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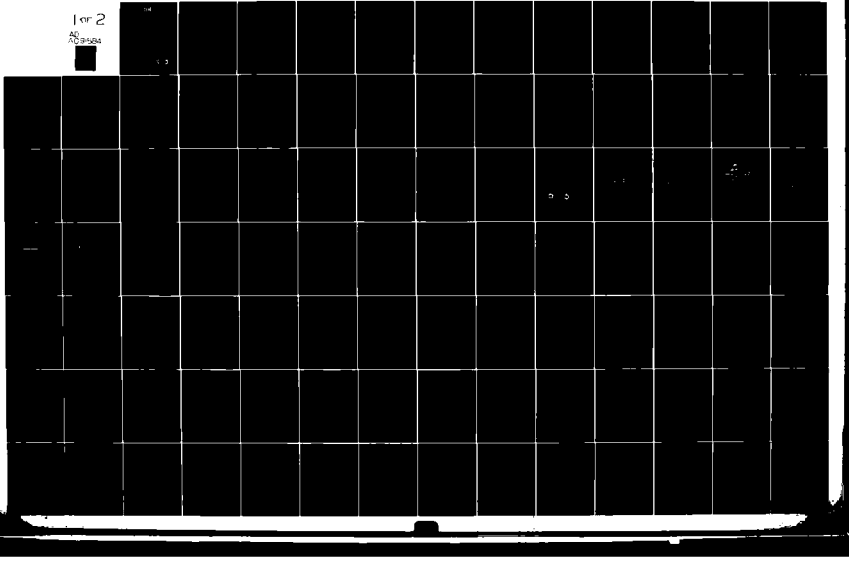

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ATTACK HELICOPTER EMPLOYMENT OPTIONS

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

MASTER OF MILITARY ART AND SCIENCE

by

MICHAEL L. BRITTINGHAM, MAJ, USA
B.S., Citadel, 1966

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Using qualitative methods, this thesis summarizes the present capability of the attack helicopter to operate effectively in a battlefield environment characterized by intense, sophisticated air defense. Given the demonstrated survivability, options for employment of attack helicopters should be expanded to include aggressive, decisive employment against critical targets behind the enemy forward positions. Chapter VI of the thesis discusses the expanded options in some detail.

The thesis also proposes that the Army's organizational basis for attack helicopter doctrine/tactics is inadequate and lacks necessary unity; the question of an Aviation Branch should be re-examined. Also, the present division of roles/missions between the Army and Air Force may be counter-productive to development of effective, comprehensive battlefield aviation employment doctrine.

Current US Army attack helicopter doctrine is not complete. The thesis demonstrates that the tank-killing helicopter mission paramount in current doctrine is not the only appropriate role; in fact, it is probably not the best role. Attack helicopter capabilities far exceed the operational requirements reflected in current doctrine.

Attack Helicopter Employment Options

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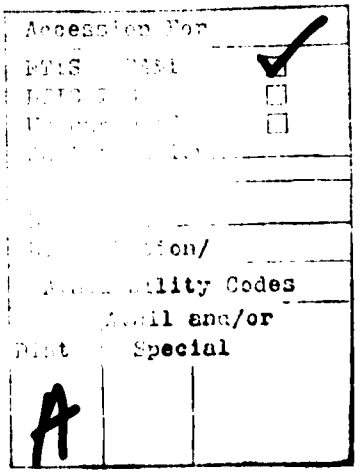
The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)



ABSTRACT

Using qualitative methods, this thesis summarizes the present capability of the attack helicopter to operate effectively in a battlefield environment characterized by intense, sophisticated air defense. Given the demonstrated survivability, options for employment of attack helicopters should be expanded to include aggressive, decisive employment against critical targets behind the enemy forward positions. Chapter VI of the thesis discusses the expanded options in some detail.

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CHAPTER I

INTRODUCTION

The helicopter is unique among all the weapons of war. Like any other weapon system, its sole reason for existence is to allow the commander to bring maximum combat power to bear on the enemy at a time and place of his own choosing. But, unlike any other weapon, the helicopter can accomplish this purpose with a speed, versatility and effectiveness never before achievable through employment of a single weapon.

The discerning reader should conclude from this thesis that the methods and machines available now, together with imaginative but sound concepts for attack helicopter employment, present a most exciting, flexible and potentially decisive innovation in warfare.

The effectiveness of the attack helicopter has been demonstrated repeatedly in a number of combat developments tests and experiments, as well as in various training exercises. Such tests, experiments and exercises have routinely been conducted according to scenarios which simulate the full intensity of modern helicopter combat; the results have been startling.

Chapter II will be a conceptual discussion of the general characteristics of the attack helicopter as a weapon

system. The importance of the attack helicopter's mobility and versatility will be established through a common-sense treatment of those broad concepts and their applicability to attack helicopter employment. That same chapter will discuss briefly the current US Army approach to developing doctrine and refining tactics for attack helicopter employment, and examine that approach's adequacy. The second chapter will conclude with a series of assumptions that will apply throughout the remainder of the thesis.

As the reader proceeds into the thesis, he will be exposed to a discussion of the threat in Chapter III. The Armed Forces of the Soviet Union will be used as the model for the potential adversary of the US in the next war. Following some broad discussion of gross strengths of the Soviet war machine facing US/NATO forces in western Europe, a detailed discussion will be presented of those Soviet systems which have a utility in an air defense role, specifically a counter-helicopter role.

Next, the characteristics and capabilities of US attack helicopters will be presented, to give the reader a basic insight for the weapon. The mid-1980's will be used as the baseline for examining the machines that make up the attack helicopter fleet. In this chapter and the one following, weapons and other on-board systems will be presented in some detail. Among those other on-board systems is the family of aircraft survivability equipment, whose characteristics,

together with the passive survivability characteristics of the attack helicopter, will be outlined and juxtaposed with the characteristics and capabilities of the Soviet air defense system presented in the preceeding chapter. Some initial conclusions concerning the survivability of US attack helicopters on the modern battlefield will be inevitable at this point in the reading.

Current employment concepts for the attack helicopter are essentially limited to antiarmor missions, conducted over and within friendly ground force areas of operation. The author will expand the philosophy of attack helicopter employment to include identification of some possible roles and missions "behind" the enemy lines. Those attack helicopter missions proposed which involve operations forward of the line of contact on the ground will be examined from a standpoint of appropriateness, survivability, sustainability and effectiveness. This is the heart of this thesis. Without taking away from the importance of the tank-killing mission, the author will support the contention that the identification of that as the sole, or even the primary attack helicopter mission does not properly exploit the full capabilities of the weapon and may not, in fact, be the decisive factor in tomorrow's war.

While some specific conclusions will be presented in this thesis, its primary intent is to broaden the horizon of planning, equipping and training the United States Army's

attack helicopter force, to insure that the attack helicopter's capabilities are recognized, and their appropriate place in today's combined arms force is determined.

CHAPTER II

DOCTRINAL REFLECTIONS

It is not the intent of this thesis to include a comprehensive review of the history of war or the evolution of the fundamental principles of war. Nor is it intended to give a detailed history of the development of the attack helicopter as a weapon of war. Any of those would require a major effort in itself, and would not contribute to the issues at hand. Rather, the author will set before the reader a few thoughts and reflections on selected aspects of war, in particular the "next war," relating those aspects to the potential of the attack helicopter.

Any student of the military art and science is continually confronted with a theme that has remained remarkably consistent throughout history: studious, rigorous application of lessons learned in the last war is no guarantee of success in the next one. The most predictable characteristic of war is its unpredictability, particularly in the area of technical innovations and their tactical applications. The horse, the chariot, the bow, the cannon, the musket, the rifle, the rank, the airplane--the litany of new weapons and tactics echoes unerringly throughout history, and each innovation has, in its turn, exerted a revolutionary impact on the conduct of war, and has, more often than not, been the

decisive ingredient for victory in the war in which it was first fully exploited.

During her own history, the United States has fared reasonably well in this contest of innovation. In the recent world wars, the geographic and political insulation of the United States allowed the opportunity to study, to catch up with and capitalize on the technology, tactics and techniques of the day prior to major commitment of US forces. That political and geographic insulation is not present today, having been stripped away by true global mobility and the nation's policy of defense well-forward in western Europe. American forces are deployed in Europe in considerable strength, and their US-based reinforcement would be sent to Europe, as necessary, on an extremely short notice. The popular description of the next war as being a "come-as-you-are" affair has the cold ring of truth. United States forces will be decisively commited at the moment the first hostile shot is fired or the first Soviet vehicle rolls into NATO Europe. It is morally and militarily necessary that those forces be equipped with the most lethal, versatile weapons of the day, and trained in the tactical doctrine for their most effective employment.

The Soviet Union possesses the most impressive collection of armored and mechanized forces in the world. Her seemingly unlimited numbers of tanks and fighting vehicles are her greatest strength, and constitute an awesome threat

to her potential enemies in war. It has never been sound military thinking to attempt to meet the enemy's strength head-on, and it is folly to suggest that such a strategy can be successful in the event of war with the Soviets. What is needed is a fundamental shift in the emphasis of the battle itself, away from the enemy strength towards the friendly strength.

How does a vastly out-numbered force accomplish this shift in emphasis? Basically, it does so by insuring that the forces (and weapons) it maintains in readiness are technologically up-to-date, in the broad sense; that they retain a characteristic flexibility of employment, allowing them to be utilized in a variety of roles with equally high effectiveness; and, perhaps most importantly in light of the defensive posture of US/NATO forces in Europe, that they can achieve and maintain a superior degree of mobility on the battlefield. Technological development, flexible options for employment and the capacity for mobility are all functions of organization, training and imagination in the actual application of battle resources. History is replete with examples of out-numbered, out-gunned commanders who achieved victory through initiative, surprise and aggressive action, alternately massing or economizing forces as the situation dictated--common-sense concepts which become reality only when superior mobility is both present and energetically applied in the tactical area.

Current US doctrine for halting and defeating an attacking Soviet army in Europe goes by the name of the active defense. Such as it is, the doctrine for that defense calls for frequent and rapid shifting of defending forces about the battlefield, thickening the most critically threatened sectors in response to the dispositions of the attacking forces. This is logically sound. The US commander will surely strive for maximum massing (thickening) of forces in opposition to the enemy's main effort, as well he should. But the success of such a defense is predicated on identifying the main effort(s) of the enemy, and then making the appropriate and timely response. Doctrinally, a Soviet "main attack" (or, if the reader prefers, deep penetration) will be executed as a follow-on to earlier successes by first-echelon forces, which probably will attack across a broad front, in dispositions and formations that do not conveniently identify a "main attack." The author maintains, in fact, that the Soviet commander will base his decision concerning where and when to commit second-echelon forces on the principle of reinforcing success--not even he will be certain before-the-fact where his main effort(s) will take place.[1]

In both the practical and philosophical sense, a successful attack depends on maintaining the momentum of the attacking echelons, keeping the defender off balance, denying him the time, and thus the opportunity, to reinforce the critically threatened areas. Soviet doctrine constantly

stresses this principle, and with the forces available to him, the attacking Soviet commander will no doubt adhere to it. Given a rough equivalence in mobility between US and Soviet ground forces, the elementary arithmetic of battlefield time-distance equations clearly defines a requirement for prescience or uncommon luck if the US commander is to mass or economize his forces in a timely, effective fashion to halt a well-planned, vigorously executed Soviet attack. The Soviet juggernaut cannot be fought everywhere at once, and if US ground forces attempt to do so, the result is likely to be a war of attrition, which once again simple arithmetic says heavily favors the Soviets with their overwhelming numerical superiority coupled with at least qualitative parity.

The intent of the active defense must be, as its name implies, to defend actively, marrying superior mobility to the inherent strengths of defensive combat. It must be an active, rather than reactive undertaking. No matter how accurate the guesswork, how sound the intuition, how exceptional the luck of the US commander, success in the next war must not be allowed to hinge on such elusive factors. Solid, comprehensive planning for and aggressive employment of existing and immediately available weapons can make the active defense active, and allow the commander to make the battlefield decisions rather than merely reacting to them.

The attack helicopter is the fastest, most mobile

participant in the land battle. Its weapons, as the reader will see later on, can destroy virtually any enemy target on the battlefield. It can engage and disengage enemy formations practically at will. All of these are vital ingredients for a successful active defense. A helicopter force can enjoy all of the protection and usefulness of terrain (a major advantage of defensive combat) with none of its attendant restrictions. What other battlefield system can offer all this?

Since the first machine guns were crudely mounted on helicopters in the mid-1950's, the development of the attack helicopter as a concept has followed an uncertain course within the US military establishment. Nearly a quarter of a century has seen the responsibility for development of armed helicopter organizations, equipment and doctrine shuffled among infantry, artillery, and armor branches of the Army. Basic questions relating to finding the appropriate niche for the attack helicopter have included such things as: is it a fire support system? is it an "escort" for troop-carrying helicopters? is it an antitank auxiliary to the armored force? It is, of course, all of these, and, potentially much more. Why has not the question been asked, "Is the attack helicopter a combat entity in its own right, with capabilities and limitations unrelated to the ground forces, needing doctrine and organizations suited to these capabilities, allowing the full range of its combat effectiveness to

be integrated into the concept of combined arms operations?" Instead, the Army has been content to permit the evolution of the attack helicopter to be driven by other, more traditional combat forces, and, as a result, has yet to come close to capturing the total capability of this, the most mobile and versatile system on the battlefield.

The United States' involvement in Southeast Asia provided the medium for growth of the armed helicopter as a weapon system. Operating for most of the war in a relatively unsophisticated air defense environment, helicopter-mounted weapons proved their effectiveness time and again. The flexible, immediately responsive combat power of the armed helicopter afforded the commander in the field the freedom of operation and creativity necessary to deal successfully with an enemy whose major strength lay in his tactics of many, widespread, small-unit actions. The Viet Nam war saw the attack helicopter used against point and area targets, hard and soft targets, personnel, vehicles, and facilities. The shock value of helicopter-delivered munitions was repeatedly demonstrated as attack ships were routinely used in a supporting role for infantry in close combat. Most of the war in Southeast Asia, however, was fought against an inferior-armed force who rarely retained the overall tactical initiative. But those who would use that fact to argue against the expanding potential of the attack helicopter in a mid-intensity war should examine closely the after-action reports from Operation Lam Son 719.

Lam Son 719, the South Vietnamese incursion into Laos, was supported by massive numbers of all types of US helicopters. Not commonly realized is the fact that the North Vietnamese Army forces opposing the extensive air-mobile operations conducted during Lam Son 719 were equipped with an air defense network that would very closely approximate the types, numbers, and densities of sophisticated air defense weapons which would confront US helicopter forces in a European war. The number of US helicopters lost during Lam Son 719 is often quoted as an argument against future helicopter employment in a sophisticated battlefield. Interestingly, however, less than ten percent of helicopter losses during that operation were a result of anti-aircraft weapons; most were lost on the ground as a result of fire from ground weapons, in pickup and landing zones; in other words, when their mobility was zero. Of those relatively few ships actually lost to the air defense network, most were lost during the earlier stages of the operation. Subsequent changes in friendly employment tactics and techniques rendered the "sophisticated" air defense umbrella virtually ineffective against low-flying helicopter forces. The major point to be grasped here is twofold: helicopters can perform well against a backdrop of sophisticated air defense; creative tactical employment can overcome and negate the effects of weapons whose characteristics are known. Or, put another way, the author suggests that a good idea is to be

favored over a good weapon; certainly that theme has repeated itself throughout military history.

Currently, the only specific mission of the attack helicopter for which anything resembling doctrine exists is the task of killing tanks on the battlefield. After he has read Chapter V of this thesis, the reader may find himself questioning the efficacy of that rather narrow scope for employment of such a versatile system. Regardless, that is the present state of things, and as a result, the responsibility for articulating requirements, developing doctrine and organizations, and devising tactics and techniques for attack helicopters rests with the armor branch of the Army. This is based, one would presume, on the belief that no one better understands how to kill tanks than another tanker.

In passing, it is worth noting that the other aspects of overall helicopter proponency have been piecemealed out to various Army branches. The scout helicopter proponency, like that of the attack helicopter, rests with the armor branch. The troop-carrying, airmobile responsibilities come under the aegis of the infantry branch, and the proponency for helicopter systems involved in logistics functions is a responsibility of the transportation branch. Finally, special electronic-mission aircraft systems and doctrine are managed by the intelligence branch.

Army aviation does not enjoy the status of a "branch" of the Army. The Aviation Center (at Fort Rucker, Alabama)

has the unenviable task of integrating the admittedly parochial efforts of no less than four separate branches into the "big picture" that is the Army in the field. How is this supposed to be accomplished? By voluntary cooperation among all the proponent agencies. At best, that is a difficult proposition to accept; at worst, it is a rather rose-colored approach to a problem that urgently demands pragmatic solution. While it is not the primary purpose of this thesis, the author maintains that until the authority and responsibility for all facets of Army aviation are brought under a single proponent, there will be no comprehensive, integrated doctrine for helicopters in general, and attack helicopters in particular, and the potential utility of the latter will never be realized by the US Army.

Unlike the formal branches, Army aviation does not yet have the organizational hierarchy to insure that good ideas are in every practicable case implemented. Nor is there, due to the absence of a branch structure, a hierarchy of advancement for aviation officers who seek greater authority and responsibility, as well as professional reward and recognition within the aviation business. Consequently, the majority of aviation officers are reluctant to devote their full career energies to the development of the helicopter force as a truly effective fighting arm of the Army. Instead, they orient their careers on the "branch" to which they belong, and often follow aviation as a secondary career

interest. Given the nature of things, no one can blame them, but of course that state of affairs serves only to further aggravate parochial differences over aviation philosophy within the Army, and makes the development of a comprehensive doctrinal body for helicopter employment an almost impossible task. Consider the conclusions of this thesis in that light. Consider also that the current capabilities of the US armed helicopter have been developed in spite of such a convoluted approach to management and lack of unified direction. How much development time could be saved or what greater capabilities would exist given a unified approach will be left to the speculation of the reader.

This chapter will conclude with some assumptions which will govern the remainder of the thesis. It is hoped that these assumptions will serve to confine the scope of the effort to a manageable dimension without detracting from the logic of its conclusions.

Assumptions

It is realized that attack helicopter operations will not take place in a vacuum on the battlefield, but rather will be but a single element of a complicated equation involving virtually every aspect, function and capability of today's Army. No attempt will be made in this thesis to include all the elements of the battlefield equation. It will be assumed that each other element will perform its missions equally well regardless of whether or not the attack

helicopter's capabilities are exercised. Identifying the "stand-alone" potential of the attack helicopter will allow the full potential of that system to be considered when the total, integrated battlefield is evaluated and tradeoffs made among all the various participants in that integrated battle. It is not a purpose of this thesis to determine the optimum number of attack helicopters required in the Army, only to delineate the full potential of the attack helicopter system, perhaps to be used as input to the decision concerning the appropriate number of attack ships in the force.

The adequacy of current and planned organization of attack helicopter units will not be addressed. The author maintains that organization is a function of tactical employment doctrine which is a function of the capabilities of the players, in this case, attack helicopters.

Soviet radio-electronic combat capabilities will not be considered. Since those capabilities will affect all battlefield players, the effectiveness of attack helicopters relative to other systems will not be altered by omission of radio-electronic combat.

Although there will be some discussion of the subject in the concluding chapters, command, control, and organization for combat for attack helicopter units will not be specifically addressed. Again, these things are functions of how the various capabilities of a unit are employed, which is the focus for this thesis.

Seemingly endless debate continues within the Army concerning the scout helicopter. Is a dedicated scout necessary? What aircraft type should be used for the scout? Should the scout be armed? How should it be armed? The questions go on and on. It is assumed that whatever the outcome of these debates, some adequate means of target acquisition/designation and fire control will be available for attack helicopter units. This may be accomplished by a uniquely-designed scout ship, the attack helicopter itself, by some other battlefield system, or through some combination of the three. As long as the "scout-related tasks are accomplished somehow, the effectiveness of the attack helicopter's employment will not be altered.

Real problems exist in combining and coordinating the effects of attack helicopters and US Air Force close air support aircraft. A major effort is currently underway under the joint sponsorship of the Army's Training and Doctrine Command and the Air Force's Tactical Air Command to define the joint air attack doctrine. These efforts will surely continue until a successful conclusion is reached. It is a particularly delicate issue since the possibility exists that the current roles and missions of the respective Services could come into question when their total interaction is defined. One thing is clear, however: every test and assessment to date has concluded that the combined effectiveness of attack helicopters and close air support aircraft is greater

than the sum of their individual effectiveness. So, any conclusions reached in this thesis which might be affected by consideration of Air Force capabilities would only be made stronger were such consideration made.

By this point, the reader should begin to have at least a glimmering of appreciation for how the broad capabilities of the attack helicopter might be used to alter significantly the outcome of the often-hypothesized European war with the Soviets. The reader has been asked to consider how a highly versatile weapon system, the attack helicopter, which can exercise almost unlimited mobility on the battlefield, might alter the "traditional" concepts of armored/mechanized warfare. Seeds of doubt should have been planted within the reader's mind concerning the adequacy of current employment concepts for the attack helicopter and whether or not there exists a suitable doctrinal body to define and deal with those concepts. The reader who is convinced that the Soviet air defense network can be overcome by attack helicopters, and who believes that the versatility and lethality of helicopter weapons systems lends them to many effective uses other than killing tanks, could skip now to the concluding chapters of this thesis. But for the reader who still harbors even the slightest doubt, a less generalized analysis will begin with the following chapter dealing with the specific nature of the Soviet threat with which the US attack helicopters will be forced to deal.

END NOTES

1. John Erickson, "Soviet Combined Arms: Theory and Practice," Defence Studies, September 1979, p. 82.

CHAPTER III

THE THREAT

Anyone who follows the national news media is at least vaguely aware of the disproportionate numerical advantage enjoyed by Soviet forces in western Europe. Garrisoned in locations in East Germany, Czechoslovakia, Poland, and other Warsaw Pact nations, Soviet armed forces, along with those of their Warsaw Pact allies, can muster an attack today that would easily outnumber the United States and NATO defenders by roughly five to one overall. In some categories of weapons, particularly fighting vehicles (including tanks) and artillery pieces, the numerical superiority is even higher.

The exact strengths in various weapon systems of the Soviet/Warsaw Pact alliance is not germane to the development of this thesis. It is, however, important for the reader to keep in mind that, generally and specifically, the United States forces will be significantly outnumbered in the event of a European war with the Soviets. A moderate degree of panic and quiet desperation when faced with that realization is not entirely out of order, and can provide the sense of urgency needed for US military planners to take every reasonable step to insure that the full capabilities of every

available weapon system can be brought to bear, if necessary, in the most effective way possible.

What is directly applicable to this thesis is the capability of the Soviet air defense system, specifically those elements of that system which pose a threat to US attack helicopters. Strictly speaking, of course, almost any weapon on the battlefield, down to the smallest-caliber pistol, is theoretically capable of bringing down an aircraft. There are a number of weapons in the Soviet inventory against which the attack helicopter will simply have to take its chances; these include the vast number of machine guns and other automatic weapons which can, when fired by a body of troops who are (as the Soviets are) well-trained in delivering massed small arms fire against aerial targets, pose a threat to attack helicopters. In this particular case, however, the probability of hit/kill against helicopters is extremely low, particularly when the attack pilot gains the cover and concealment of terrain through effective terrain flying techniques. The perennial soldier's adage to "stay low and keep moving" is equally applicable to the fighting helicopter, perhaps even more so. And the reader should not presume that the conclusions of this thesis will indicate that attack helicopters are invulnerable to destruction by enemy action. Like in any other arm of the combined force, losses will certainly occur in attack helicopter units. This chapter and the one following will serve, however, to dispel

the myth that the attack helicopter is such a fragile weapon that it must be handled like eggs on the battlefield. The paramount consideration in the employment of any weapon must not be its vulnerability, but rather its ability to influence the final decision of the war. No single factor can do more to destroy a fighting force's aggressive spirit than a misguided belief that the enemy is capable of destroying that force at will. An overpowering obsession with surviving at all costs leads to an attitude which can only be called defeatist. Of course, the normal human emotion is to be concerned with one's survival, and only discipline, training, and confidence in the leadership and the equipment can convince the individuals in a fighting force that they can fight aggressively, win, and survive. That is an age-old problem that has been an inherent part of every Army ever fielded.

This thesis does not argue for reckless employment of the attack helicopter, or any other fighting system. It says only that temerity must never be mistaken for prudence, nor ignorance of a weapon's capabilities as caution. It is hoped that this and the next chapter will have some positive result in dispelling any ignorance of the attack helicopter's capabilities and lead to a firm conviction that attack helicopters can be employed with an aggressive spirit which will bring the entire strength of this remarkable weapon to bear on the enemy.

Like the small-arms systems mentioned earlier, most, if not all of the Soviet air defense systems can be rendered far less effective by the mobility of the attack helicopter coupled with its ability to use the terrain for protection from observation and fire. Notwithstanding that, however, there are still large numbers of sophisticated Soviet air defense weapons that are capable of shooting down a helicopter which does nothing to prevent its own destruction. The things that can and will be done to prevent the untimely demise of the attack helicopter in such an air defense environment will be discussed in detail in the next chapter. For the remainder of this chapter, the reader will examine the characteristics and capabilities of those Soviet air defense weapons commonly believed to pose a serious, if not debilitating threat to a helicopter force.

Air defense weapons can be classified broadly in three generic types. Surface-to-air missiles (SAM's) include those weapons which fire a projectile which then moves by rocket power to its target. Anti-aircraft-artillery (AA) describes the family of weapons which fires free-flight ballistic ordnance with no propulsion other than the firing of the cartridge in the weapon itself. The third type, while not a "pure" air defense system, includes all other individual and crew-served weapons that may be used in an air defense role in addition to their primary functions. Examples of this third type are such weapons as tank main guns, antitank

guided missiles (ATGM's), concentrations of tube and rocket artillery fire, and the full inventory of small-arms (rifles and machine guns).

The Soviets possess an air defense network that makes their ability to defend from air attack second to none. Doctrinally and in actual practice, their air defense employment concepts include all types of weapons; the Soviets are keenly aware of the threat posed by air attack, and of the absolute requirement to negate that threat if ground operations are to be conducted successfully.

Air defense weapons can be further classified according to the method of fire control and (where applicable) missile guidance employed to achieve target hits. Those methods include infrared, radar, optical and electro-optical (TV and laser). Little information is currently available concerning Soviet use of electro-optical technology in air defense systems, but their air defense network includes a variety of weapons in each of the other three functional areas.

Two infrared, heat-seeking SAM's are found in the current Soviet inventory. They are the SA-7/GRAIL and the SA-9/GASKIN. The SA-7 is similar to the US REDEYE, in that it is man-portable and shoulder-fired, and is deployed in considerable numbers among all maneuver units down to battalion level. It is a short-range system, effective at ranges of only two to three kilometers. The SA-9 is a vehicle-mounted (normally on the BRDM-2 amphibious armored vehicle) infrared

missile system, with an effective range of about seven kilometers.[1] The effectiveness of both these systems depends on the ability of the missile to "lock-on" and track on the heat signature of the airborne target. During the tracking sequence, the missile automatically corrects its flight path to compensate for movement of the target. Infrared, heat-seeking missiles do not track on the target itself, but instead they attack the infrared signature of the aircraft--an important distinction when one considers methods to counter infrared systems in the next chapter.

Among the radar family of SAM weapons in the Soviet army, the ones considered threats to US helicopters are the SA-8 GECKO and the SA-6 GAINFUL. The SA-8 is a vehicle-mounted system which relies on radar to acquire the target and also for guidance of the missile. This system also has an auxiliary electro-optical (TV) tracking system. A single SA-8 vehicle can launch two missiles at the same target, simultaneously, guiding each missile on a separate radar frequency, a capability designed to overcome attempts by the target aircraft to disrupt the guidance radar.[2] The SA-6 GAINFUL is another, earlier version of a radar-guided SAM. It is considered a marginal threat to helicopters, since it is not effective against aircraft at altitudes below 300 feet.[3] It does have the capability to launch two missiles at the same target, each missile being guided by a separate radar frequency. There are several other radar systems among the

Soviet SAM inventory, but they are designed for maximum effectiveness against targets which fly faster and higher than helicopters, and so will not likely be routinely employed against US attack ships.

Anti-aircraft artillery systems to be specifically considered include the ZSU-23/4, and the S-60. There are other machine gun systems of differing capabilities, to be sure, but a discussion of the principal players in the Soviet AAA arsenal will serve the purpose of this thesis.

The S-60 has been a mainstay of Soviet air defense for many years. It is a 60-mm gun that has been traditionally employed as a regimental-level weapon; it is being phased out at the regimental (tactical) level by the SA-6 and SA-8 missile systems, but will still be found in a rear-area protection role. The S-60 is radar-controlled and has a tactical anti-aircraft range of from four to six kilometers.[4]

The backbone of Soviet air defense within their maneuver echelons is and will continue to be the ZSU-23/4 gun system. The ZSU-23/4 is a self-propelled, four-barrelled, high-rate-of-fire (2400 rounds per minute, sustained), with on-board radar for both target acquisition and fire control. There is an excellent optical back-up acquisition and fire control system for use when the radar is ineffective. The ZSU-23/4 fires armor-piercing incendiary or explosive ammunition, and is effective at ranges up to 2500 and 3000 meters in the optical and radar modes, respectively.[5] It is a superb AAA weapon, whose effectiveness is underscored by the fact

that during the 1973 Mid-East War, nearly half the aircraft losses of the Israeli forces were a result of the ZSU-23/4.

Figures III-1 through III-5 summarize the characteristics of the Soviet air defense weapons discussed above, while figure III-6 shows the distribution of each type of weapon that might be found in a "typical" Soviet combined arms army. Figure III-7 is a schematic profile view of the Soviet air defense umbrella for that typical combined arms army. Those characteristics and normal dispositions will be important later, when this thesis addresses employment concepts for US attack helicopters.

Other ground systems, such as tank main guns, machine guns, artillery, small arms, etc., will receive little more than a cursory mention in this thesis. The inherent mobility of the helicopter, coupled with the use of extremely low altitude flight profiles to gain the protection of the terrain, are the best means to counter these types of weapons; reduction of the helicopter's vulnerability to hits from these types of weapons has been accomplished and continues to be refined. These measures will be covered in greater detail in the next chapter; otherwise, the attack helicopter will just have to operate in spite of these threats, which are, at any rate, less of a danger than are the dedicated air defense weapon systems.

One final, but certainly not least important threat to US helicopters will be discussed here: the Soviet armed helicopter. After concluding, like their counterparts here

NATO code name GASKIN. This SHORAD air defense system is transported on a modified BRDM-2 amphibious armored vehicle which is 18' long and carries a probable crew of four. The SA-9 slant range is approximately 7 kilometers. The missile has an infrared seeker, an HE warhead, and probably is powered by a solid propellant. Four missile canisters each with one missile are normally carried on the launcher turret. The SA-9 GASKIN can be utilized in conjunction with the ZSU-23-4.

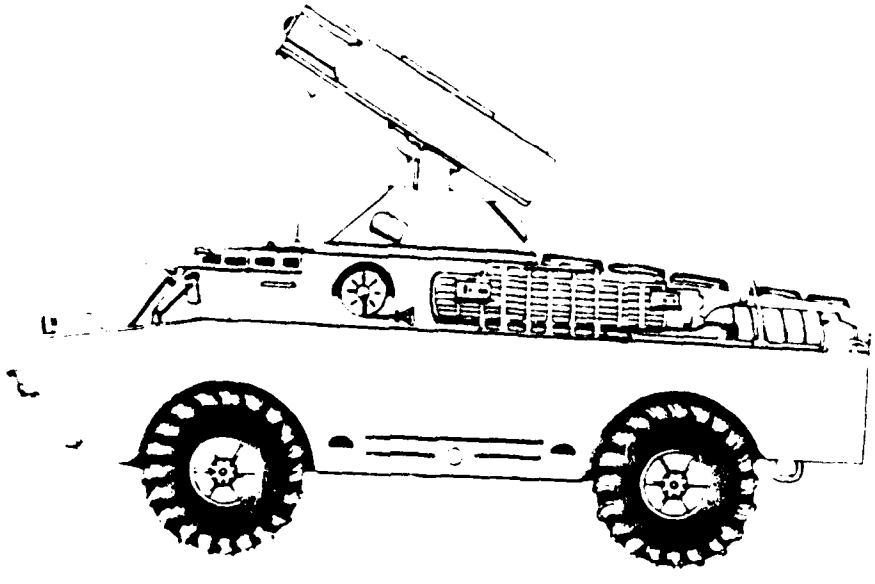
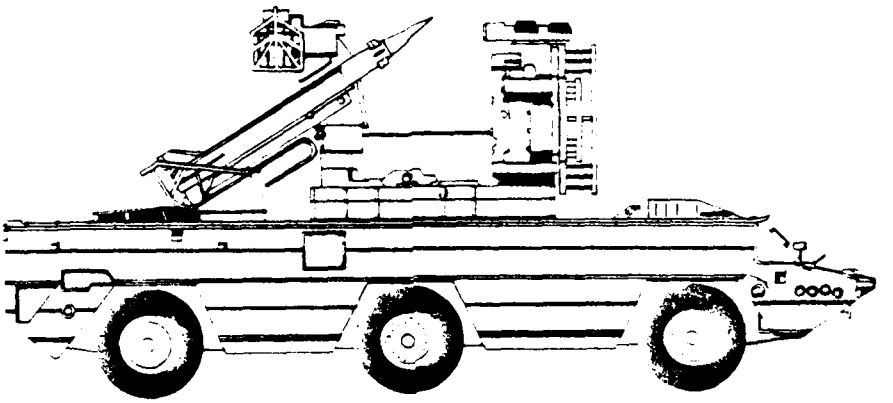


Figure III-1. SA-9 missile system [6]



NATO code name GECKO. The SA-8 SHORAD air defense missile operates by command guidance and is effective at altitudes of from about 150 to 20,000 feet. It is fully self-contained with acquisition, tracking, and two missile guidance radars mounted on a six-wheeled, amphibious vehicle which is about 29'6" long. Four missiles, each about 10' long, are carried in an integrated mount. The system contains an electro-optical tracker, probably television. With a slant range of approximately 10-15 kilometers, the highly mobile SA-8 can provide close support to armored and mechanized forces.

Figure III-2. SA-8 missile system[7]

NATO code name GAINFUL. This air defense missile is about 19' long and has a slant range of about 30-35 kilometers. It is powered by an integral solid rocket ramjet system and is command guided by the STRAIGHT FLUSH fire control radar. The missile carries an HE fragmentation warhead and has a range of about 300 to 33,000 feet.

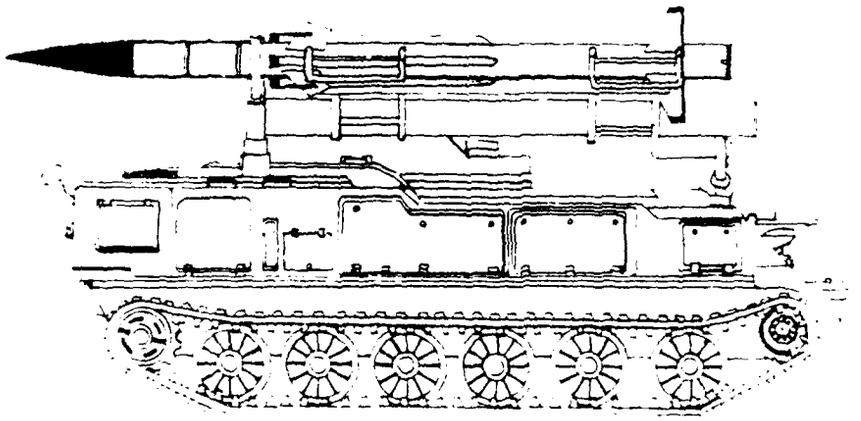
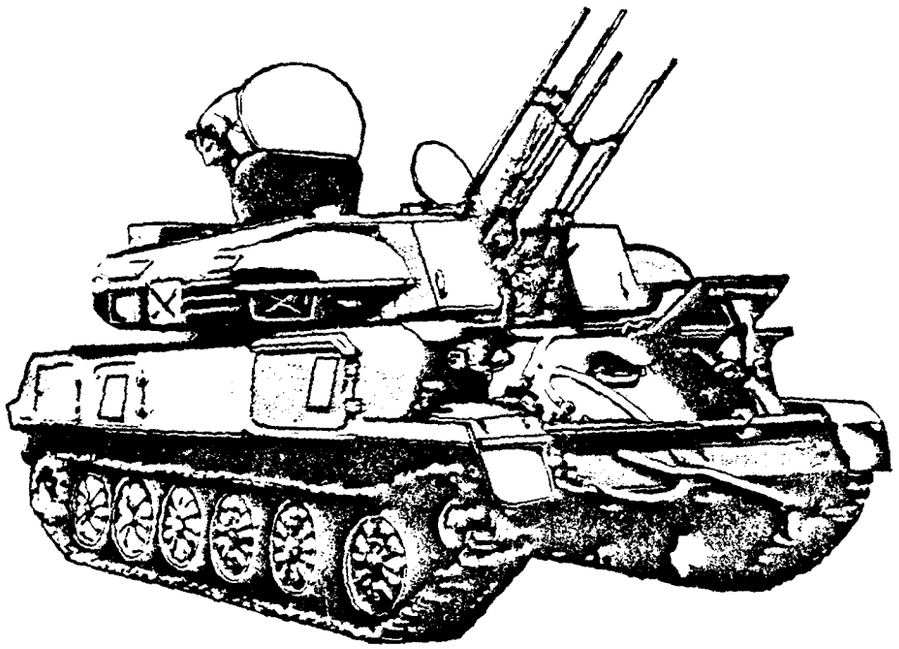


Figure III-3. SA-6 missile system[8]



Vehicle

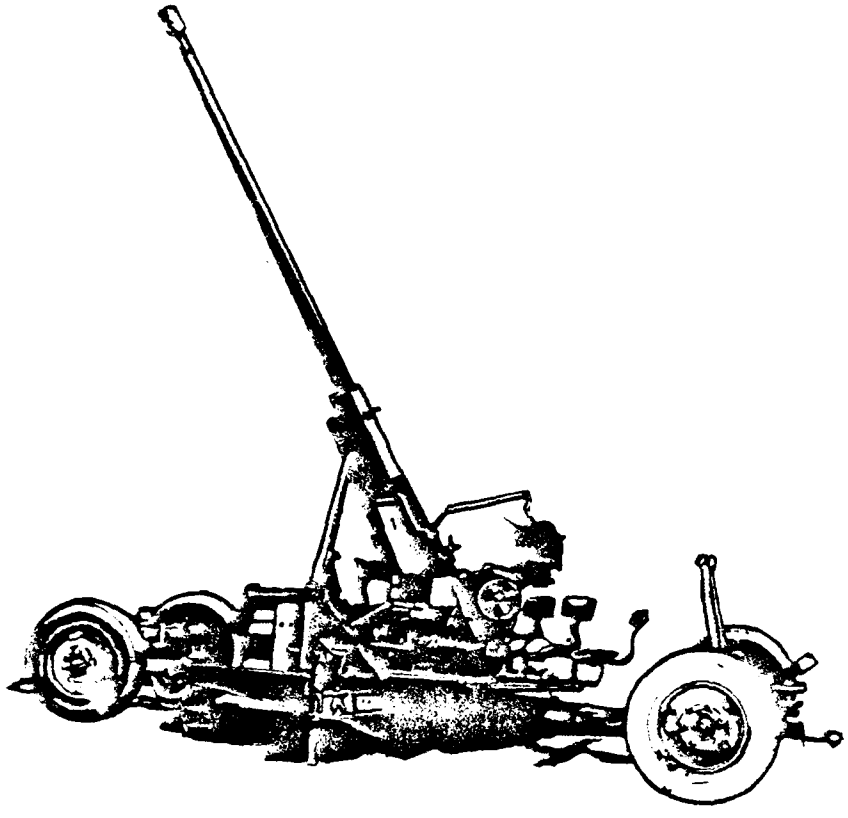
Combat Weight	14 tons
Speed	44 kph
Cruising Range	260 km
Crew	4 men

Armament	Quad 23-mm
Elevation	+80°
Depression	-7°
Traverse	360°
Range	3,000 m w/ radar
	2,500 m w/o radar

Vulnerabilities

Hull and turret can be penetrated by heavy mg fire.
Treads and roadwheels are vulnerable to destruction by field artillery weapons.
HE fragmentation can penetrate its armor, destroy the radar dish, and rupture the coolant sleeves of the liquid-cooled 23-mm cannon.

Figure III-4. ZSU-23/4 gun system[9]



Max Range:	
Horizontal	12,000 m
Vertical	8,800 m
Effective AA Range	6,000 m
Armor Penetration	
0- 500 m	106-mm
Crew	7 men
Elevation	+85°
Depression	-4°
Traverse	360°
Rate of Fire:	
Cyclic	105-120 rpm
Practical	70 rpm

Figure III-5. S-60 gun system[10]

WEAPON	TYPE	UNITS	WEAPONS LAUNCHERS
ZSU 23-4	AAA	32 Btrys	128
S-60	AAA	23 Btrys	138
SA-6	SAM	5 Btrys	15
SA-4	SAM	9 Btrys	27
SA-2	SAM	3 Btrys	18

Figure III-6. Air defense weapons density, Soviet Combined Arms Army[1]

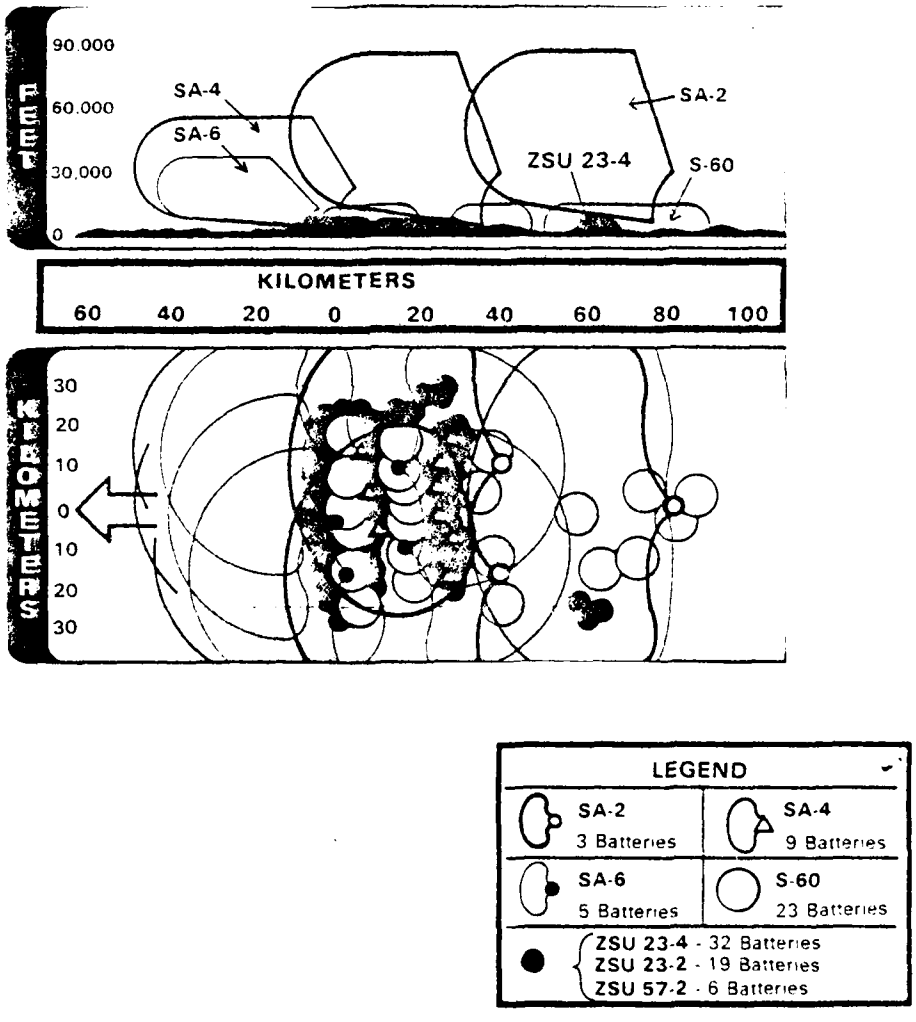


Figure III-7. The Soviet air defense umbrella[12]

in the US, that modern high-performance aircraft have a very limited utility in an air-to-air role against low-flying helicopters, the Soviets have moved in earnest towards developing the air-to-air capability of their armed helicopters. Specifically, the HIP and the HIND helicopters are considered by the Soviets to be potentially very effective in a counter-helicopter role. There is virtually no information available concerning what specific types of weapons the Soviets have in mind for this task, but military writings in Soviet publications repeatedly mention the need to develop systems and tactics for the HIP and HIND to permit them to engage US attack helicopter formations.[13] The helicopter-to-helicopter threat cannot be ignored; the total number of HIP and HIND helicopters in the Warsaw Pact forces clearly outnumbers the US/NATO armed helicopter forces, and Soviet production of the HIND is continuing at a rapid rate. Confrontations between hostile helicopter formations in a European war will be inevitable. What form those confrontations might take will be covered in a later chapter of this thesis.

Now that the air defense capability of the Soviets has been summarized and briefly discussed, the US family of armed helicopters will be described, along with the systems, measures and tactical methods currently available to counter each type of Soviet air defense system.

END NOTES

1. Tyrus W. Cobb, MAJ, USA, "Tactical Air Defense--A Soviet-US Net Assessment," paper prepared for the US Military Academy, West Point, NY, undated, p. 3.

2. Ibid., p. 4.

3. Ibid., p. 6.

4. Ibid., p. 4.

5. Ibid., p. 3.

6. Department of the Army, The Threat Organization; Tactics and Equipment, TC 6-4-2 (31 December 1976), p. E-7.

7. Ibid., p. E-5.

8. Ibid., p. E-6.

9. Ibid., p. E-4.

10. Ibid., p. E-2.

11. Department of the Army, Operations, FM 100-5 (1 July 1976), p. 8-3.

12. Ibid., p. 8-4.

13. M. Belov, COL, "How to Fight Helicopters," Soviet Military Review, September 1979, p. 19.

CHAPTER IV

THE ATTACK HELICOPTER AND ITS WEAPONS

The mainstay of the US attack helicopter fleet in the mid-1980's will continue to be the AH-1S Cobra, a modified version of the AH-1G, which continues to see extensive service as it has since its introduction during the Viet Nam War. Between those AH-1G's which will be retrofitted with the "S" model characteristics and the newly-manufactured "production" AH-1S's, the total number of AH'1S's in the inventory by the end of 1984 will be nearly one thousand. If current Army plans are realized, the attack helicopter fleet will be augmented by nearly 500 AH-64's, the long-awaited advanced attack helicopter.

Although Chapter V will deal extensively with on-board systems to enhance the survivability of the attack helicopter on the European battlefield, inherent structural characteristics, to include armor protection for vital components (including the crew) and improved durability of the rotor systems, will result in the AH-64 attack helicopter being virtually invulnerable to incapacitating damage from small-arms up to and including the 12.7 millimeter Soviet round; tests indicate also a very low vulnerability to 23 millimeter high-explosive incendiary rounds.[1]

The ultimate measure of effectiveness of the attack helicopter is the lethality of the weapon system it can carry into combat and the ordnance it can deliver to the target. Figure IV-1 shows the different combinations of weapons that can be carried by the attack helicopter. The following paragraphs will examine each weapon and describe its capabilities.

The HELLFIRE missile system has been designed as the primary armament for the attack helicopter of the mid-1980's. It has been initially designed to operate in a mode which requires laser deisgnation of the target being engaged, either in an autonomous mode by a laser designator on board the attack helicopter or in the remote mode, where designation is accomplished by a laser mounted either on the ground, on a vehicle, or on another aircraft. Its design also allows for planned improvements to accomodate a variety of "seeker" warheads, which will result in a true fire-and-forget capability. In the autonomous mode, the attack helicopter will be required to remain unmasked and vulnerable to enemy observation and fire for the duration of flight of the missile; in the remote mode, the helicopter can re-mask immediately after launching the missile, or even (in the lock-on-after-launch mode) launch the missile from a completely covered and concealed position. With the addition of any of a variety of seeker warheads, as they become available, the attack helicopter will be able to launch

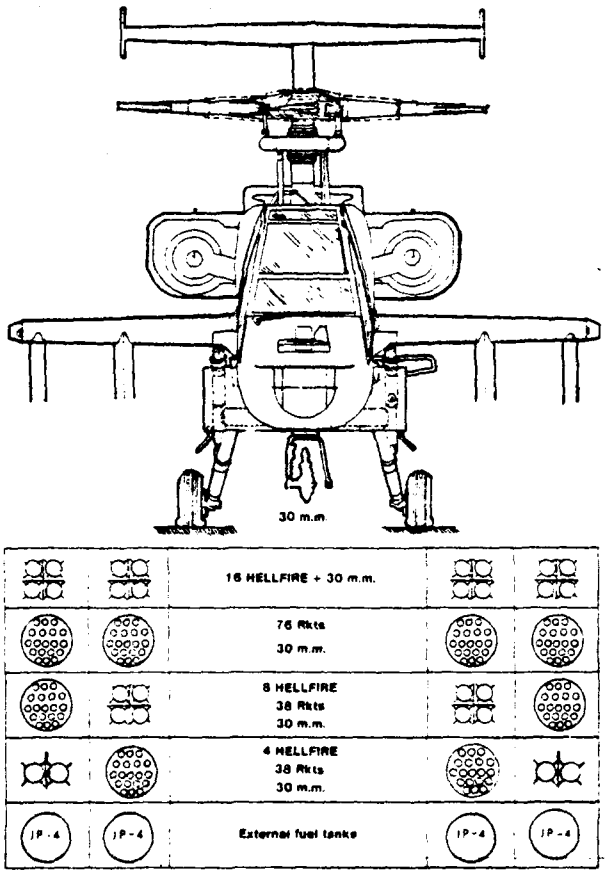


Figure IV-1. Attack helicopter weapon options

a missile which will automatically home on the electronic, infrared, or optical signature of the target selected. The missile currently has a range well in excess of five thousand meters, which can place the attack helicopter well outside the effective range of most Soviet air defense weapons considered threats to US helicopters. The application of rapid fire and ripple fire techniques to the helicopter-launched HELLFIRE will enable a single helicopter to engage multiple targets during a single firing sequence.[3] The long range of the missile, together with its planned growth to include the fire-and-forget mode of operation, means simply that no point target on the battlefield cannot be attacked by the helicopter force operating within the relatively secure environment of the nap-of-the-earth.

A secondary armament on tomorrow's attack helicopters will be the 30-millimeter cannon, or XM-230 chain gun. The cannnon has a rate of fire of up to 620 rounds per minute, and the attack helicopter will have a capacity for 1,200 rounds in its basic load. The 30-millimeter gun will be effective against personnel, lightly armored vehicles and other aircraft. The latter should seem more important considering Soviet helicopter employment doctrine discussed in Chapter III. The 30-millimeter cannon is tied to the attack helicopter's fire control system, and is accurate at ranges up to 3,000 meters.[4]

Last, but certainly not least, the improved 2.75-inch

rocket system completes the attack helicopter's arsenal. A variety of warheads for this rocket system are available, including smoke, chaff, illumination and other special-purpose warheads, but the round of particular interest is the multi-purpose submunition warhead. This warhead consists of a 2.75-inch rocket containing nine shaped-charge submunitions, designed to deploy and fall vertically from the main round when it detonates above the target. Detonation is by timed-fusing, which is set by the pilot/gunner in the cockpit prior to each rocket firing.

The submunition projectile is highly effective against lightly-armored (and, of course, unprotected) targets, and has even demonstrated a measure of effectiveness against tanks. A single attack helicopter armed with 76 rockets can, from standoff ranges in excess of five kilometers, deliver 684 submunitions into a target area 250 X 350 meters. It is not difficult to imagine the effect on a Soviet motorized rifle battalion that could result from attack by an entire helicopter company similarly armed. It is an area weapon system of tremendous capability, when properly employed, and together with the fire-and-forget missile and the XM-230 chain gun makes up a weapon system (the attack helicopter) with unequalled and unprecedented flexibility and lethality on the modern battlefield.

The Target Acquisition and Designation System/Pilot's Night Vision System (TADS/PNVS) and the new wing stores management system provide the capability for operations around

the clock in nearly all weather conditions, with stores management that allows pilot/gunner selection of a variety of range and fuse settings to permit delivery of ordnance that is well-suited for destruction of whatever target is being engaged.

Now that the reader has been familiarized with the attack helicopter, its capabilities, and the characteristics of the weapons it can employ, he is prepared to move on to the next chapter, which deals with those sub-systems available now for installation and employment on board the attack helicopter to enhance its survivability on a battlefield which includes highly sophisticated air defense weapons, against an enemy who considers the air defense of his ground forces to be a top priority ingredient for success in his conduct of war.

END NOTES

1. Attack Roles to Grow with Expanded Capacity," Aviation Week and Space Technology, July 3, 1978, p. 94.

2. Daniel Bauer, MAJ, "Tank Killer," Armor, May-June 1977, p. 9.

3. Ibid., p. 10.

4. Robert F. St. Louis, COL, "Modernized Cobra, Aviation Digest, March 1978, p. 9.

CHAPTER V

SURVIVAL ABOVE THE BATTLEFIELD

The most lethal weapon in the world is of little value if the platform from which that weapon is intended to be fired cannot survive the intensity of combat which will characterize a European war with the Soviet Union. The rallying cry of those who remain skeptical of the utility of the attack helicopter in such an intense battle continues to be outspoken statement that helicopters simply cannot and will not survive in a sophisticated air-defense environment where dense concentrations of highly lethal anti-air gun and missile systems are the rule, rather than the exception. That is just not the case.

A major effort within the aviation combat development community has been and continues to be the development and purchase of a family of aircraft survivability equipment (ASE) that will permit effective employment of attack (and other) helicopters with a high probability of surviving even the most intense and sophisticated air defense. Keep in mind the thoughts mentioned in the opening chapters that tactics and techniques adapt to overcome situational tactical difficulties, and the array of sophisticated air-defense-defeating systems to be described in this chapter, and the myth of non-survivability of helicopters on tomorrow's

battlefield should be dispelled once and for all.

As the reader has seen, Soviet air defense weapons depend on one or more of three signatures of the airborne target to provide acquisition, tracking, and firing information to the air defense weapon. They are the infrared, the optical, and the electronic. Accordingly, aircraft survivability generally fall into the following categories:

- o Infrared
- o Optical/Electro-optical
- o Radar
- o Vulnerability reduction (ballistics hardening)[1]

Recall from the preceding chapter that the infrared variety of surface-to-air missiles do not actually track on the target, but rather on its infrared signature. Consequently, the principle behind countering an infrared threat is to reduce or alter that signature to such a degree that the missile receives insufficient or inaccurate (confusing) information concerning the location of the target aircraft. Passive infrared countermeasures include such things as low-IR-reflective paint and exhaust-plume suppressors designed to lower the intensity of the aircraft heat signature.[2] They work. Additionally, the ALQ-144 is an active infrared countermeasures set which confuses any threat infrared missile. It too works. Test results indicate that when both the passive and active infrared countermeasures are employed, ground-launched infrared heat-seeking missiles are simply not effective against helicopters.[3] Finally

in the infrared area, the M-130 dispenser will be used to dispense high-heat flares from a helicopter in flight, providing a false target for the heat-seeking air defense missile. A missile approach detector is being developed for US helicopters which will allow the automatic dispensing of these flares at any time a missile is homing on the helicopter.[4] This does not mean, of course, that US helicopter forces can ignore the SA-7 and SA-9, but it does mean that those missile systems can be dealt with and will not prohibit effective helicopter operations. In short, the infrared threat can be defeated.

Moving on to radar countermeasures, the first system to be discussed will again be the M-130 dispenser. The M-130 will also dispense radar-defeating chaff from the helicopter in flight. A false radar target is presented to the radar-guided missile (or radar-aimed anti-aircraft gun system), and the target becomes a cloud of tinfoil rather than the aircraft itself. The M-130 has proven highly effective as a countermeasure to all threat radar air defense systems.[5]

The ALQ-136 is an automatic radar jammer designed for installation on Army helicopters. It receives and analyzes radar signals from threat air defense acquisition and tracking radars, and jams them electronically (automatically), causing the air defense system to break lock and lose its guidance information. The ALQ-136 can defeat two separate threat radars simultaneously. It is effective against all threat radars currently in the field.[6]

The APR-39 Radar Warning Receiver is a passive radar warning set that will tell helicopter crews when a threat air defense radar is illuminating the aircraft. It provides visual and aural information to the aircrew, who can determine the approximate location of threat radars, when the acquisition radar has "locked on," and when a missile or gun tracking radar is directing ordnance against them. In addition to being a part of the integrated automatic survivability suite, the APR-39 can provide the aircrew sufficient warning to allow timely maneuvering to avoid acquisition and/or destruction by enemy radar weapons.[7]

Again, the existence of effective countermeasures does not mean that radar-controlled air defense weapons can be ignored completely; the tools are available, however, to permit development of tactics and maneuver techniques to allow helicopter operations in a radar air defense environment.

In the area of optical and electro-optical (television and laser) air defense countermeasures, a laser warning receiver, similar in design and function to the APR-39 radar warning receiver, is being developed to provide early warning to aircrews of illumination by an enemy laser beam. On the passive countermeasure side, many steps have already been taken to reduce the helicopter's susceptibility to visual detection. Low-reflective paint and flat-surfaced cockpit canopies have greatly reduced the glint of sunlight reflecting from helicopter surfaces, a major facilitator of visual helicopter detection. Extensive work is being conducted to

determine what physical designs for helicopters offer the lowest visual detectability, insuring that future helicopter designs will optimize this characteristic. There is even serious research being done concerning liquid crystal paint for helicopters, paint which will change colors to match the sky or terrain background--a sort of flying chameleon.[8]

Given the effectiveness of radar and infrared countermeasures, however, the greatest threat to US helicopters today comes from those air defense weapons which can be fired and directed optically. In a visual engagement, weapons ranges and platfrom mobility become the only serious technical considerations. Given the superior mobility of the helicopter vis-a-vis ground air defense systems, the fight between the optically-controlled ground air defense system and the helicopter should be inherently weighed heavily in favor of the latter. In order to see, one takes the risk of being seen; once the intervisibility has been achieved, he that shoots the farthest and the most accurately, and can move the fastest, will be the winner. These are things that can be accomplished through training in and tactical employment doctrine which maximizes the attack helicopter's effectiveness and mobility.

The overall picture of attack helicopter survivability is not nearly so glum as the prophets of gloom would have one believe. Not to say that there will be no helicopter casualties in the next war; surely there will be.

But most importantly at this point in the thesis, there should be in the reader's mind at least a thread of belief that the modern attack helicopter is not so fragile as to limit its employment essentially to missions performed behind the forward locations of friendly troops. If that were the case, then perhaps the only suitable mission for the attack helicopter would indeed be the destruction of attacking tanks in the Soviet first echelon. That is not the case, however. Using appropriate tactics and techniques, and employing to the fullest all available active and passive air defense countermeasures, a formation of attack helicopters can conduct a penetration of Soviet air defense, bypass the intensity of the central battle, and bring the full range of attack helicopter firepower to bear on the Soviet rear echelons.

Once the penetration of the air defense umbrella is given, an entire spectrum of possible employment options for the attack helicopter begins to emerge. A few of those employment options, along with some consideration of means for sustaining helicopter combat in the absence of secure ground logistics supply routes, will be the subject of the following chapter.

END NOTES

1. "Aircraft Survivability Equipment US Countermeasures," Annex B to agenda item 15 to 10 QWG/AVN, undated, p. 1.

2. "Aircraft Survivability Equipment Special Issue," Army Aviation, June 30, 1978, p. 53.

3. Ibid., p. 53.

4. Ibid., p. 54.

5. Ibid., p. 54.

6. Ibid., p. 43.

7. Ibid., p. 29.

8. Ibid., p. 70.

CHAPTER VI

EMPLOYMENT OPTIONS

The mission of US/NATO forces in the event of a Soviet attack in Europe is clear; halt the attacking force, cause it to withdraw in order to restore the international boundary. The backbone of any Soviet attacking force will be its armored and mechanized forces, committed in supposedly overwhelming numbers. A tank is a frightening battlefield system, and the vast numbers of tanks opposing NATO in Europe have caused the dominant direction of planning the defense of Europe to be the destruction of tank formations. No where in Soviet doctrine, however, can one find any specific comment to the effect that an attack cannot take place (or continue) in the absence of tanks. Soviet offensive doctrine deals in concepts and philosophies of war-fighting, and the essential ingredients of Soviet success are, in their own estimation, generic in nature. Soviet doctrine calls for mobility, firepower, activeness (aggressiveness), defense from air attack, and other generally stated principles, none of which are unalterably dependent on a single weapon system. Rather, the Soviet thought seems to be towards employment of every weapon system in a situationally-dependent formula to achieve the greatest combined effectiveness.

At the same time, US doctrine is leaning towards an almost obsessive determination to stop the Soviet tanks at all costs, and, by so doing, halt the attack and accomplish the overall mission. But what about the rest of the Soviet Army? Tanks make up less than twenty percent of the fighting systems in any attacking Soviet division. In the Soviet's eye, an attack can and will continue without any tanks at all; while the capacity for shock action, heavy armor protection and long-range direct fires may be degraded, other Soviet capabilities and systems will work to overcome that degradation and continue the momentum of the attack. For example, a BMP "pure" Soviet unit may not be quite as effective as one in which tanks are also present, but either can present serious problems to a severely outnumbered defender.

The Soviet doctrinal concept of committing subsequent attacking echelons "though" the leading forces represents a potentially chaotic problem in battlefield management for the Soviet commander, at any echelon. His concept of echeloning is sound enough, logically, but its execution will present some very real difficulties in actual practice. Even the amateur tactician realizes that the most difficult of any tactical maneuvers are those involving a change of command and control of the battle from one commander to another. Such maneuvers as the delaying action, the relief of one unit by another during the battle itself, a "simple" passage of lines, or merely coordinating the approach

to one another of two friendly forces--these are typical examples of this broad type of operation. The key to success of this type of operation rests in maintaining continuous, positive command and control. The Soviet plan to "echelon" his attacking forces encompasses all of the worst problems of command and control of maneuvering forces. Maintaining the momentum of his attack is of such prime importance that he will take the substantial risk of attempting the tactically delicate passage of successive echelons through (or around) heavily engaged first-echelon units; this is generally true at all echelons down to and including battalion level. Successfully overcoming that substantial risk will require skilled commanders at all levels to exercise maximum positive command and control during all phases of the commitment of following echelons. That his commanders are sufficiently skilled must be assumed. Likewise, that those commanders have the capability to exercise the needed command and control is without question, if they are allowed to do so without significant interference on the part of the defender.

It makes a lot of sense to attempt to capitalize on that risk. For while the Soviet concept of echeloning is, on one hand, a tactical strength, it is simultaneously a potential weakness; an outnumbered defender must take advantage of every possible weakness on the part of the attacker.

Before dealing with that and other Soviet vulnerabilities, some general discussion in in order. For many

reasons, most of which relate to air defense weapons' means of target acquisition and target tracking, a helicopter operating at the nap of the earth, employing suitable countermeasures, is less vulnerable to destruction by the sophisticated Soviet air defense network than are high-performance aircraft which are unable to gain and utilize the full protection of terrain. Both radar and infrared weapons are seriously degraded in effectiveness when the target is close to the ground; optically-controlled weapons can be degraded by use of terrain masking. While this thesis chose not to address specific USAF capabilities, one general principle must be mentioned here: when dealing with an air defense "umbrella" such as the Soviets', where many different weapons systems must be coordinated and orchestrated to provide defensive coverage across a wide spectrum of target speeds, ranges, and altitudes, the most effective counterforce is obviously one which causes him (the Soviet air defender) to attempt to engage aircraft in as many different configurations of speed, range, and altitude as possible. Simultaneous employment of "low-and-slow" attack helicopter forces and high-performance fighter aircraft will substantially complicate the Soviet air defense problem, and result in increased survivability and effectiveness for both the helicopter and the fighter. The inter-service distinction between Army and Air Force roles and missions becomes rather foggy at this point.

Figure VI-1 is offered as a simplified model for examining the ingredients of a Soviet attack and its likelihood

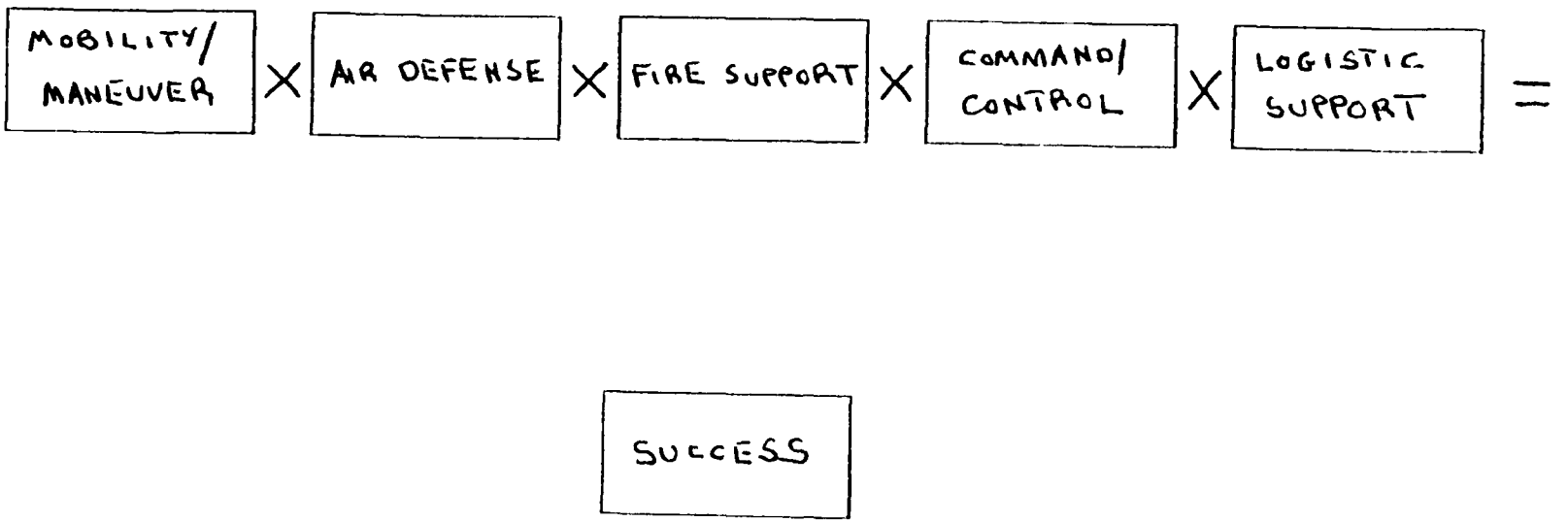


Figure VI-1. Soviet offensive model

of success. Each ingredient will be discussed briefly.

Mobility and maneuver are the cornerstones of Soviet offensive doctrine. They hope to achieve success here through rapid, almost reckless advance of completely armored/mechanized forces, counting on speed and momentum to keep the defender off balance. And while the active defense can no doubt inflict heavy losses on such a pell-mell attacking force, the sheer numbers of tanks and armored vehicles indicates that it is highly unlikely that sufficient defensive combat power can be employed across a sufficiently wide front to halt or decisively slow all potential high-speed penetrations and breakthroughs. The defender in Europe must accept the premise that such breakthroughs are going to occur, and that the land battle will have to be fought in depth, with little regard for traditional linear concepts of defensive combat.

The Soviets view defense from air attack of their maneuver units as critical. Their doctrine clearly states that, in the absence of complete Soviet air supremacy, maneuver forces must never operate without the cover of the air defense umbrella. In the Soviet view, to do so is to invite disaster. This was reinforced by the Egyptian experience during the 1973 Arab-Israeli war.

Likewise, Soviet tactical concepts are deeply rooted to the integration of maneuver and fire support. Fire support for Soviet ground forces is provided for the most part by large

numbers of tube and rocket artillery systems, disposed and employed in task-organized groups at each level down to regiment, and in rare cases, battalion. In recent months, the Soviets have begun integrating the fire support capabilities of their armed helicopters into the ground battle as well. Soviet offensive operations are keyed to the availability and employment of large quantitites of artillery. The Soviets depend on their artillery to perform the necessary role of suppressing or destroying sophisticated ground-mounted anti-tank weapon systems. In the Soviet view, sufficient numbers and effective employment of their tube and rocket artillery is essential to the successful conduct of offensive operations.[1]

Like any military operation, Soviet offensive operations are dependent on adequate logistical support for the maneuver forces. The degree of dependence on the overall operation on massive logistical support is deteremined by the maneuver unit's organic logistic capability and by the length of time a particular unit must be sustained logistically. In consonance with their principle of echelonment, the Soviet's have "pushed forward" to the maneuver units the capability to resupply and maintain themselves for limited periods of time (one to three days, depending on the situation and intensity of battle), after which subsequent "fresh" echelons would be committed, virtually eliminating the need for cumbersome and operationally complex "front-line" logistic

operations. The Soviets would strive to conduct a short, violent war in Europe. In that case, battlefield logistics designed to replenish fuel, ammunition, other supplies, and personnel are not thought to be critical areas underlying Soviet offensive operations. Interdiction of logistic activities above the level of the Soviet division will have little immediate effect on the outcome of a European war which follows the design of the "short-war" scenario.

Elimination of the organic logistics capacity of Soviet division and regimental units, however, can have the effect of forcing the enemy commander to conduct more extensive and more critical battlefield logistic operations, in order to maintain the combat effectiveness of his maneuver forces at even a minimum level required for a successful attack. This will have the effect of slowing and/or shortening the advance of the leading echelons, and forcing commitment of subsequent echelons at times and places not necessarily ideal in the tactical sense.

Although a very simple model indeed, the equation of figure VI-1 is significant, in that the ingredients of Soviet success combine multiplicatively. As long as the Soviet commander can exercise all of the capabilities shown, he will have some chance for success. Conversely, and more importantly, if any of the factors in the equation can be effectively reduced to zero, the attacking Soviet commander's probability of success will also be zero. Of the factors in

the equation, those most easily isolated, both conceptually and tactically, are defense from air attack, fire support, and command and control. It is in attacking and destroying these Soviet capabilities that the author suggests may be found the most decisive areas for employment of attack helicopter forces.

Figure VI-2 is a schematic representation of the coverage against air attack provided by the family of Soviet air defense systems found within a notional Soviet combined arms army. (For purposes of this illustration and the discussion following, it is assumed that a US division will be called upon to defend against attack by a Soviet combined arms army.)

Of course, any air operations include consideration of countering enemy air defenses. The specific mission of attacking and destroying air defense installations is for the most part a problem of attacking well-defined point targets, a task requiring use of weapons with high accuracies. Those weapons are available, as has been seen, for employment by attack helicopters as well as Air Force high-performance aircraft. Can US air (including helicopters) forces operate in an environment of intense, sophisticated air defense? The characteristics of today's aircraft, along with all the available air defense countermeasures suggest that they can. Can US air (again including attack helicopters) forces successfully engage the Soviet air defense network in a "head-on" battle? The answer to that question will not be known for

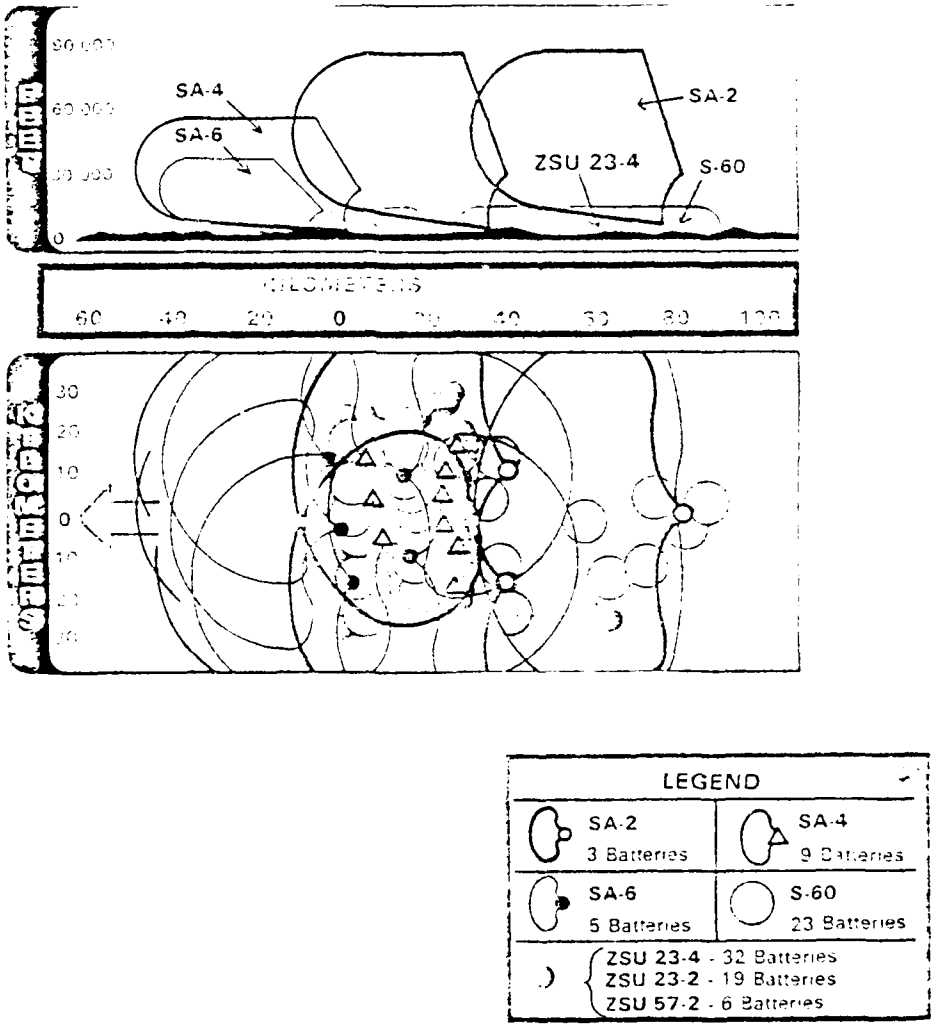


Figure VI-2. The Soviet air defense umbrella[2]

certain until such a battle actually takes place, but the criticality of air defense to Soviet operations suggests that a full examination and analysis of that pitched battle to eliminate the Soviet air defense network must be undertaken.

Figure VI-3 is a schematic representation of how the regimental and divisional artillery groups would be disposed during a Soviet offensive. Figure VI-4 is a detailed look at how the individual artillery weapons within those groups are likely to be positioned on the ground. It can be seen that attacking and destroying artillery formations calls for employment of weapons which are effective against poorly defined "area" targets. The improved 2.75-inch helicopter rocket system is such a weapon. Figure VI-5 is a composite sketch of the effects of a single attack helicopter firing the multipurpose 2.75-inch sub-munition warhead into the area doctrinally occupied by a Soviet firing battery. The picture draws its own conclusions. Remember, these rockets can and would be launched from positions that are either covered and concealed from enemy air defense weapons, or beyond their effective ranges, or both.

Contemporary Soviet writings outline a broad concept for employment of the (Soviet) armed helicopter in a counter-helicopter role. The existence of a radar-controlled cannon currently installed on the HIND-D, together with the inevitable addition of an air-to-air missile system for use

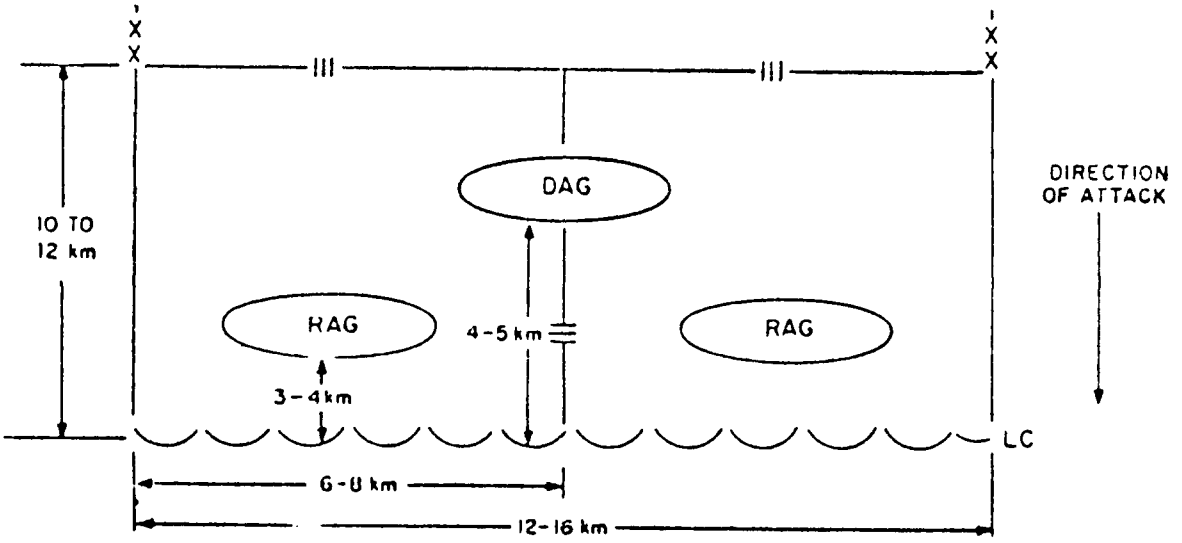
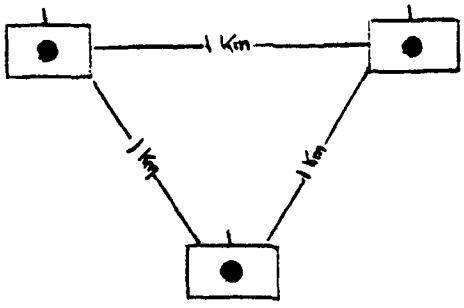
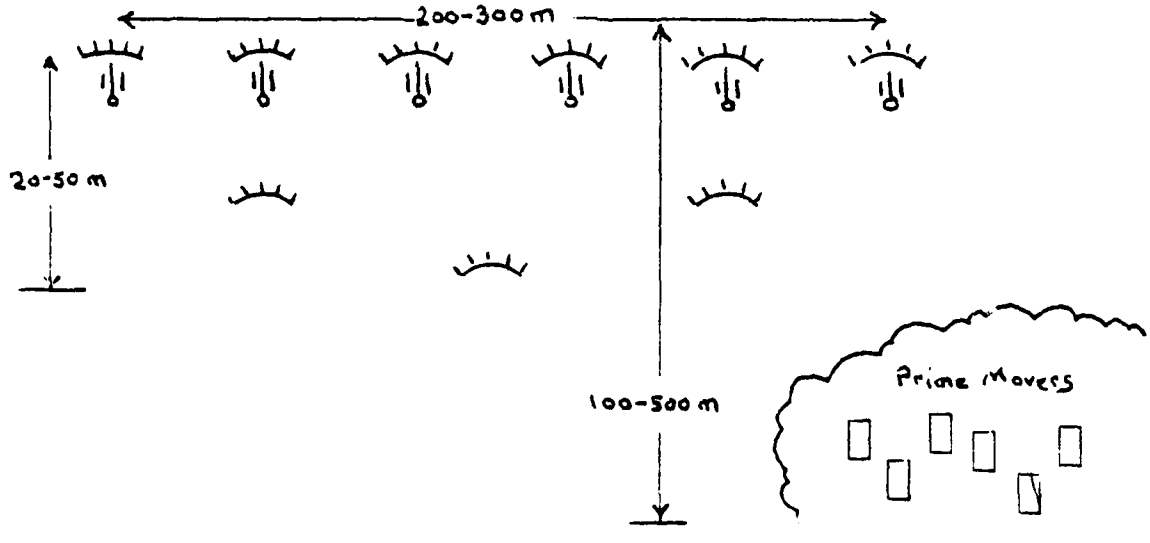


Figure VI-3. Soviet divisional and regimental artillery groups



Typical Battalion Disposition



Firing Battery Position

Figure VI-4. Soviet artillery battalion/battery formations

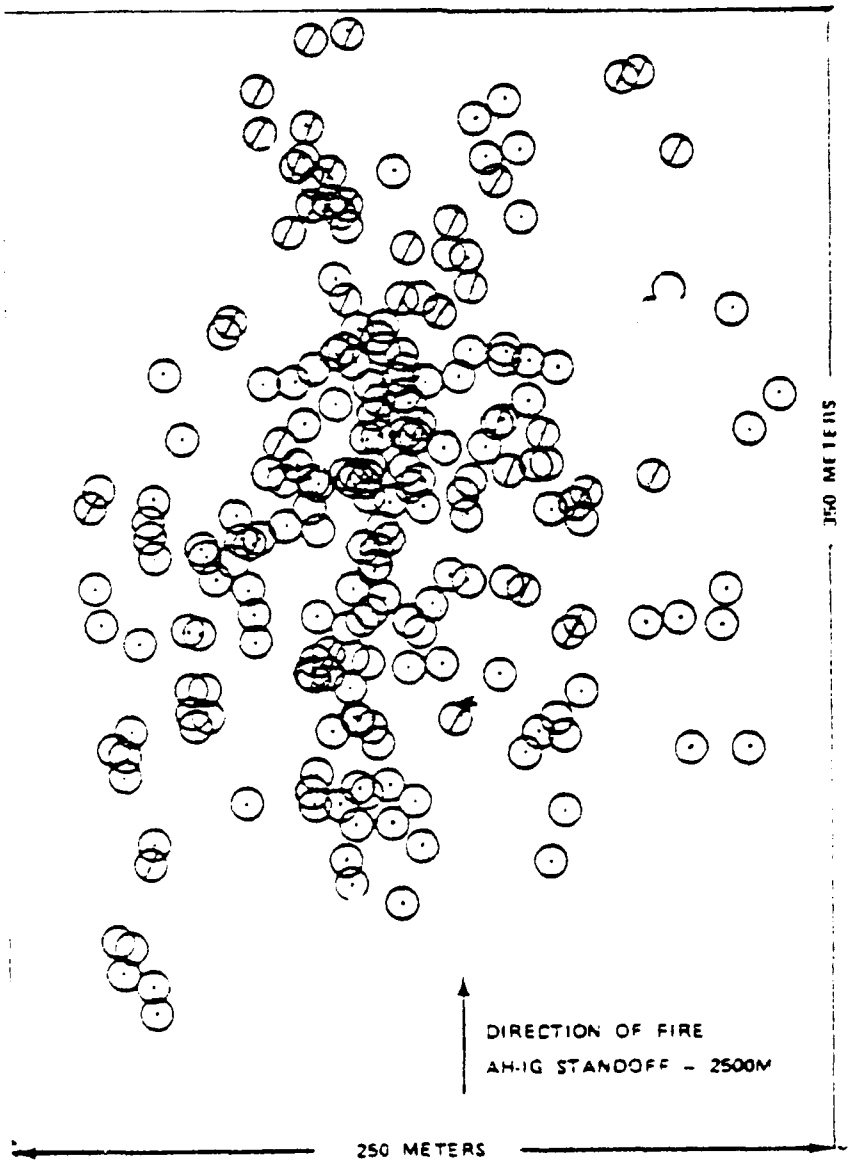


Figure VI-5. The 2.75 kill zone

by their armed helicopters, reinforces the logical position that the most effective means to counter highly mobile, survivability-enhanced, sophisticatedly armed helicopter forces is through employment of a similarly capable helicopter force. Considering the mobility of helicopter forces, and the shortened battlefield time-distance factors resulting from that mobility, the encounter between opposing armed helicopter forces is likely to be the first helicopter action to be fought in the next war. This assumes a move-and countermove employment philosophy for armed helicopters which parallels the broad concepts of mobile warfare. The only conceivable reason why this helicopter battle should not take place would be the reluctance of the commander (on either side) to expose his helicopter forces to it; if the opposing helicopters are aggressively and energetically employed, even that decision may not be a feasible one. Remember, initiative and mobility are complementary, and the use of both most often allows the commander to select the time, tone, and place of battle. Summarizing, the US commander must be prepared for enegagements between helicopters. Furthermore, the synergisms of three-dimensional warfare suggest that the helicopter vs helicopter battle may well have to be fought. Fast-moving jet fighters are relatively ineffective against helicopters; existing flight techniques and survivability measures can overcome (or at least minimize) the ground air defense threat; only another helicopter can decisively engage a helicopter force on the modern battlefield.

It is appropriate at this point to attempt to describe the interactions which will take place in a modern three-dimensional war between mobile forces. The author offers a series of simplified models for examining the relative effects of selected battlefield systems on both sides. These models appear as figures VI-6 through VI-9.

As mentioned earlier, the ultimate mission for the defender in Europe will be to halt the attacking Soviet ground forces; all battlefield systems must support that final task. But in an elaborate and deadly game of "scissors-cuts-paper/paper-covers-rock/rock-breaks-scissors," many fighting systems combine and interact to achieve the desired end result. The logic underlying figures VI-6 through VI-9 follows:

1) Only air-delivered weapons are capable of attacking <u>any</u> element on the Soviet side of the model.
2) Close air support jet aircraft are more susceptible to destruction by ground air defense systems than are helicopters.
3) Only an armed helicopter force can effectively counter another armed helicopter force.
4) Unless both the Soviet armed helicopter force and the Soviet air defense network is eliminated, the effectiveness of the USAF CAS mission will be seriously degraded if not altogether eliminated.

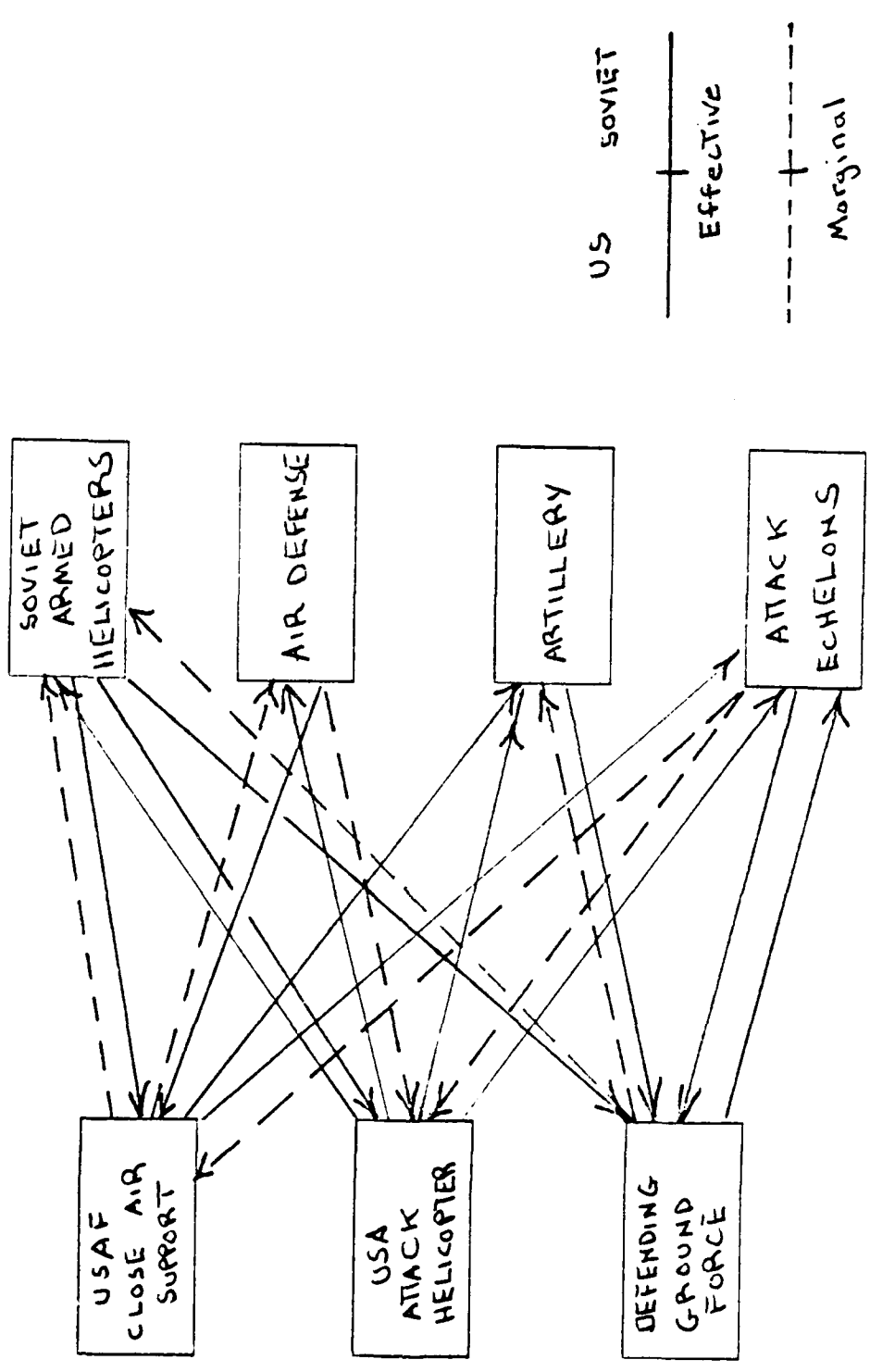


Figure VI-6. US-Soviet combat power interactions

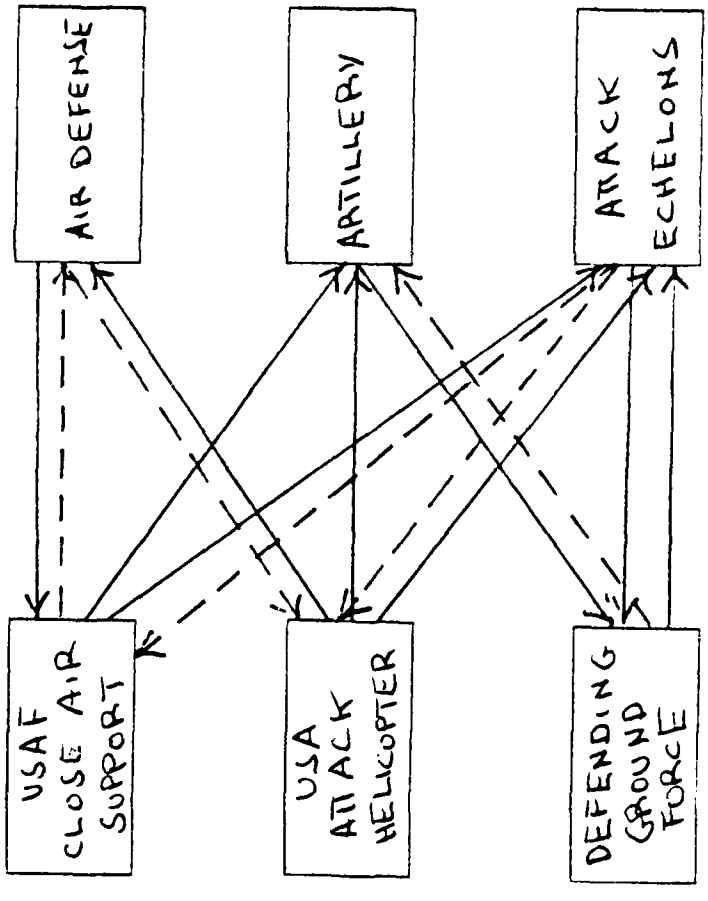


Figure VI-7. US-Soviet combat power interactions

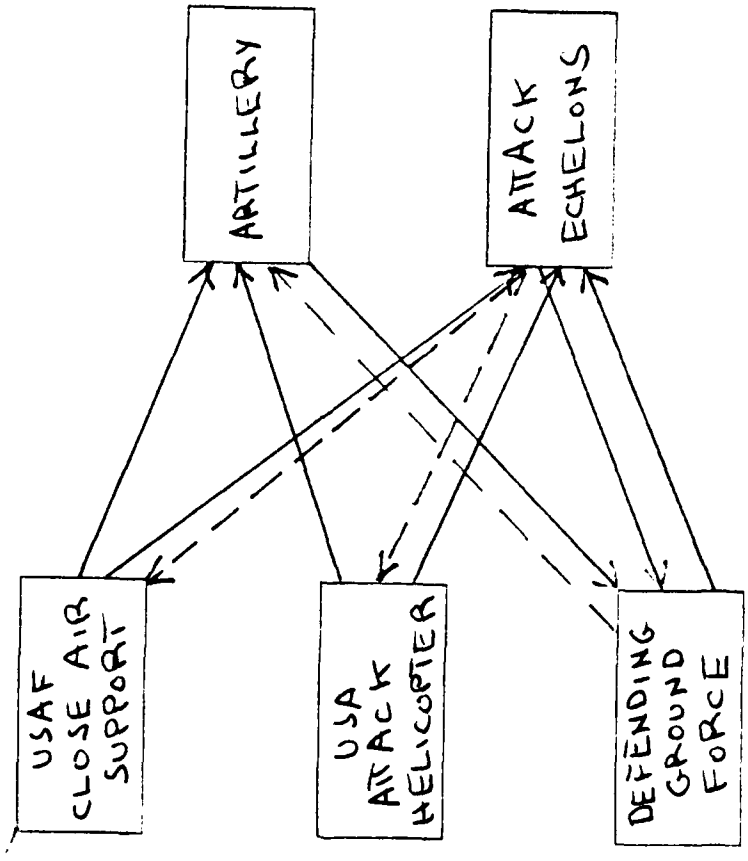


Figure VI-8. US-Soviet combat power interactions

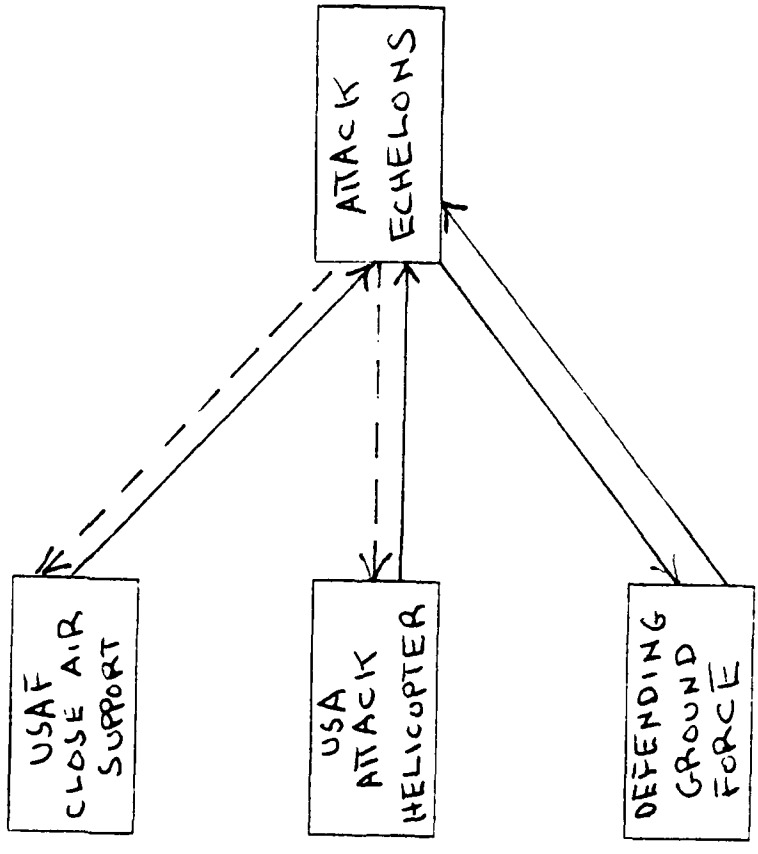


Figure VI-9. US-Soviet combat power interactions

5) Soviet mass employment of artillery can significantly reduce the effectiveness of ground antiarmor defenses. US forces are counting on those ground antitank weapons to offset the disparity in the relative numbers of tanks on both sides. Soviet artillery effectiveness must be degraded to the maximum possible extent.

6) In order to permit effective attack of Soviet artillery positions by either US attack helicopters or CAS aircraft, the Soviet armed helicopter threat must be minimized. This is best accomplished through its destruction.

7) Likewise, in order for US attack helicopters to engage and effectively reduce the Soviet air defense capability, the Soviet armed helicopter force must be met and destroyed.

8) In order for USAF CAS aircraft to be effectively employed against Soviet ground forces, the Soviet air defense network must be overcome.

9) Since Soviet helicopters can threaten USAF CAS aircraft, but not necessarily vice versa, and since the Soviet ground air defense system can seriously hinder USAF CAS operations, but not necessarily vice versa, and since the (US) attack helicopter can threaten the Soviet ground air defense system to a greater degree than the

latter can threaten the former, and since US and Soviet armed helicopters can threaten one another to a relatively equal degree, the key player in the game of scissors/rock/paper becomes the helicopter force; the outcome of the inter-helicopter battle will influence every other aspect of the battle, and in the final analysis may determine the success or failure of the defense of Europe.

10) In the absence of either or both the Soviet armed helicopter force or the ground air defense umbrella, US (Air Force and Army) aerial-delivered antiarmor weapons will be devastatingly effective.

11) In the absence of massive Soviet fire support to suppress them, US ground forces' antitank defenses will be highly effective.

12) Once the Soviet helicopter force, air defense network, and artillery capability have been sufficiently degraded, the full attention and combat power of the defending ground forces can be directed towards stopping the attacking Soviet ground forces. Similarly, any remaining US helicopter and/or USAF CAS assets can then be directed wholly to the task of destroying the attacking enemy force.

Summarizing the logic above, the three-dimensional war that would be fought in Europe against an attacking Soviet army calls for an approach that will allow defeat in

detail of the principal contributors of Soviet combat power. Such defeat in detail does not imply the same in the classical sense of the physical, time-related, sequential engagement of fragmented forces on the ground--Soviet numerical strengths and doctrine will probably preclude that. Rather, the defeat in detail would take place in the philosophical and conceptual sense. Of course, the tempo and intensity of the next war will not allow for each step of this three-dimensional battle to be fought separately, one at a time. A far more likely scenario might call for large formations of (US) attack helicopters to be dispatched across the FEBA, to attack and destroy Soviet air defense weapons and artillery groupings, thereby increasing the effectiveness of USAF CAS and the defender on the ground, respectively, as they engage the attacking Soviet ground forces. Special-purpose counter-helicopter helicopters would be required, both with the deep-hitting attack helicopters and the defenders in the main battle area, to deal with the threat from Soviet armed helicopters. Likewise, the addition of CAS aircraft to the deep-striking helicopter forces would greatly enhance their effectiveness.

These across-the-FEBA air operations would be conducted either in response to specific intelligence concerning enemy dispositions, or in a "search-and-destroy" mode, similar to the fighter sweeps conducted behind enemy lines during World War II. In the latter case, both helicopters and CAS aircraft would engage targets of opportunity, probably in priority: enemy air (including helicopter) forces,

enemy air defense sites, enemy artillery positions, enemy command and control centers, and finally enemy logistics facilities. If there is clear evidence pointing to the location and intention of the Soviet subsequent maneuver echelons, such an air strike force would be equally effective if employed to interdict those echelons.

There are at least two immediately obvious potential problems when one considers these expanded employment options for the attack helicopter force. First is the question as to whether or not the currently projected number of attack helicopters that would be available will be sufficient to accomplish all that the concepts described above would require. In answer to that objection, the author contends that the size of the helicopter force has been determined based on its (the attack helicopter's) employment principally and primarily as an antitank adjunct to the ground maneuver force. If broader employment modes are considered and determined to be valid requirements, those requirements would drive the ultimate size of the attack helicopter force upward.

Second, the sustainability of an attack helicopter force operating over unsecure ground is severely limited by current concepts for refueling, rearming and repairing that force. New concepts would have to be described, and new methods and techniques developed for their execution, to permit helicopter forces to be replenished across-the-FEBA; without new concepts, the attack helicopter force will be

required to transit the central battle repeatedly in order to continue operations in the enemy's rear. Not only would this place the attack helicopter force in repeated jeopardy from the most intense concentration of ground threats near the FEBA, but it would also detract substantially from the time that would be available for the helicopter force to conduct its fighting mission. Every minute lost flying to and from a refueling/rearming point is a minute lost to the availability of attack helicopter combat power.

The author suggests that a refueling, rearming and limited maintenance capability could be moved in utility or cargo helicopters, across the FEBA at the same time the strike force makes its initial penetration. Small infantry forces would have to accompany the logistic force for local security of forward sites. The size of each site, that is its capacity for servicing the fighting ships, and the degree of security required, would be situationally dependent. Because of their susceptibility to detection and destruction once replenishment operations were begun, each site would operate for an extremely limited period of time, probably a single replenishment cycle for a pre-determined number of attack ships. Its personnel would then move, via its own air or ground mobile transport, to another site where fuel and ammunition had been positioned.

Obviously, command, control, and coordination of such an across-the-FEBA helicopter replenishment operation would present extremely complex problems. Army Pathfinders would

no doubt play an indispensable role in assisting in coordination of the entire effort, to include control of air traffic into and out of each site. Other problems of coordination such as what attack ships would use what replenishment sites at what times would best be solved through extensive training and rehearsal, and the development of detailed plans and standard procedures to be executed in the event of the full range of contingencies. Training and coordination-intensive? Yes. Impossible? Certainly not. The decision to establish such replenishment sites across-the-FEBA would depend on a number of factors; surely some situations would allow the attack helicopter force to return to the relative security of the friendly main battle area to conduct its replenishment. But just as surely, there will be situations where the ability to penetrate and sustain an attack helicopter force in the enemy's rear areas could well be decisive in determining the outcome of the land battle.

The conclusions of the discussion in this chapter are twofold. First, the helicopter is an admittedly expensive, but highly effective weapon system which must be employed when and where it will contribute the most to the successful prosecution of the land battle. Second, the state of the art of current technology has resulted in the ability to assemble an attack helicopter force whose performance characteristics, ability to survive, and weapons lethalities open the door to practically unlimited employment options. One concept for

combining and trading-off those options has been preserted in this chapter. Summary remarks and conclusions of the thesis will be presented in the next, and final chapter.

END NOTES

1. The Offense, Sidorenko, p. 119.

2. Department of the Army, Employment of Army Aviation in a High Threat Environment, FM 90-1 (30 September 1976), p. 2-5.

3. USACGSC, Soviet Tactics, Artillery Organization and Employment, PT 100-3, Vol. III (March 1979), p. 11.

4. Department of the Army, US Army Intelligence and Security Command, US Army Intelligence and Threat Analysis Center, Soviet Army Operations, IAG-13-U-78 (April 1978), pp 5-13.

5. Tow, James L. COL, "2.75 Update. Whatever Happened to the Egg on the Wall?" Aviation Digest, May 1978, p. 12.

CHAPTER VII

CONCLUSIONS

The summary and conclusions of this thesis are fairly straightforward, as are the areas requiring further study and analysis. Some of the implications are not as straightforward, and require serious introspection on the part of the reader if he is to gain full appreciation of the potential impact of expanded employment doctrine for the US attack helicopter force. This chapter begins with a listing of conclusions that have been drawn by the author.

Conclusions

1) The attack helicopter can be employed aggressively on the modern battlefield with a high probability of surviving.

2) Helicopter weapon systems can be effective against any target on the modern battlefield.

3) The confrontation between US and Soviet armed helicopters will have a major impact on every other aspect of a war in Europe. The US must continue, in all due haste, developing the air-to-air potential of its helicopter forces.

4) Attack helicopters are better-suited than USAF CAS aircraft for the mission of attacking and destroying the enemy air defense network. The most effective counter-air defense force will consist of both Army and Air Force attack aircraft.

5) Attack helicopters can be employed successfully in the attack of Soviet air defense installations, Soviet armed helicopter formations, Soviet artillery positions, and Soviet command/control and forward logistic facilities.

6) Items 3, 4, and 5, above, contain implications of a crossing-over of responsibilities, roles and missions between the Air Force and the Army. Those implications must be considered with one central thought in mind: how to utilize all available capabilities to best influence the outcome of the land battle in Europe.

7) Sustainability of attack helicopter forces operating behind enemy lines is a demanding but not impossible problem.

8) Within its own house, the Army must come to grips with the complex nature of attack helicopter doctrine, attack helicopter systems development, force development, and training. A unitary, integrated approach to the attack helicopter business (and its integration into the total force) is absolutely required. A single doctrinal and systems proponent for all helicopter matters is the only logical course to pursue. Failing that, the total capabilities of the helicopter force will probably never be realized.

Once the conclusions above have been determined to be valid, other areas requiring further study arise if expanded attack helicopter employment concepts are to become realities. Those areas for further discussion are as follows:

1) The supposedly clear-cut distinction between the roles and missions of the Air Force and the Army must be re-examined.

2) The question of establishing an aviation branch within the Army, with a single proponency for aviation matters, must be reexamined.

3) If an expanded capability for the attack helicopter force is considered, one of two determinations must be made: either the total number of attack helicopters projected for the 1985 force must be re-evaluated, or the priority of employment modes for the attack helicopter force must be determined. Perhaps killing tanks is not the most effective and decisive mission for the attack helicopter.

4) Combat service support concepts relating to the attack helicopter force must be examined in detail, with an eye towards developing the capability to sustain helicopter forces across-the-FEBA.

In summary, given the conclusions above and successful resolution of the questions outlined for future study, the aggressively employed helicopter force offers the opportunity to change the face of mobile warfare. With the advent of flying machines which are capable of operating within the protective embrace of the terrain, while at the same time demonstrating the high mobility and striking power of an aerial force, no longer is there a clear distinction between the ground and air battles. The commander tasked to defend

Western Europe from Soviet attack must approach his mission from a true three-dimensional perspective. The modern helicopter force has bridged the gap between the ground forces in their tanks and foxholes and the air arm of battle. With lethal helicopter forces operating in that heretofore poorly defined tactical arena, the marriage of ground and air forces cannot only be finally consecrated, but consummated as well on the battlefields of Europe. Particularly in a war where friendly forces will be vastly outnumbered, it is an undeniable requirement that the US examine, define, and develop the <u>total</u> potential of the fighting helicopter, and thus complete the latest chapter in the continuing saga of combined arms warfare. The final decision of the next war may go to the side that most effectively uses all available resources. If the US develops the potential of the fighting helicopter, it may well be the weapon of decision in the next war, just as the tank was in the last. If the US chooses to employ only a fraction of the attack helicopter's capabilities, as is the case reflected by current doctrine, and if the Soviets (as they seem to be) pursue the helicopter's full potential, it <u>will</u> be the weapon of decision.

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