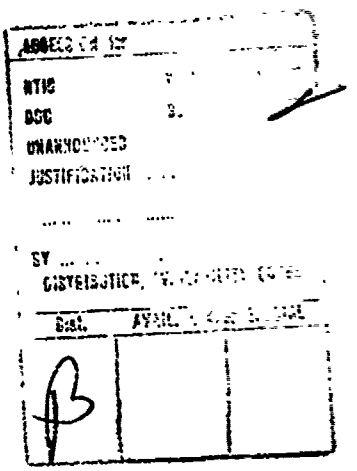
MASTER OF MILITARY ART AND SCIENCE

by

ROBERT C. KNIGHT, USA
B.A., UNIVERSITY OF NEBRASKA AT OMAHA, 1973



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The opinions and conclusions expressed herein are those of the individual student author and do not necessarily represent the views of either the U.S. Army Command and General Staff College or any other governmental agency.

TABLE OF CONTENTS

ABSTRACT

In view of current Soviet emphasis on armed helicopters, is there a need for an air-to-air defensive weapon system for U.S. attack helicopters?

The Soviet Union is moving into the area of helicopter employment with a great deal of enthusiasm over a relatively short period of time. Doctrinally, the Soviets have emphasized airborne operations to the rear of enemy forces. This doctrine remains valid, with emphasis being placed on airmobile operations rather than on parachutists. An advanced attack helicopter that is designed for antitank operations has been introduced into the Soviet inventory. This attack helicopter is armed with additional weapon systems.

European weather phenomena will provide excellent periods during which attack helicopters can be employed. Past tests and experiments have proved that detection of helicopters by high-performance aircraft would be extremely difficult even during periods of unlimited ceilings and visibility. Weather data compiled in Europe indicate that prolonged periods of ceilings of less than 1,000 feet occur frequently.

US and Soviet doctrine is focused on using weather as a means of increasing the survivability of attack helicopters. During periods in which ceilings are reduced, attack helicopters from the United States and the USSR will operate on the battlefield. The tactics which will be employed by both nations will be similar. In addition the basic characteristics of the helicopters will be the same. These

aircraft will be capable of moving over the same terrain and performing the same maneuvers. Only within the area of weapon systems does an obvious gap exist. The gap that currently exists in the area of air-to-air defense for attack helicopters must be filled if the US is to continue its lead in attack helicopter operations.

Chapter 1

INTRODUCTION

Increased emphasis concerning the future of Army aviation and employment of helicopters in a mid/high intensity conflict combined with emerging results of the 1973 Mideast War indicate that attack helicopters are an integral member of the combined arms team.

In view of the proposed use of attack helicopters, the mission of air cavalry units in Europe, the soviet air threat to helicopters, the current doctrine, and the tactical employment of US Air Force assets, is there a requirement for an air-to-air defense capability for attack helicopters?

In order to evaluate the requirement, the feasibility of such a system must be evaluated. Current tactics and doctrine of both services must be examined. A determination must be made whether existing assets and methods of employment will, in fact, accomplish the mission with minimum loss of men and equipment.

BACKGROUND

Limited tests and experimentation have been conducted concerning air-to-air defense for helicopters. At this writing, however, there are no on-going tests, studies, or programs which address air-to-air defense for helicopters.

The threat of attack helicopters to mechanized and infantry formations is recognized by many nations. This has led to the development of sophisticated antiaircraft weapon systems, radar to detect low-flying aircraft, and intense training of ground antiaircraft radar crews. At the same time, advanced helicopters are being developed to overcome these defenses. Within our own Services, existing tactics and doctrine are being changed and new doctrine and tactics are being developed to increase helicopter survivability.

STATEMENT OF THE PROBLEM

Is there a requirement for an air-to-air defense capability for attack helicopters? Can such helicopters survive on the battlefield, using current weapon systems and being supported by Air Force tactical fighters? Can they complete their assigned missions with minimum losses of men and equipment? Are the US Army and Air Force working together as a team? Can they do so? Are Army attack helicopter and Air Force tactical fighter crews equipped and trained as a team? If not, can they be equipped and trained?

METHOD OF INVESTIGATION

The basic method for evaluating a requirement for an air-to-air defense capability will be through research of available documents. Past tests will be analyzed to determine if an air-to-air weapon system is feasible. Current tactics and doctrine will be evaluated. Missions of the US Air Force and missions of air cavalry units in Europe will

be thoroughly analyzed. The air threat of other nations, as well as their proposed employment of helicopters, will also be analyzed. Available data will be researched and presented. Data will be analyzed that will either support the requirement or demonstrate that no such requirement exists.

Helicopters will fight on future battlefields and they will perform a variety of missions, to include actions beyond the forward edge of the battle area. Many of these missions will depend primarily on the element of surprise as a means of survivability.

This study assumes that the US Air Force can support helicopter operations within its capabilities and based on its priorities.

Other threats to helicopters will not be examined in depth. Some of these will be outlined to support the fact that the Army is spending a considerable amount of money on research in order to improve the survivability of the helicopter. If the threats being tested are valid, and means to overcome these threats are developed, the question still remains of what is being accomplished concerning the air-to-air threat?

BACKGROUND

Helicopters were employed extensively in Vietnam in resupply missions, troop transport, and a close air support role. Vietnam provided an active hostile environment which tested the abilities of crews and the survivability of helicopters against the enemy ground forces. It has been due, in part to the outstanding combat record of

helicopters in Vietnam that more sophisticated weapon systems and advanced attack helicopters are being developed.

In Cambodia, attack helicopters successfully engaged and disabled enemy armored vehicles. That success led to the development and production of the AH-1Q attack helicopter armed with the TOW antitank missile.

The Soviet Union was also able to obtain information concerning the US role of attack helicopters in Vietnam and Cambodia. Today the Soviet Union has an antitank capability for the HIND A, the Soviet's primary attack helicopter. The Soviet Union also enjoys the advantage of training its attack helicopter crews in the European environment. It is in this same environment that a potential future conflict may develop.

The evolution of a large helicopter force within Warsaw Pact Nations indicates an increased awareness of the role of helicopters in any European conflict. It must be assumed that the Soviets are also developing new doctrine. Much of their doctrine will probably be based on what is known concerning US tactics and doctrine. If a gap existed concerning an air-to-air defense capability for US attack helicopters, it would appear feasible that Soviet doctrine would capitalize on it.

Even though the US enjoyed complete air superiority in Vietnam, that will certainly not be the case in any European conflict. This fact in itself cannot be the sole basis for determining a requirement for an air-to-air capability for attack helicopters. Other factors, such as the threat from other helicopters and limitations due to

adverse weather conditions, enter into any European scenario. These two factors should be major considerations.

If, in fact, it is determined that the US Air Force and the US Army could work as an integral team on air operations, will weather permit it? If air superiority was achieved, or not even contested, could the US Air Force fly every day that helicopters could? In view of the increasing numbers of US and USSR attack helicopters armed to perform antiarmor operations, the probability of meeting engagements between these two opposing attack helicopter forces increases significantly.

Available weather data compiled over a period of years in Fulda, Germany, will be examined. In determining whether the Army and Air Force can operate as a team, the European weather will be evaluated. Nature itself may hamper the combining of these forces. Periods of low ceilings and reduced visibility provide needed concealment for attack helicopters. Both the US and USSR can be expected to take advantage of this type of weather to conduct antiarmor operations. This will increase the possibility of a situation which pits attack helicopter against attack helicopter. In light of this, can the United States afford a void in air-to-air defense capabilities for attack helicopters?

Chapter 2

REVIEW OF RELATED LITERATURE

The growing role of attack helicopters on future battlefields is fully appreciated by many world powers, as indicated by the following extract:

> "Until recently, helicopters played a secondary role on the battlefield. They were employed for providing various types of support for the ground forces. However, the situation at the present time, as borne out by the foreign press, is quite different. The need for effective air operations in destroying mobile and small targets, particularly tanks, has revived interest in helicopters . . . ."
>
> "The air defense methods to be employed against helicopters will depend upon the nature of the actions carried out by the latter, the number of antiaircraft subunits and also upon their fire potential."
>
> "In view of the fact that the helicopters will rarely be used in middle altitudes, the antiaircraft gunners must master the art of destroying targets at altitudes just several meters above the ground. Here a considerable amount of importance is attached to anticipating the course to be followed by the helicopters and the targets of their strikes. If it is determined that the deployment of the antiaircraft subunits is not in keeping with the interests of air defense, then the deployment should be changed to insure that the helicopters will appear within the range of effective fire of the PVO (air defense) weapons . . . ."[1]

This quotation presents the views of a Soviet General Officer concerned with air defense. Other Soviet officials are analyzing air defense doctrine to improve their employment of Soviet helicopters.

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[1] V. Gatsolayev, LTG of Arty, Soviet Army, Military Herald, No. 11, 1973, pp. 65-70.

The Soviet Union gained an appreciation of helicopters as a result of United States involvement in Vietnam. Using data produced as a result of Vietnam, the Soviets embarked on a new venture. An increased number of helicopters were introduced into the Soviet military during the previous decade. Although sources differ in their estimates, the figure of 2,500 helicopters is generally accepted.[2]

The first production of a true helicopter gunship within the Soviet Union occurred in 1970. The MI-24 HIND was, according to a Czechoslovak aviation magazine, ". . . designed on the basis of technical specifications similar to the S-67 BLACKHAWK."[3] (A US attack helicopter prototype) No other comments were provided concerning this interesting statement. The HIND is heavily armored, mounting a machinegun in the nose. Rocket pods, along with four antitank guided missiles (ATGM), are mounted on its wings. Classified data is included in appendix I.

Soviet employment of armed helicopters is the subject of varied reports; each Soviet analyst has his own views. One source states that Soviet helicopter assets are distributed throughout the armed forces. During wartime, at least one tactical air army could be expected to support each Soviet front (army group).[4] Classified sources present yet another figure, which is provided in appendix II.

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[2]The Military Balance, 1974-1975, the International Institute for Strategic Studies, London, Eng., 1974, p. 10.

[3]Another Mi, Letectvi a Kosmonautika, No. 9, 1974, pp. 20-21.

[4]Gazaham H. Turbiville, Military Review, October 1975, p. 5.

Additional helicopter threats are noted in Soviet planning for heliborne assault forces. The following was taken from a Soviet military journal:

> "The importance and significance of tactical (heliborne) landing forces have greatly increased in modern combat. These forces may be assigned various tasks: delay the entry of the enemy's reserves; destroy nuclear attack weapons; occupy and hold water crossings and sections suitable for crossing in force; destroy command posts in the rear; hold mountain passes, gorges, road intersections, and other important tactical areas or facilities of the enemy. In addition, they can seize sections of a shoreline and thus contribute to the landing of Marines."[5]

The Soviets initially focused on transporting airborne infantry units on heliborne operations. This was based on the inherent light weight of such a unit. The increased lift capability of current Soviet lift helicopters leads to the planning for employment of motorized infantry units. After testing this concept, the Soviets realized the potential of lifting motorized infantry ahead of advancing divisions to seize key terrain.

The Soviets are also well aware of the vulnerability of a heliborne force to ground and aerial weapon systems. Tactical fighters and helicopter gunships are included in the planning from the time troops are picked up until they are airlanded. One Warsaw Pact nation noted:

> "It seems that the enemy will endeavor to wipe out a tactical assault operation from the moment it is discovered, during the assault landing. Therefore, an airborne tactical assault should be given protective fighter cover during the entire process.

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[5]K. Urtayev, The Battalion of an Air Assault Force, Voennyi Vestnik, No. 3, 1971, pp. 20-25.

> This threat will increase as the assault force approaches the landing area. This can be prevented only by assigning a maximum number of fighter aircraft to provide air cover during the final assault stage."[6]

Whether or not the Soviet planners envision employment of fighter aircraft to support all helicopter operations can only be left to theory. Soviet interest in an air-to-air defense system for attack helicopters is a subject of yet another question. This topic is addressed in part by a classified source and is included at appendix III.

The Soviets, living within the European environment, are more cognizant of the weather phenomena than the infrequent US visitors. During past wars the Soviets have skillfully used the weather to defeat enemy forces. One cannot dismiss weather as insignificant in any battle. Can it be assumed that the Soviets will not employ helicopters on those days that will preclude support from fighter aircraft? That is, indeed, a doubtful assumption. If the Soviets are aware that the United States does not possess a dedicated air-to-air defensive weapon system for its attack helicopters and that the weather will prevent use of fighter aircraft, who would oppose a Soviet helicopter threat?

US HELICOPTER OPERATIONS

The United States, with years of experience in employing attack helicopters in Vietnam, is also changing doctrine and developing

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[6]Henryk Majcherek, Fighter Cover for a Tactical Landing Operation, Wojskowy Przeglad Latniczny, September 1969, pp. 3-7.

advanced attack helicopters. In addition to experience gained in Vietnam, data produced as a result of the 1973 Mideast War has resulted in significant re-evaluation of current doctrine and testing of proposed countermeasures.

The US Army expended twenty man-years and four hundred and seventeen thousand dollars in funds to overcome the threat posed by radar and radar-controlled antiaircraft weapons. The HELORADE (Helicopter Operations in a Radar Environment) test has produced results that will assist helicopters in operating within a hostile radar environment.

Other systems being tested include the use of chaf rockets to block radar. The rocket fires pieces of aluminum strips which block radar reception of the actual target. A radio system, which will indicate the direction to a radar installation, and study of the use of smoke to increase survivability are also ongoing combat developments efforts.

The testing of proposed systems for helicopters is not a new innovation for the army. The subject of air-to-air defense is not new either. In December 1970 General Dynamics, a civilian firm, submitted a proposal to the US Army. The proposal was for an air-launched missile for attack helicopters.[7] General Dynamics outlined their proposed weapon system, which included test data based on actual firing tests. Detailed results, which are classified, are included at appendix IV.

Possibly as a result of the General Dynamics proposal, the US Army Combat Developments Experimental Command (CDEC) at Fort Ord,

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[7]General Dynamics, Technical Proposal for RAM, an Air-to-Air Armament System for Attack Helicopters (U), Pamona Operation Publication CPC-2514, December 1970.

California, conducted a series of tests entitled Test 43.1, Air-to-Air Defense for Attack Helicopters. The results produced from the test were concerned with the detection capabilities of high-performance aircraft versus helicopters. Simulated engagements were also recorded by gun-mounted cameras that were installed in the jet aircraft. The results of this test, which are classified SECRET, are provided at appendix V.

Testing of air-to-air weapon systems for attack helicopters was apparently curtailed from 1971 until September 1974. There is no data which indicates that any tests, studies, or evaluations were made during that period.

In August 1974 a report was submitted by the US Army Materiel Systems Analysis Activity concerning the use of the attack helicopter in an air defense role.[8] The report focused on the feasibility of employing attack helicopters to augment the capabilities of existing ground systems in defeating an air threat. Results of this report are summarized in appendix VI.

Following this report was a second report from the Air Warfare Division. This report was based on computer simulations, using an attack helicopter that mounted varied defensive missiles against a simulated high-performance aircraft threat.[9] Computer simulations were

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[8]US Army Materiel Systems Analysis Activity, Air Warfare Division. Comments on the Attack Helicopter in an Air Defense Role (U). Interim Note No. A67 (Confidential). Air Warfare Division Publication, August 1974.

[9]US Army Materiel Systems Analysis Activity, Air Warfare Division. Helicopter for Air Defense Missile Intercept Simulation (U). Interim Note (unnumbered) (Confidential). Air Warfare Division Publication, September 1974.

made against several types of high-performance aircraft. The missile systems employed were also varied. A summary of the results is provided in appendix VII.

On the other side of the coin is the doctrine to support an air-to-air capability. The problem of doctrine is compounded by the division of the responsibility for preparation of manuals to support helicopter operations. The US Army Aviation School published a draft manual on the employment of helicopters in a high threat environment. The field manual, published in March 1975, presents a comprehensive approach to the subject of aviation employment.[10] Included in the field manual are potential threats to helicopter operations, which include an enemy helicopter threat. Emphasis in countering this air threat is placed on training crews in the technique of detection avoidance and maneuvers designed to evade or destroy the enemy helicopter threat. Active engagement by the use of organic armament is not addressed in the manual. (One is led to assume that the maneuvers should be such that the enemy helicopter will either fly into the ground or over friendly air defense elements on the ground.) The purpose in presenting the possible threat is justified in the manual by stating that Soviet helicopters have an armament system that can be used against US helicopters.

The manual emphasizes the integration of the combined arms team and exploitation of other services' capabilities. It states that

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[10]US Army Aviation School, Field Manual 90-1. Employment of Army in a High Thrsat Environment, March 1975 (Draft), DA Publication.

"attack helicopters perform traditional Army firepower tasks and will continue to be supplemented by tactical fighters . . . ."

Responsibility for the publication of field manuals for attack helicopters rests with the US Army Armor School. In April 1975 a draft training circular was published concerning gunnery training for attack helicopters.[11] The circular states that an air threat exists due to enemy helicopters. There is no training recommended, or suggested, to counter any air-to-air threat.

The lack of a stated need for air-to-air training in field manuals is not a new problem. The need for an air-to-air defense weapon system is not a new concept either. The training aspect was first surfaced in 1969 by the US Army Aviation School combat development activity. Recognizing a need for an air-to-air defense system, they initiated paperwork to develop a requirement for an air-to-air weapon for attack helicopters. The process followed by the aviation school is outlined in appendix VIII.

In reviewing Air Force doctrine concerning support of heliborne operations, a tremendous gap was identified. The only data concerning helicopter operations was obtained in a two page summary of altitudes and techniques.[12] The manual does not address procedures to be followed

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[11]US Army Armor School, Training Circular 17-17. Gunnery Training for Attack Helicopters, 30 April 1975 (Draft), US Armor School Publication.

[12]Tactical Fighter Weapons Employment, TACM-3-1, Volume IV, 15 August 1974, Department of the Air Force, Tactical Air Command.

in the event enemy aircraft are encountered, nor coordination requirements. It is highly unlikely that army helicopters and air force aircraft will be collocated at the same airfield. Coordination of the operation will present unique problems. This problem is compounded by the lack of training between army and air force teams.

Chapter 3

WEATHER AND TERRAIN

While tactics and doctrine can be developed that will increase the survivability of attack helicopters against high-performance aircraft, weather and terrain must also be considered. One general comparison of tne European weather was related to the author upon receipt of orders to Germany. The comment was made by a fellow aviator who had several years of flying experience in Europe. He said that the worst flying conditions in the United States were to be found at Fort Lewis, Washington. In contrast, the most favorable flying weather in Germany was found at Stuttgart. Yet, the weather at Fort Lewis was more favorable for flying than was the weather in Stuttgart, Germany.

The differences in the weather in these two areas may be attributed to their geographical locations. Fort Lewis is located on the coast. The weather is affected by the warmer waters of the ocean in winter months. The water temperature is normally warmer than that of the surrounding land mass. Washington state is also affected by Siberian highs which cross the ocean before moving over the state. Germany is an inland country, not subject to the types of moist air masses that move across Washington. Winds in Germany are also calmer, which prevents them from blowing the fog away. Terrain conditions

produce fog at all times during the year, and this fog remains in place for extended periods of time.

Historically and doctrinally, weather has had a tremendous impact on combat operations. Current doctrine concerning employment of aviation includes the element of surprise. One means of achieving surprise is "... through taking advantage of adverse weather."[13] Yet, current Army regulations restrict flying when weather conditions are below a five hundred-foot ceiling with less than a one half mile of visibility.[14] These weather restrictions are even more confining when flying within the Air Defense Identification Zone (ADIZ) in Germany. It is within the ADIZ that the threat forces will initially cross the border in the event that there is a war in Europe. Restrictions to flight within the ADIZ also include no flying from one-half hour before sunset to one-half hour after sunrise.

Although weather phenomena in Germany are readily observed, they are extremely difficult to predict. The weather may be forecasted to be visual flying conditions (VFR); however, it is not uncommon for the forecasted weather to deteriorate to instrument flying conditions (IFR) in a matter of hours.

A historical summary of weather recorded at Fulda, Germany, over a ten-year period is at appendix IX. Of particular interest

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[13]Field Manual 90-1, Employment of Army Aviation Units in a High Threat Environment (Draft), 21 October 1975, DA Publication, p. 3.

[14]Army Regulation 95-1, 1 October 1973, p. 4-8.

are the weather conditions during the period between September and November.[15] A cursory examination of the data indicates that ceilings of less than 200 feet, with visibility of less than one-half mile, can be anticipated between 0300-0800 hours from 28 to 32 percent of the time during the months of September and October. These conditions are certainly favorable for attack helicopter operations.

The preceding paragraph examined a "worst case" example of flying weather. Ceilings of less than 1,000 feet, with visibility of less than 2 miles, can be encountered from September through March, these conditions will exist from 17 to 38 percent of the time. During these periods, heliborne operations may also be conducted with relative ease without regard to interference from high-performance aircraft.

US Air Force pilots may well state that during the periods when ceilings are less than 1,000 feet they will be operational. However, the pilot's ability when flying at speeds in excess of 500 knots, to locate a helicopter flying at tree top level at a speed of less than 50 knots is open to question. Combine this difficulty with flying with a visibility of less than 2 miles and in a valley with only a few hundred meters of turning radius, and helicopter survivability increases drastically.

At this point it is prudent to note that the CDEC test cited in Chapter II was conducted during the period 1 July to 30 September.

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[15]Air Weather Service Pamphlet 105-4, Volume IV Europe, 20 December 1967, US Air Force Publication.

It was stated in the test summary that, "The experiment period (1 Jul-30 Sep) contains the best flying weather of the year. Visual flying conditions are optimum, with ceiling and visibility exceeding 10,000 feet and 10 miles, 96% of the time in July, 95% in August and 93% in September." (Emphasis added).[16] These conditions certainly contained some favorable factors for the high-performance aircraft crews. For this reason, this study questions the ability of high-performance aircraft crews to locate helicopters when the ceilings are below 1000 feet and visibility is less than 2 miles.

TERRAIN

Weather is not the sole natural phenomenon that will have an impact on attack helicopter operations in Europe. It is necessary to briefly discuss the terrain in order to emphasize the likelihood of air-to-air encounters by attack helicopters in Europe. Terrain in Europe favors employment of attack helicopters. At the same time, high-performance aircraft will have difficulty in detecting and engaging attack helicopters, particularly during times of reduced visibility.

The relief of the terrain in the Fulda Gap area is characterized by a diversified landform. In the south, the Hohe Rhoen Mountains reach an elevation of 950 meters. The mountain range extends for approximately 50 kilometers between the Ulster and Fulda Rivers and

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[16]Project Analysis (Abbreviated), Attack Helicopter Air to Air 43.1, 27 May 1970, US Army Combat Developments Command, Experimentation Command.

continues up to the Werra at Vacha. Along this area, the gradients of the mountains are rather steep. The western portion of the Rhoen is also rough. As it continues to the north, it forms a more open type of landscape. Elevations in the area vary from 770 meters in the highlands to 200 meters in the valley areas. The western area is composed of low rolling hills. Also in the western area are the Taunus Mountains. The major range runs generally northeast to southwest, with the highest elevation being approximately 800 meters. The southern slope runs generally to the Main River Valley. The northern slope runs to the Westerwald, which is a large region of mountainous terrain. The area of the Westerwald is also laced with streams and valleys with steep sides. Farther west is the broad open valley of the upper Rhine. This valley ends abruptly when it meets the escarpments of plateaus into which the middle Rhine gorge is cut. At the southern end, the gorge is approximately 350 meters deep. As it moves northward it becomes wider and shallower. The middle Rhine Valley runs through these uplands for approximately 50 kilometers. The uplands between the Rhine and Mosel Valleys is called Hunsruck. As it goes westward the terrain changes from smooth plateaus to rugged hill country. This area is covered with dense forest and large tracks of moors. To the southwest, after passing the Hunsruck, is an area of rolling hills called the Saar-Nahe Uplands. This area is isolated, steep-sided, and thickly wooded. These features give the area a more rugged aspect than does the Rhine-Hessiam Hills, which are to the east.

The vegetation in the Fulda gap area is 40- to 50-percent covered by dense woods in the higher elevations. The lower slopes and valleys are primarily pasture and farmland.

Movement in this area is considerably restricted in the more heavily wooded areas. These areas present obstacles to vehicular movement, which must be confined to the trails through the woods.

MILITARY CONSIDERATIONS OF WEATHER AND TERRAIN

The Soviets undoubtedly realize the limitations of their air forces in anti-helicopter operations. The United States possesses an advantage in aircraft technology, training, and combat experience. The technological advances include an all-weather intercept capability. US aircraft can engage other aircraft at altitudes without having to observe them visually. Whether this same system is effective in locating a stationary helicopter hovering at ground level is another question. Also to be questioned is the effectiveness of an infrared missile fired toward the ground at a helicopter.

It will be during periods of reduced ceilings and visibility that the Soviets will prefer to conduct heliborne operations. US tactics and doctrine parallel this line of thinking.

Nearly every manual published by US agencies concerned with employment of aviation assets emphasizes using the weather to conceal movement and to achieve surprise. A draft field manual published by the Armor School states, "Adverse weather which reduces visibility also reduces the effectiveness of attack helicopters; however, low

ceilings may favor attack helicopter employment."[17] Further, "Extreme weather conditions may limit the use of attack helicopters; however, close air support, both enemy and friendly, will have been severely limited or terminated long before helicopters are forced to stop flying."[18]

The same tactics that favor US employment of attack helicopters also favor the employment of Soviet helicopters. Also the Soviet fleet of helicopters, specifically attack helicopters, is increasing at a very rapid pace. The Soviets have historically emphasized employment of airborne forces deep into the enemy rear areas.

Although publications dealing with employment of aviation assets stress using the weather to enhance survivability, regulations prohibit this type of training. As previously stated, the restrictions imposed in Europe are even more severe. Currently the only US pilots authorized to fly within the ADIZ are those who are stationed at Army installations within the ADIZ. There are a few minor exceptions to this policy for training purposes.

There are no flights authorized within 5 kilometers of the border unless there is a "border qualified" pilot on board the aircraft. The border qualified pilots are those pilots assigned to one of the two armored cavalry regiments in Germany. We are just not training pilots in the weather, or over the terrain where they will be expected to fly.

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[17]Field Manual 17-50 (Draft), Attack Helicopter Operations, October 1975, US Armor School, p. 3-5.

[18]Ibid.

On the other side, the Soviets live in the environment and train in areas close to the political border on an annual basis. They enjoy a marked advantage in this area over US pilots.

The purpose of discussing the weather and terrain in Europe as it relates to this thesis is two fold. First, we advocate using weather to enhance helicopter survivability and to attain an element of surprise on the battlefield. Secondly, we emphasize that the Soviets will also be planning attack helicopter employment during these same periods.

The only logical conclusion to be drawn from an analysis of the weather and terrain is that Europe will favor employment of attack helicopters. Tests indicate that it will be extremely difficult for high-performance aircraft to locate and engage attack helicopters. From this it seems inevitable that US and Soviet attack helicopter crews will come face to face on the battlefield in Europe. High ranking officials state that superior training will be the key element of victory. No amount of training will produce success, if one opponent has a marked gap in weapons systems.

A thread sown throughout this research, but not addressed, has been one of inter-Service rivalry. Personnel within the combat developments community and training officers of major aviation units have indicated that inter-Service rivalry has retarded the development of an Army air-to-air weapon system for attack helicopters. The subject has not been addressed in the preceding chapters. It is an area which is open to contradiction, and one that this author finds difficult to

accept for two reasons. First, it is difficult to conceive that high ranking military officials would use inter-Service rivalry to prevent the development of a self-defense weapon. To accept this premise would be to accept the idea that if a US Air Force pilot were forced to bail out over enemy-held territory he could not defend himself on the ground. Once on the ground he would be in a "traditional" Army infantry role. Secondly, training is the responsibility of the commander.

Chapter 4

DISCUSSION OF FINDINGS

The attack helicopter has not been introduced into the Army inventory equipped to resolve all problems identified from its employment in combat. Experiences in Vietnam demonstrated that modifications to the initial configuration were required to improve the effectiveness of the attack helicopter. These modifications were made, and because of the duration of the Vietnam conflict, many were revalidated in combat.

Attack helicopters were not confronted with an air threat in Vietnam. Based on the lack of an air threat, there are those who assume that such a threat is not a reality. If this premise is to be accepted, the same rationale should apply to the development of US Air Force aircraft. The Air Force was not faced with an air threat in South Vietnam. The air threat in Korea was not significant either, yet more sophisticated air-to-air systems were developed by the Air Force during the Korean conflict. To support the development of aircraft for the Air Force, a comparison is made concerning Soviet capabilities. This same comparison should also be made concerning Soviet attack helicopters.

The data presented indicate that the air-to-air threat to attack helicopters has been recognized since the introduction of the

attack helicopter into the Army inventory. Since its introduction, there have been no conflicts that surfaced any air threat to the attack helicopter. Other threats, such as radar controlled anti-aircraft weapons, received attention since they were a reality we faced during operations in Cambodia. A considerable amount of money was spent by the combat developments community to develop a system to overcome the threat of radar controlled weapons. During this time, new munitions were tested based on combat experience in Vietnam. An air-to-air weapon system would probably have received the same attention had the threat surfaced in Vietnam.

The Soviets, lacking actual combat experience with attack helicopters, have embarked on a costly program designed to increase attack helicopter assets and performance capabilities. One can only question their rationale for undertaking such a program, recognizing as we do that the Soviets live, train, and conduct exercises in Europe on a daily basis.

Doctrinally, the Soviets have placed a great deal of emphasis on the employment of airborne forces in enemy rear areas. It appears from the current trend of increased helicopter assets that their emphasis is on heliborne operations. This transition has been made in a rather short period of time when compared to US advances in this area. Again we should attempt to determine why.

Previous tests and experiments indicate that helicopters can survive on future battlefields. The problem of detection of helicopters is compounded by the problems associated with engagement and destruction of the helicopter threat. It is obvious that the Soviets are placing

a great deal of emphasis on the employment of helicopters. This fact can be based strictly on the increasing amount of helicopters in production over the past decade. The Soviets are pursuing this relatively new field without the benefit of having actual combat experience with helicopters. There must be some unknown factors that are responsible for this increased emphasis.

It is evident from comparing numbers of attack helicopters in the US and Soviet inventories, and the programed production rates that the Soviets will soon have parity in this area. It also appears logical to assume that both nations will employ attack helicopters on future battlefields with emphasis on using them in an antitank role. The tactics for such employment will be basically the same for both nations, thus, these aircraft will be operating in the same environment. Should this occur, US and Soviet helicopters will face one another on the battlefield.

The analysis of European weather phenomena indicates that ideal weather for employment of attack helicopters will exist for extended periods of time during the winter months. The data researched have indicated that detection of low-flying helicopters will be extremely difficult. The weather conditions for the experiments concerning the detection of helicopters should be kept in mind. During the experiments, ideal weather conditions prevailed.

It appears that the Army combat developers are generating problems. Current emphasis in the combat developments community is

on the use of standard scenarios. Studies being conducted must be supported by the use of a standard scenario. Many of the studies are also conducted using war gaming techniques. The problems come when we war game requirements around a battle to be fought in July.

The US Army Training and Doctrine Command publishes guidance concerning standard scenarios. This guidance is also applicable to the war gaming conducted at the Combined Arms Combat Developments Activity. What is produced as a result of this war gaming has an impact on equipment introduced into the Army inventory. An example was the results of war gaming an infantry division against a threat armored division. The war game produced an unacceptable loss rate within the infantry unit. To overcome this, additional TOW weapons were used in another gaming sequence. The results of this sequence produced favorable results. In view of these results, infantry units throughout the Army were issued additional TOW weapons.

The war gaming process currently in use, however, has the battle being fought during July, and weather conditions during this time frame certainly favor the use of air support.[19]

For the purposes of war gaming, several approaches are proposed for analysis and consideration. First, why focus on a war to be fought in July? Certainly the Soviets realize that they lack the technology the US possesses concerning the use of airpower.

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[19]Letter, Headquarters, US Army Training and Doctrine Command, 17 October 1974, TRADOC European Standard Scenario for Combat Developments, p. 2.

They should also be aware that the US places a great deal of emphasis and reliance on the ability of the Air Force to destroy tanks on the battlefield. Why start a war when our use of airpower would be detrimental to their ground combat units? If the weather rendered airpower ineffective, it would seem logical to start a conflict when weather would prohibit or severely restrict the use of high-performance air assets.

Another proposal for the war game analysis would be to war game a situation fought on a typical November to February day in Europe. The weather conditions would include ceilings of less than 1,000 feet and a visibility of less than 1 mile. A typical mission in Europe would find elements of an armored cavalry squadron in the delay. Assume that the squadron comes under attack by a Soviet HIND A helicopter armed with SAGGER antitank missiles. Tactically, the attack helicopter would be located on a hilltop overlooking the valley where the cavalry squadron is conducting the delay.

The Soviet attack helicopter might have clearance from the clouds by a matter of just a few feet, with the terrain below him being unaccessible by ground means. The aircraft remains behind the hill mass until it is ready to attack, then rises above the treetops to fire. In less than 20 seconds it has fired, hit its target, and dropped back behind the hill mass to move to another attack position.

The present options open to the cavalry squadron are limited. If Vulcan units were attached they could engage the aircraft, if the observed it and took it under fire within the 20 second time frame.

The range of the Vulcan, however, is limited to less than that of the attack helicopter. A Redeye missile could also be employed, again, if the helicopter were observed prior to firing. It must be remembered also that the Redeye missile is an infrared, heat seeking missile, and firing at a helicopter head on would seldom result in a kill. Also, elements of the squadron could engage the helicopter with organic weapons, the 7.62 mm machine gun or a .50 caliber machine gun. Combat experience in Vietnam indicates that unless these weapons are massed it is difficult to hit and destroy a helicopter. A call could be made for artillery support, but it is doubtful that it could be successfully employed within the 20 second time frame involved. The last option would be to request assistance from the US Air Force. Keeping in mind that such assets are located well to the rear of the corps, one could expect assistance in nothing less than 30 minutes, unless a high-performance aircraft were in the area. It is questionable how effective their radar would be against a helicopter flying at treetop level with the amoung of ground clutter associated with the target. If they did pick up the target, the question would be the effectiveness of their air-to-air missiles firing down on a helicopter that is hovering over the treetops.

One other option should be available to the cavalry squadron. Normally, an element of the regiment's air cavalry troop will be employed to augment the cavalry squadron. Helicopters are not restricted to movement over terrain obstacles, and all helicopters have the same basic capabilities. The logical weapon to seek out and destroy the

Soviet helicopter would be a properly armed US helicopter.

Examining the same situation from a Soviet point of view, one readily understands why placing emphasis on attack helicopters may be productive. The US Redeye missile does not present a significant threat to the survivability to the HIND A, nor does the Vulcan/Chapparal. This is the same approach the US takes concerning the Soviet SA-7 and ZSU-23. Small arms fire presents a threat, but not a significant one. US high-performance aircraft normally will not be operating overhead and will have difficulty in detecting and engaging helicopters. US helicopters do not possess an air-to-air capability, so they will not be a threat to Soviet attack helicopters. It is little wonder that the Soviets are building up their helicopter assets.

Chapter 5

CONCLUSIONS AND RECOMMENDATIONS

It is doubtful, in light of the data researched, that the United States can maintain a comfortable lead in airmobile concepts if the gaps in doctrine, training, and weapons systems are not filled. Currently, the United States possesses the necessary technology to fill these gaps. In addition, the United States has within its Services the combat seasoned pilots so essential to maintain a superior fighting force. No other nation can match this technology and level of experience.

Uppermost in the mind of every commander should be the welfare of his men and the training of an effective fighting force. Training is limited only by personnel, time, and imagination. It may be time for all aviation commanders to imagine that their attack helicopters will meet Soviet attack helicopters on future battlefields and to commence training with that in mind.

Training literature needs to be revised to include air-to-air defense for attack helicopters. The cost associated with such training is minimal. It could be accomplished in conjunction with current training requirements.

The doctrine to support the training is not complex. Our own doctrine is the basis for determining what is required to be known about the enemy. Doctrinally, he will be using similar tactics and operating in the same environment. Our current tactics for

antiarmor operations is a starting point for the development of tactics and doctrine. It is not very much different to engage a helicopter at a hover than it is to engage an armored vehicle. Both are nearly comparable in size, and both will be at or near ground level.

Under similar weather conditions in Europe. and with Soviet doctrine that advocates airmobile operations deep into the enemy rear, one cannot help but ponder the question: who is responsible to engage helicopters conducting these types of operations? If ground units cannot engage or are ineffective against such aircraft and high-performance aircraft are not available or are hindered because of weather, this type of operation, conducted during periods of low ceilings, would be unopposed.

At any time of the year, in any given part of the world, and in any type of conflict there will be periods in which attack helicopters can operate with relative ease. Attack helicopters will have freedom of movement across the battlefield, with little concern about being detected by high performance aircraft. Attack helicopters of the United States and the USSR will be habitually operating in the same environment and employing the same tactics.

The most effective system to defeat the attack helicopter threat is a system which can operate under the same weather conditions, over the same terrain, have the same characteristics concerning flight maneuverability, and, most importantly, have the appropriate weapon to engage and destroy the enemy. The Soviets may have this capability, the United States currently does not.

The largest gap that currently exists is in the area of an effective air-to-air weapon system. At present, it would be foolhearty to attempt to engage an enemy helicopter with the 20 mm or 7.62 mm machine guns and attempt to obtain a hit using tracer burnout as a means of adjusting fire. Once the enemy aircraft was fired on, it would take appropriate maneuvers to prevent it from being hit. In addition, the Soviets can be expected to employ their aircraft in pairs, just as we do. The second aircraft, with adequate armament, could easily destroy any attacking helicopter.

As a starting point, past tests and experiments should be used as a basis for the development of an air-to-air weapon system. The threat which provides the validity of needing the system has been validated several times in the past. The lengthy combat developments process should be shortened to field an effective air-to-air system in the near time frame. The answer is certainly not to go back to where we were ten years ago and start over.

Training in air-to-air defense should be included in all aviation unit training programs now, if the attack helicopter is to survive on the battlefield tomorrow. The 1973 Mideast War demonstrated that when outnumbered and using the same type of equipment, the key to victory was the state of readiness and training. We have no training for air-to-air combat in attack helicopters.

Until an effective air-to-air weapon system is fielded, commanders need to take the initiative to insure that US forces are prepared to fight while outnumbered and that they are an effective fighting force using whatever equipment is available.

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