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BATTLEFIELD AIR INTERDICTION: AIRPOWER FOR THE FUTURE, *by*

MAJ Roger P. Busico

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

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Fort Leavenworth, Kansas
1980

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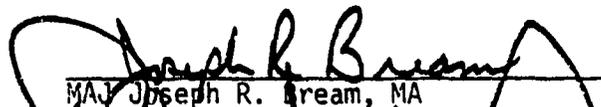
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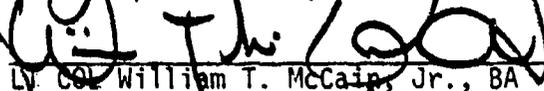
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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (Reference to this study should include the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

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ABSTRACT

BATTLEFIELD AIR INTERDICTION: AIRPOWER FOR THE FUTURE, by Major Roger P. Busico, USAF, 66 pages.

In this study battlefield interdiction in modern warfare is evaluated and recommendations for the effective use of airpower for this purpose are made. A future war will probably be against the Soviet Union or one of its client states. Soviet tactics emphasize the echelonment of forces and massed artillery. Destruction of these elements is critical for victory. Target acquisition capabilities are sufficient to generally target second echelon forces and artillery but direct observation of the target is necessary to destroy mobile targets. Of all current weapon systems evaluated for range, accuracy, flexibility, availability and survivability, tactical aircraft are best suited for the battlefield interdiction mission. However, current battlefield air interdiction employment principles are a confusing mixture of close air support and interdiction procedures.

Recommendations include: adopt battlefield air interdiction as a separate Air Force mission with world-wide application; control battlefield air interdiction using request procedures similar to close air support but from the Tactical Air Control Center rather than the Air Support Operations Center; increase the Army manning at the Tactical Air Control Center and assign them from echelons above corps so they will be more responsive to theater-wide targeting requirements; and clearly define the battlefield air interdiction area by changing current fire control measures.

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CHAPTER I

INTRODUCTION

Battlefield air interdiction (BAI) is a new term used to describe the employment of tactical air power against second echelon enemy forces. Although the term is new, the concept is old. This method of using tactical air forces has existed as long as airpower itself. Until now it was not important to differentiate between BAI and the more inclusive term interdiction. Interdiction of all types has generally been considered primarily an air force responsibility. But, Soviet depth through echelonment of forces and increased mobility has caused Army Commanders to look and fight in a deeper battlefield. Therefore, they have become concerned with an area of operations which had previously been left to the Air Force. In response to the Army Commander's concern BAI was created. Along with a new term, perhaps new procedures may be necessary to insure the Army and Air Force staffs are prepared to meet the challenge of a fast moving second echelon. The purpose of this thesis is to discuss and develop procedures for conducting BAI in an effective and safe manner.

BACKGROUND

World War II was a major turning point for the employment of air power. Until Operation Torch, the invasion of North Africa, tactical air forces were employed much like artillery. Fighter units were assigned to a particular Army unit. As a result, air

power was applied piecemeal. Two major strengths that were inherent in the use of aircraft, flexibility and ability to concentrate firepower, were not exploited. This problem was soon recognized and corrected. All tactical air assets were placed under one Commander who used them in force as needed along the entire front. This concept of centralized control significantly increased the effectiveness of the air effort. Centralized control has become a basic tenet of all U.S. Air Force operations. ¹

From the beginning of World War II to today, the air forces of all nations have proved to be of great value. The Army Air Corps was highly successful in both the Pacific and European theaters. Indeed history has revealed that "airpower was decisive in the conquest of Germany".² On the Axis side, the Luftwaffe was a critical element in the successes of the German blitzkrieg. One example of the Luftwaffe's effectiveness occurred near Kursk. A squadron of German aircraft totally defeated a Soviet armored brigade without the assistance of any ground forces. ³

In Korea and more recently in the Middle East, airpower has proven to be a decisive element of power. The Far East Air Force was a critical factor throughout the Korean War. Through continued close air support and interdiction campaigns from the Pusan perimeter to the Yalu river, airpower often proved to be the Army's "only salvation". ⁴ In 1967, the Israeli Air Force (IAF) was instrumental in Israel's victory. The extremely effective counter air campaign on the first day of the war rendered the Egyptian Air Force "... (no longer) an effective fighting force...unable to give

either cover or close support..."⁵ The Israeli Air Force successfully supported the ground forces, enabling them to defeat a force of far superior numbers. The October 1973, Middle East War again proved the value of airpower even though it also proved that aircraft are also subject to the greater lethality of the modern battlefield. Israeli armor units in the Sinai were facing a disaster until the IAF was used against Syrian armor in the Golan freeing Israeli armor to reinforce the Sinai front.⁶ The armor freed in the Golan then opened a hole in the Egyptian air defense umbrella allowing the IAF to once again provide effective close air support and interdiction.⁷

Tactical airpower has continually evolved, and should continue to change to meet new problems. Defeating the second echelon forces is one of those new problems. Developing workable, efficient procedures for battlefield air interdiction should ensure air power will continue to be the valuable asset it has been in the past.

TRADITIONAL ROLES OF TACTICAL AIR

It is important to understand close air support (CAS) and interdiction operations to understand how the battlefield interdiction concept developed. Close air support is conducted to blunt the enemies attack, assist friendly forces in the attack and allow friendly forces freedom of movement. Close air support is the use of airpower against hostile forces which are designated by the ground commander. It is flown against targets which are close to friendly forces, and must be totally coordinated with

ground fires and maneuver. ⁸ It is generally considered to include all air operations up to the fire support coordination line (FSCL). ⁹ There are two types of CAS missions: preplanned and immediate. Preplanned missions are requested through Army communications channels generally 24 to 48 hours before they are required. Immediate missions are requested by Army Commanders through a dedicated Air Force Request Net. These missions may be requested to meet emergencies or for operational changes not allowing time to use preplanned request channels.

Interdiction is conducted to "destroy, neutralize, confuse or delay enemy ground forces. ¹⁰ Interdiction missions are executed by the Air Force Component Commander following general guidance established by the Joint Force Commander. ¹¹ They are almost entirely preplanned although scheduled aircraft may be diverted to a more lucrative target or be forced to a secondary target for weather or fuel considerations. Interdiction missions are conducted independently beyond the FSCL. CAS missions and interdiction missions are differentiated by the requester and by where the missions are flown.

BAI is a combination of CAS and interdiction concepts. Tactical Air Command considers BAI part of interdiction operations. ¹² Air Force Manual 1-1 also considers BAI part of interdiction. ¹³ The Tactical Air Command and Army Training and Doctrine Command Air Land Force Agency (ALFA) also define BAI as a specific type of interdiction. However, ALFA goes on to say Army Commanders may request BAI by calling it CAS. According to ALFA, BAI can occur

on either side of the FSCI, using procedures and resources dedicate to either CAS or interdiction. ¹⁴ (See figure 1) This is confusing. It is the belief of this author that insufficient emphasis will be placed on BAI unless it is considered independently from either CAS or interdiction. BAI should be considered as a separate mission with its own allocations and procedures.

THESIS STATEMENT

The hypothesis of the thesis is that battlefield air interdiction should be considered as a separate and distinct mission of tactical airpower equal to close air support and interdiction. BAI missions should be preplanned in Air Force channels; but, should respond to "immediate" Army requirements. Fire control measures should be established to specify areas in which CAS, BAI or interdictions may be flown.

Regardless of the specific procedures used, BAI is going to be critical on any future battlefield. To win the first battle against superior numbers, the Air Force must function as a part of the combined arms team. Airpower must be applied when and where it will do the most good. Since tactical aircraft are able to engage the enemy's second echelon, and, since it is critical to defeat that second echelon, tactical airpower must execute the BAI mission as effectively as possible.

CONSTRAINTS

This thesis is constrained in the following ways:

1. Only fighter operations will be considered. The reconnaissance capabilities of tactical airpower will be considered

only as an intelligence collection resource.

2. Air assets will be considered as a limited resource. Were this not so, allocation of any mission would not be important. It is likely even given the entire resources of the U.S. Air Force in any one theater the assets would still be insufficient to meet all the requirements.

3. Suggested solutions should fit existing organizations. It would be prohibitive to suggest a "perfect" solution that would require major reorganization of the Air Ground Operations System.

4. The procedures developed for handling BAI should be generalized to be applicable to any theater. This corresponds with current training procedures and allows for the widest application of concepts.

5. The study will be based on today's technology. Improvements in intelligence gathering capability and command and control will undoubtedly change and improve the application of airpower tomorrow. But, the problems of handling BAI must be solved now to be beneficial in meeting today's threat.

6. Considerations will be made for the non-nuclear battlefield only. Hopefully it will provide a basis for future study to apply BAI principles to the integrated battlefield.

7. This thesis will be unclassified so it may receive the widest dissemination.

ORGANIZATION OF THE STUDY

Chapter II will include an analysis of the threat. Primary emphasis will be placed upon the Soviet forces since it is likely that any future belligerence will be against the

Soviet Union or one of its client states. Chapter III will discuss target acquisition capabilities. Major systems will be evaluated as to their capability to support BAI. Chapter IV will include the Army and Air Force's capabilities regarding BAI. It will include an evaluation of weapon systems with potential use for the BAI mission. Chapter V will be a discussion of the Air Ground Operations System and its ability to provide Command and Control for BAI. Chapter VI will draw conclusions and make recommendations.

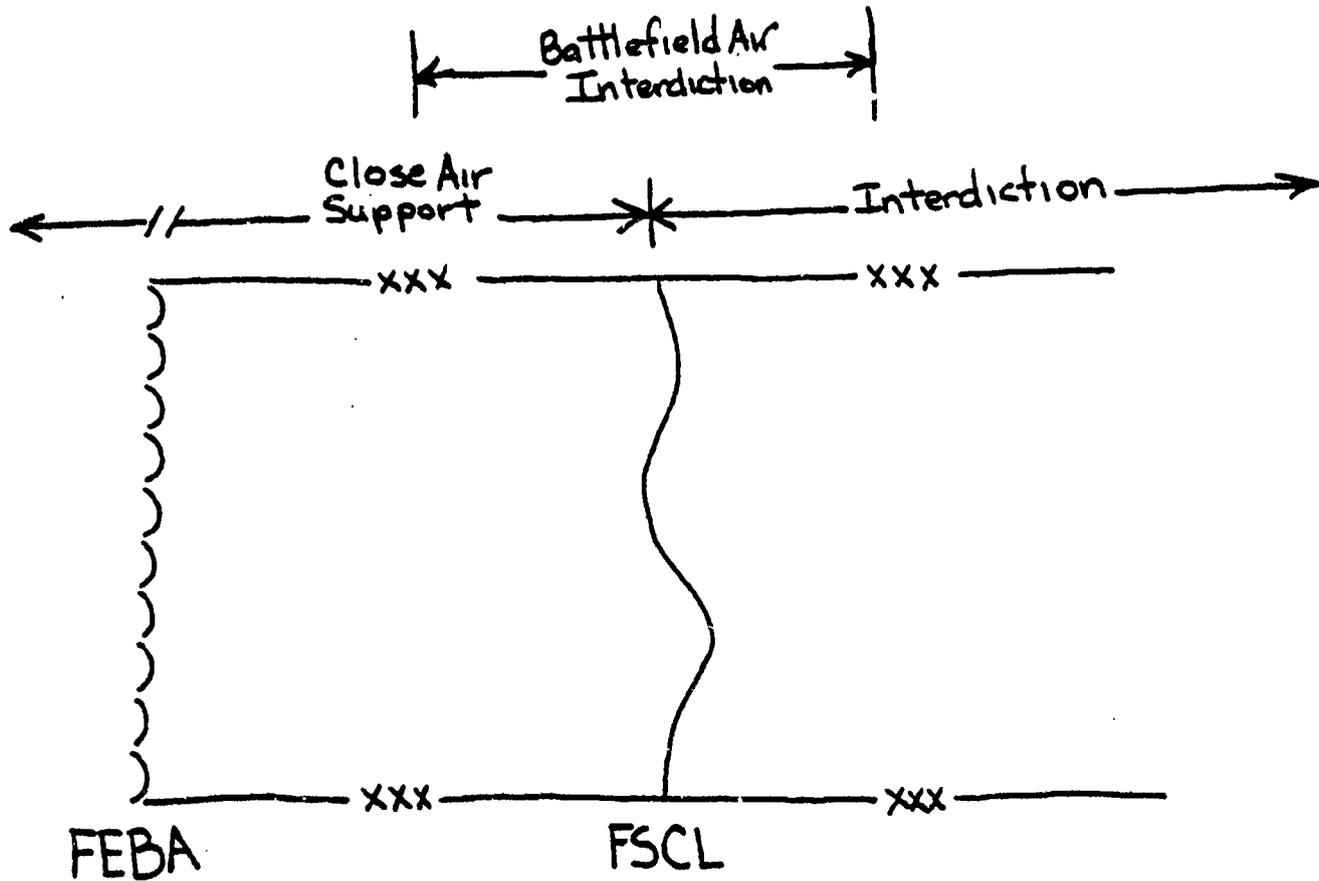


FIGURE 1
 CURRENT FIRE CONTROL MEASURES AND BATTLEFIELD
 AIR INTERDICTION AREA

CHAPTER I

END NOTES

1. Alfred Goldberg (ed.), A History of the United States Air Force 1907-1957 (Princeton, N.J.: D. Van Nostrand Company, Inc., 1972), p. 59.
2. Ibid., p. 73.
3. For a detailed account of this battle see Capt Lonnie O. Ratley, "A Lesson for Today? Air Power at Kursk." RUSI, Journal of the Royal United Services Institute for Defense Studies, June 1977.
4. Goldberg, p. 249.
5. Randolph S. Churchill and Winston S. Churchill, The Six Day War (Boston: Houghton Mifflin Company, 1967), p. 93.
6. _____, Yom Kippur War (Garden City, New York: Doubleday & Company, Inc., 1974), p. 238.
7. Ibid., p. 343.
8. Tactical Air Command Manual 2-1, Tactical Air Operations (Langley AFB, VA: Headquarters Tactical Air Command, 15 April 1978), p. 4-37.
9. US Army Command and General Staff College Reference Book 101-5-1, Operational Terms and Graphics (Ft. Leavenworth, Kansas: US Army Command and General Staff College, 1 August 1979), p. 56, defines the fire support coordination line as a line normally placed on terrain identifiable from the air, beyond which all targets may be attacked by any weapons systems (including aircraft and special weapons) without endangering friendly troops or requiring coordination with the establishing headquarters so long as the effects of the weapon do not fall short of this line. It is normally established by corps or independent division.
10. Tactical Air Command Manual 2-1, p. 4-30.
11. Ibid., p. 4-31.
12. Ibid.,
13. Air Force Manual 1-1, Functions and Basic Doctrine of the United States Air Force (Washington: Headquarters United States Air Force, 14 February 1979), p. 2-8.

14. TAC-TRADOC ALFA "Air Land Bulletin 78-3"(Langley AFB, VA: 19 July 1978.) An unpublished Bulletin.

CHAPTER II

SOVIET TACTICS

Battlefield air interdiction has evolved in response to Soviet tactics. In this chapter the author will briefly cover principles of Soviet tactical doctrine. There can be little doubt that Soviet tactics are generally sound; however, they also have weaknesses. BAI can exploit the weaknesses and must be employed to do just that.

TACTICAL PRINCIPLES

To the Soviet tactician, there are seven basic principles. Understanding these tenets should provide valuable insight toward what a Soviet style commander seeks to do on the battlefield. The first principle is to achieve and maintain a high rate of combat operations. This requires mobility of fire support and combat service support in addition to combat forces. Essentially it means relentless pressure on a defender; overwhelming him if possible, or bypassing him when his defense proves to be resilient. The second principle involves concentration of superior forces at the decisive point of contact. To accomplish this, the attacker reduces frontages and concentrates large amounts of artillery on that front. He seeks overwhelming force ratios to ensure his success. (See figure 2 for some force ratios.) The third Soviet tactical principle is surprise and security. He considers security essential to attain surprise by attacking when and where it will be least expected. Surprise need not be total. It only must

leave the opponent unable to react in an effective manner. Maintaining the offensive is the fourth principle. Even in defensive situations, the Soviets maintain a large reserve to enable them to counterattack at the earliest possible moment. The fifth principle stresses the importance of preserving combat strength. Using combat multipliers such as nuclear and chemical weapons and reliance on artillery are both examples of ways to preserve forces. Insuring the goal can be attained is the sixth tactical principle. The mission must be obtainable with available forces in the required time when compared to the capabilities of the enemy. The final principle is coordination. The combined arms concept around which Soviet forces are developed requires internal and external interaction to execute the mission. ¹

FIGURE 2 ²

UNIT TYPE	DESIRED RATIO
Infantry	2 to 1
Tanks	4 to 1
Artillery	5 to 1
Aircraft	3 or 4 to 1
Overall	3 to 1 min 6 to 1 desired

Although not a principle, Soviet "norms" are also an overriding factor for their tactical commanders. These norms are established formulae for success. ³ Norms, like the force ratios discussed above must be met for the commander to perceive that the operation will not fail. It is unlikely that any Soviet commander will begin an operation unless he has met the prerequisite

standards. ⁴ Norms and tactical principles are then the basis for conducting either offensive or defensive operations.

OFFENSIVE OPERATIONS

Soviet offensive operations (see figure 3) stress rapid, continuous movement. Objectives are established which demand high rates of advance. A regiment, for example, is expected to progress twenty to thirty kilometers per day. To meet these objectives the Soviets have four types of operations; the meeting engagement, the hasty attack, the attack of a defending enemy and the pursuit. ⁵ The meeting engagement occurs when opposing forces are both moving. Upon contact, the Soviet forces conduct a frontal attack or an envelopment to bring follow-on forces into play as necessary to defeat the enemy, cause him to withdraw or establish a defense. The hasty attack is similar to the meeting engagement except the opposing force is already in a defensive position. Lead elements attack the defenders to destroy them or fix them in place while follow-on units bypass the defensive positions. For both of these operations, the goal is to move as quickly as possible into the opponent's rear areas.

The deliberate attack, also called the attack of a defending enemy, is made only if a hasty attack fails. It is elaborately planned and executed using a heavy concentration of forces against a perceived weak point in the defense. The purpose of this operation is to rupture the defense. Once a breakthrough is obtained small forces are left behind to contain the defending forces while the preponderance of the force penetrates as deep as possible into

FIRST ECHELON, SECOND ECHELON AND RESERVE

THAT AT ONCE THE FORCE IS DIVIDED INTO SEVERAL GROUPS OR ECHELONS IN ORDER TO PERFORM PRELIMINARY OPERATIONS. IN THE EVENT OF THE FIRST ECHELON (THE MAIN BODY OF THE FORCE) GENERALLY MAKES THE PENETRATION, THE SECOND ECHELON (THE REAR) EXPANDS THE PENETRATION AND EXPLOITS THE SUCCESS.

THE SECOND ECHELON OFFERS THE TRADITIONAL RESERVE IN THAT IT IS GIVEN A SPECIFIC MISSION PRIOR TO THE ATTACK. A SMALL ADVANCE DIVISION IS ALSO CONSTITUTED, IT USUALLY IS ABOUT ONE-THIRD OF THE FORCE.

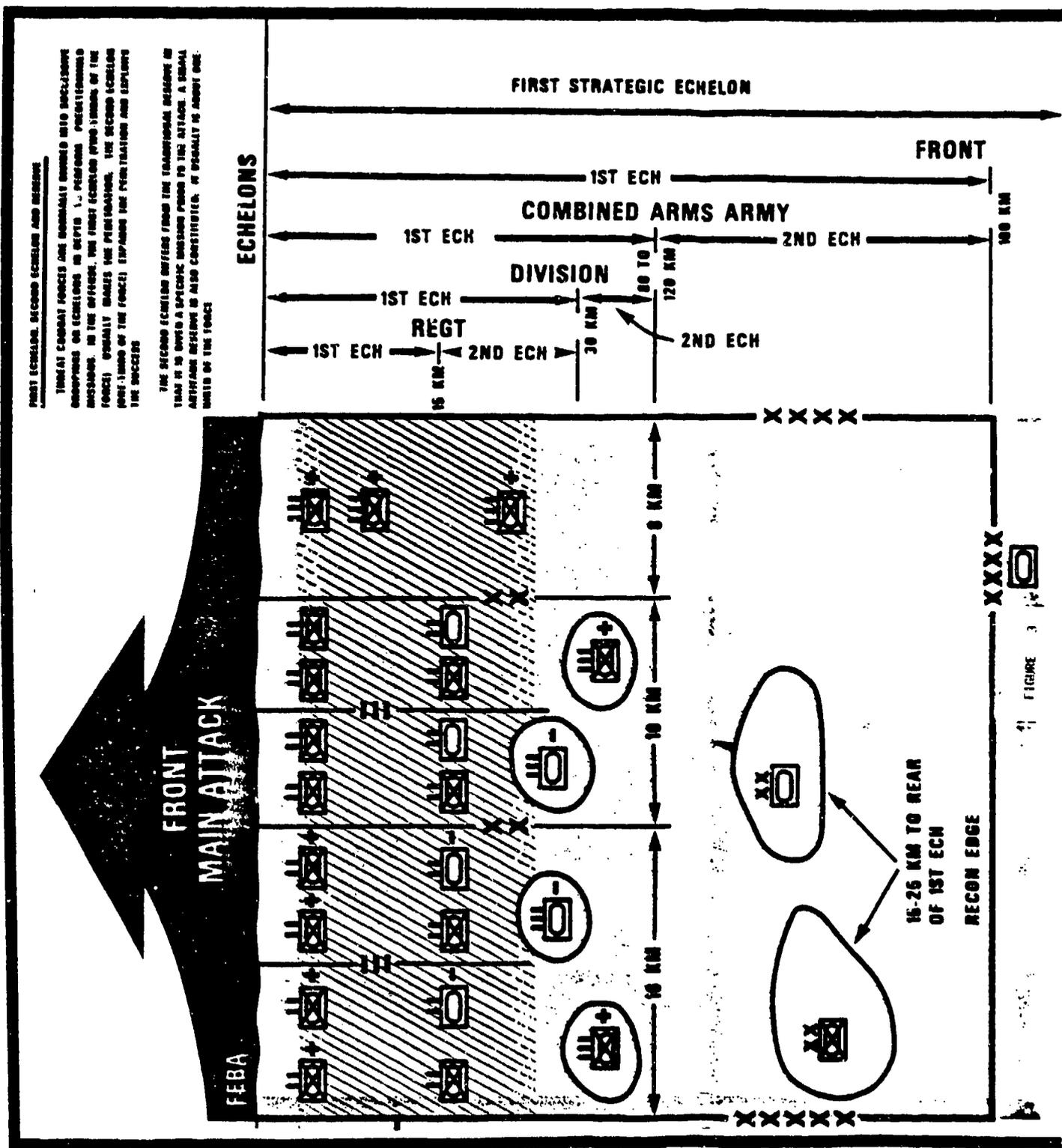


FIGURE 3

the opponent's rear. The pursuit is designed to destroy a withdrawing opponent. During the pursuit, Soviet forces attempt to overtake the opponent from the rear or along parallel routes to cut off the withdrawing units from reserve or reinforcing units. ⁶

Regardless of the tactic used, the Soviet attack is characterized by echeloned forces. Combat units follow each other like the waves of an incoming tide. The second wave may be added to the strength of the first or take over operations if the first was not totally successful. If the first wave accomplishes its mission, the second moves to exploit that success. This causes the defending force severe problems because they eventually reach a saturation point where it is physically impossible to destroy all the approaching targets. The defender must, therefore, slow the wave action to logistically and physically "service" the attacking forces. Frequently, follow on echelons are positioned in areas with sufficient lateral maneuverability to exploit success anywhere along the front. For this reason, a unit which appears to threaten one defending commander may soon be the problem of another commander. Slowing and possibly stopping the follow-on echelons is the job of battlefield interdiction.

The Soviet Army on the Offense relies heavily on its artillery. Artillery units are assigned to support maneuver units and placed well forward. During the deliberate attack, there are three types of artillery fires; preparations, scheduled or on call fires and continuous fires into the defenders rear areas. Preparation fires may last thirty to sixty minutes, massing up to 100

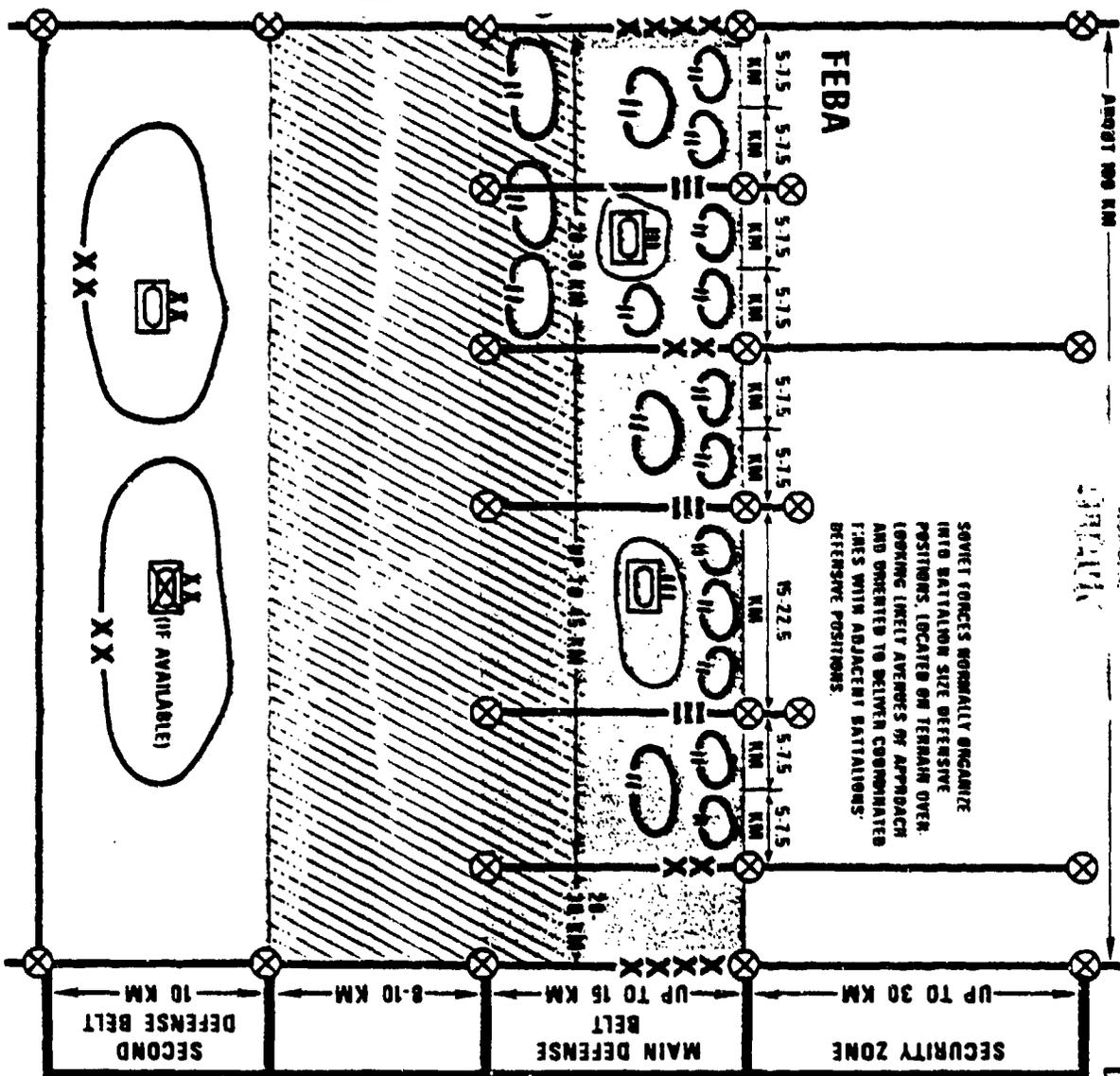
tubes per kilometer at the point of contact. Scheduled or on call fires begin along the front as the Soviet forces close with the defenders. Additional fires are executed far into the depths of the defense to create confusion and neutralize secondary or final objectives. ⁷

Soviet air defense artillery moves with maneuver forces to provide a continuous protective umbrella. The Soviets have developed a deadly, interlocking, highly mobile air defense system. This system may be slightly more effective behind the FEBA because of additional non-mobile systems.

DEFENSIVE OPERATIONS

Although the policies of the United States are not offensively oriented, it will undoubtedly become necessary to conduct offensive operations to restore international boundaries or put pressure on Soviet forces to cause them to reallocate their forces from offensive operations in another area. Consequently, it is also important to discuss Soviet defensive tactics.

There are two types of Soviet defensive operations; (see figure 4) the hasty defense and the deliberate defense. The two differ essentially by the amount of preparation time available and the estimated duration of the defensive operation. The hasty defense is conducted from movement to contact or when offensive operations are stalled. ⁸ The hasty defense may turn into a deliberate defense if conditions do not favor the return to offensive operations. ⁹ Both defenses are characterized by echeloned forces to provide depth and dedicated reserves to block penetrations or conduct counterattacks.



DEFENSE OPERATIONS

IN DEFENSE THE SOVIETS ESTABLISH A SECURITY ZONE UP TO 30 KILOMETERS FORWARD OF THE FEBA. BATTALIONS IN THE SECURITY ZONE EMPLOY DELAYING ACTIONS, FOLLOWED BY A WITHDRAWAL.

THE MAIN DEFENSE BELT MAY BE UP TO 15 KILOMETERS IN DEPTH AND MAY CONSIST OF MOTORIZED RIFLE DIVISIONS IN FIRST AND SECOND ECHELON DEFENSIVE POSITIONS, AS THE ENEMY APPROACHES THE MAIN DEFENSE BELT, HE IS SUBJECT TO CONTINUOUS FIRES FROM ALL AVAILABLE SOURCES.

THE SECOND DEFENSE BELT MAY BE 10 KILOMETERS IN DEPTH AND LOCATED 10 KILOMETERS TO THE REAR OF THE MAIN DEFENSE BELT. IN THIS BELT A TANK DIVISION IS HELD IN ASSEMBLY AREAS NEAR PROBABLE AVENUES OF ENEMY PENETRATION. THIS DIVISION IS PREPARED TO COUNTERATTACK FROM THESE ASSEMBLY AREAS TO DESTROY ENEMY PENETRATIONS OF THE MAIN DEFENSE BELT.

FIGURE 4

The Soviet defense is planned around company or battalion positions. These positions are heavily reinforced, using obstacles and mutually supporting fires to form kill zones whenever possible. These strong points are arrayed in three defensive belts. In the deliberate defense there will also be a twenty to thirty kilometer security zone. The security zone is established to locate the main attack, attrite the attacking forces, and deceive them of the true location of the first defensive belt. The belts themselves are generally between ten to fifteen kilometers deep with an eight to ten kilometer space between them. In each belt there is a tank heavy reserve which may reinforce a breeched position or counter-attack. ¹⁰ The reserve will only counterattack if the attack has been contained, if sufficient forces can be generated to meet attack norms and if approved by higher headquarters. These counter-attack forces will be a significant obstacle to successful offensive operations and will have to be a priority target.

The Soviet Army relies heavily on its artillery in the defense. Artillery is organized and used much the same as in the offensive. Additional emphasis is placed on counterfire and to fill gaps between defending units. ¹¹ Because of the preponderance of Soviet artillery, battlefield interdiction will be required to destroy the artillery at all echelons particularly those in the second and third defensive belts.

The problem presented by Soviet air defense artillery for attacker will be the same as described for defenders. However, there will be greater coverage because still more non-mobile systems are available.

CONCLUSION

Soviet offensive and defensive operations are well founded and historically proven. Their offense copies Germany's blitzkrieg and operation "Bagration", the Soviet Army's highly successful assault into Belorussia during World War II. ¹² Their defense is modeled after their many successful defensive operations during the Second World War. Additionally, the Soviets have learned much from the United States' war in Vietnam and from the Middle East War.

There are several weaknesses caused by Soviet reliance on their tactical principles and norms which can be exploited. The first weakness is in their reliance on a high rate of advance. If this momentum can be stopped or stalled, doubt regarding their overall capabilities may be significant enough to force them to end offensive operations altogether. A second weakness is found in their dependence on massive artillery. If their artillery can be effectively neutralized, Soviet forces could quickly lose the will or capability to continue the offensive. Reliance on a highly structured command and control system is a third weakness. Confusion or destruction of their command and control capability will bring Soviet operations to a quick halt. Effective battlefield interdiction is capable of exploiting these three weaknesses.

CHAPTER II

END NOTES

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3. Soviet Army Operations, pp. 1-2 through 1-4.
4. Ibid., p. 3-89.
5. PT 100-3 Vol. IV Soviet Tactics in the Offensive (Fort Leavenworth Kansas; US Army Command and General Staff College, March 1979), p. 2.
6. Ibid., p. 2-31.
7. PT 100-3 Vol. III Soviet Tactics Artillery Organization and Employment (Fort Leavenworth, Kansas: US Army Command and General Staff College, March 1979), p. 15.
8. PT 100-3 Vol. V Soviet Tactics in the Defense (Fort Leavenworth, Kansas: US Army Command and General Staff College, March 1979), p. 22.
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10. PT 100-3 Vol. V, pp. 10-14.
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12. Arnold, Major Joseph C., "Current Soviet Tactical Doctrine: A Reflection of the Past." Military Review. July 1977, p. 20.

CHAPTER III

U. S. CAPABILITIES FOR TARGET ACQUISITION

If destroying Soviet follow-on echelons, artillery units and command and control facilities is essential to victory, accurate and timely acquisition of those forces is a first prerequisite. The Army and the Air Force have a variety of systems designed to determine enemy positions. These systems range from National resources such as satellites and strategic aircraft, to an individual rifleman observing enemy movement. The information provided by the systems is available to commanders at various levels. (see figure 5) In turn, commanders have different capabilities to destroy identified targets. In this chapter, the author will discuss the current target acquisition systems including their capabilities, responsiveness and availability.

TARGET ACQUISITION SYSTEMS

National strategic systems which include satellites and manned aircraft like the SR-71, U-2 and RC-135 provide optical photography, radar data and signals intelligence (SIGINT) data.¹ These systems have unlimited range. They may provide strategic information for early warning, changes in force structure and significant interdiction targets. Response time for information from National assets may vary widely, but generally is not real-time for operational commanders. The information is normally available to Corps Commanders and higher. On the Air Force side, the information

INTELLIGENCE ASSET AVAILABILITY					
	GENERALS		COLONELS		CAPTAINS
	CORPS	DIVISION	BRIGADE	BATTALION	COMPANIES
NATIONAL STRATEGIC SYSTEM	★				
USAF/USN SYSTEMS	★	★			
TACTICAL SYSTEM					
ELECTROMAGNETIC SIGINT					
COMINT	★	★	★		
ELINT	★	★	★		
REMS		★	★	★	★
GSR		★	★	★	★
WEAPONS LOCATING RADAR		★	★		
IMAGERY					
PHOTO	★	★			
IR	★	★			
SLAR	★	★			
HUMAN OBSERVATION					
RECONNAISSANCE UNITS	★	★		★	
TROOPS				★	★
IPW	★	★	★		

*This chart illustrates the echelons at which these assets are normally assigned, attached, or in direct support.

FIGURE 5 18

is available above the Wing level and down to the Support Operations Center (ASOC) ² in the Tactical Air Control System (TACS).

National systems are presently incapable of providing information timely enough to be used for battlefield interdiction targeting.

Air Force tactical reconnaissance aircraft provide a wide variety of target acquisition capabilities. The RF-4C has visual, photographic, infrared imagery (IR), side-looking airborne radar (SLAR) and Tactical Electronic Reconnaissance Sensor (TEREC) systems to provide information to tactical commanders. All these systems are virtually unlimited since the RF-4 range is well beyond the forward edge of the battle area. Visual sightings may be reported immediately in flight by radio or, if that is infeasible, upon landing. Photographic and IR imagery is usually available less than a hour after landing. However, detailed study of the film may require several days. SLAR is data linked to a ground or airborne receiver. It is able to report moving targets in real time. The actual response time depends on the location of the data link receiver and the communications capability of that station with using units. TERC is the newest system for the RF-4. TERC is an electronic sensor system capable of detecting and providing accurate location of significant threat emitters in real time. ³ It is highly sensitive and provides line of sight coverage over a large geographic area. ⁴ Again, actual response time depends upon the communications capability of the receiving station. With an efficient communications system, "field commanders can obtain the location and operational characteristics of highly mobile threats and 'fleeting' targets, and

so can appropriately direct or redirect strike forces during ongoing operations".⁵ Tactical air reconnaissance information is provided primarily to the Tactical Air Control System. It is simultaneously fed into the Army channels down to division level from a Military Intelligence Battalion Aerial Reconnaissance and Surveillance (MIBARS) unit located with the Tactical Reconnaissance Squadron. Information gained from tactical reconnaissance can be used to target battlefield interdiction missions if it reaches the targeting agency rapidly. Visual reports and data linked information will be the most reliable for this purpose.

The E3A AWACS aircraft provides some ground target acquisition capability with systems like the AN/ALR-59. This system "has a high probability of detecting a wide range of ground activities, including concentrations of troops and armour (where radar-directed AAA and SAM systems are likely to be deployed)..."⁶ The AN/ALR-59 is a line of sight system which is capable of detecting targets well into the enemy's rear area. This data is available to the Tactical Air Control Center (TACC)⁷ and enters the Army intelligence system above the corps level.

There are other Air Force systems which provide target acquisition data into the Air Force system and subsequently into the Army system with capabilities similar to the AWACS. These systems include Rivet Joint and Compass Ears.⁸

The Air Force also manages a system of remote sensors (REMS) which reports acoustic, magnetic or seismic inputs via airborne relay.⁹ The range of this system is virtually unlimited. However,

it reports information gathered within a small radius of each emplaced sensor. Information is passed to the TACC and may reach Army channels as low as corps. The REMS system is based on technology more than a decade old and is slated to be replaced by a new system currently under development. ¹⁰ Remote sensors cannot pinpoint targets sufficiently to be used for battlefield interdiction.

The Army has airborne reconnaissance assets of its own, particularly the OV-1, the RU-21 and the Standoff Target Acquisition System (SOTAS) configured UH-1H.

The OV-1 Mohawk has visual, photographic, IR, and SLAR capabilities similar to the RF-4C. However, because of its slow speed and consequent increased vulnerability, the Mohawk does not have the same range capability. Operating behind the FEBA, the Mohawk may not be able to reach beyond 50 kilometers. On the other hand, since it is an Army asset usually in direct support of corps, the intelligence it gathers may be more responsive to Army tactical commanders. The OV-1 may also be equipped with the Quick Look system, a non-communications detection/location system. Quick Look I provides radar emitter location to the Control and Analysis Center of the Combat Electronic Warfare and Intelligence Group at corps, which, in turn, passes it to the Tactical Control and Analysis Element (TCAE) at both corps and division. ¹¹

The RU-21 is the airborne platform for Guardrail. Guardrail is capable of detecting and locating VHF/Multichannel targets. It is also an intermediate range system with link capability for near real-time dissemination of information to the division, corps and higher level organizations. ¹² Guardrail is jointly operated by the Army and the Air Force.

The SOTAS equipped UH-1H is a radar system designed to locate the enemy's reserve and second echelon forces. It is a line of sight system which operates rear of the FEBA. Its data link capability makes SOTAS a near real-time system which provides target information directly to the division. ¹³ Army airborne target acquisition systems provide timely information which can be used to designate battlefield interdiction targets. However, this information must be passed to an agency with assets capable of performing the mission before the value of the data perishes.

In addition to its airborne assets, the Army has target acquisition systems which are ground based. These systems include receivers for communications intelligence (COMINT), radars, and various artillery counter-battery techniques such as sound and flash ranging. "Army ground-based detection and location systems can provide information regarding HF, VHF and multichannel communications nets... However, they have line of bearing capabilities only and require other intelligence resources to refine target accuracy." ¹⁴ Moving target locating radar units like the AN/TPS-25 or AN/TPS-58 are capable of accurately locating targets up to as much as 20,000 meters. The AN/MPQ-4A weapons locating radar can establish the position of a mortar or artillery piece to 15,000 meters. Sound and flash ranging techniques also have a weapons locating capability with a maximum range of 20,000 meters. ¹⁵ These systems are available to Army commanders at division and below. These systems, with the exception of COMINT, have a limited capability that they can only determine a target location, not necessarily the nature

of that target. Ground-based systems do not have the range needed for battlefield interdiction.

Human intelligence (HUMINT) provides target acquisition capabilities. These resources are particularly Army-oriented. In addition to the visual reports from pilots which were discussed earlier, there are three major HUMINT resources: prisoner of war/refugee interrogation, long range reconnaissance patrols and templating. Prisoner of war/refugee interrogation can provide excellent intelligence regarding fixed targets and enemy intentions. However, their information is generally old and may not be useful against moving forces. Long range reconnaissance patrols may provide real-time target acquisition information via radio. This information is available as low as battalion. Templating provides a tactical commander with an "educated" guess regarding the enemy's positions and routes of march. Based on terrain analysis and enemy doctrine, an intelligence officer can fairly accurately predict artillery positions, avenues of approach and staging areas.¹⁶ While this information is very rough initially, it may be refined when compared with information collected by other means. Templating is available to any commander, however, there are dedicated units for this purpose at division level and above. HUMINT resources are generally not timely enough to be used for battlefield interdiction.

FUTURE DEVELOPMENTS

The shortcomings of current target acquisition systems are widely recognized. Many additional systems are currently under development. In the near future there may be so much information

available it may be difficult to sort out that which is critical. To coordinate the intelligence of the future, a new information sorting system, BETA (Battlefield Exploitation and Target Acquisition) is currently being developed. "BETA has been conceived as a tactical system to accept the mass of data from radar, ELINT, COMINT, infra-red, acoustic and other types of sensors." ¹⁷ The systems which are developed from the BETA project will be able to identify additional targets, deeper in the enemy's rear, increasing their vulnerability to destruction.

SUMMARY

The Army and the Air Force have extensive target acquisition systems. Combined, the systems exploit a variety of collection means. They have many different ranges and their reporting times vary considerably. They are responsive to many different levels of command. There is a general correlation that the greater the range of the detection system the higher the information they provide the military organization. Army equipment is more limited in range than Air Force equipment. Current Army equipment is insufficient to alone provide a corps commander with the necessary range he must have to see the enemy. This relationship is important when determining the best level to select targets for a specific area. For example, it would seem illogical for a division commander to use national assets to target a moving unit deep in the enemy's rear when a corps commander would receive the information much earlier with the same or better detail. Similarly, the Air Force should be able to target using its own assets more effectively than the Army which receives the same information later.

CHAPTER III

END NOTES

1. Tactical Air Command Manual 2-1, Tactical Air Operations. (Langley AFB, Virginia: Headquarters Tactical Air Command, 15 April 1978). p. 4-11.
2. The ASOC was formerly called a Direct Air Support Center (DASC).
3. Sundaram, Gowri S., "TEREC - the USAF's Tactical Electronic Reconnaissance System." International Defense Review, No. 1, 1979. p. 118.
4. Ibid., p. 119.
5. Ibid., p. 118.
6. Boyle, D., "Airborne ESM Systems - the AN/ALR-59 and TEREC." International Defense Review Special Series #8 "Electronic Warfare" 1978, p. 35.
7. In Europe an Allied Tactical Operations Center (ATOC) performs the same functions as a TACC.
8. For a detailed description of these two systems see Suppression of Enemy Air Defenses Vol. 1 Joint Study Report, Air Land Forces Application Agency, (Langley AFB, Virginia: 1 February 1977. (Confidential))
9. FM 6-121 Field Artillery Target Acquisition. (Washington: Headquarters, Department of the Army, 1 May 1978), p. 2-7.
10. "REMBASS to Expand Tactical Commanders Capabilities." Defense Electronics, June 1979. p. 33.
11. Suppression of Enemy Air Defenses Vol. 1 Joint Study Report, (Langley AFB, Virginia: Air Land Forces Application Agency, 1 February 1977 (Confidential)) p. B-3.
12. Ibid., p. B-2 and B-3.
13. Cianciolo, Colonel August M., "SOTAS-Standoff Target Acquisition System." Signal, October 1978. p. 6-7.
14. Suppression of Enemy Air Defenses. p. B-3.
15. FM 6-121. p. 2-1 through 2-4.

16. FM 100-5 Operations (Washington: Headquarters, Department of the Army, 1 July 1976. p. 7-14.
17. Boyle, Dan, "BETA Basis for a New Sensor Sorter." International Defense Review No. 8 1978. p. 1275.
18. FM 100-5, p. 7-8.

CHAPTER IV

ARMY AND AIR FORCE BATTLEFIELD INTERDICTION CAPABILITIES

As information is gathered on lucrative targets, Army and Air Force commanders must decide how to destroy them in the most effective and efficient manner. They each have assets with potential capabilities beyond the range of ground-based direct fire weapons. The Army has cannon artillery, surface to surface missiles, and attack helicopters. The Air Force has tactical fighters and strategic bombers. In this chapter the author will discuss the capabilities and weaknesses of these assets to execute battlefield interdiction missions. Emphasis will be placed on the following factors; range, accuracy, availability, flexibility and survivability.

OPTIMUM CHARACTERISTICS

To evaluate individual weapon systems, optimum characteristics should be defined. A discussion of the "perfect" weapon will ease the selection of the best current system. Range is a critical factor. A satisfactory weapon system must have sufficient range to engage the enemy as far from the front lines as possible. Corps commanders must be able to see and attack enemy forces capable of influencing the battle within 72 hours (about 150 kilometers). Division commanders are concerned with a 24-hour (50 kilometer) window. Brigade commanders are concerned with those forces entering the battle within 12 hours. ¹ To meet a corps commander's needs, therefore, the optimum weapon needs at least a 150 kilometer range.

Accuracy may be divided into three areas; initial ordnance placement, ability to adjust or refine subsequent deliveries and area coverage. The ideal weapon should have a low circular error probability (CEP). That is, it should place the first piece of ordnance on target. If it misses with the first round, it must be able to adjust rapidly so subsequent deliveries will destroy the target. On the other hand, if the lethal area of the weapon is large the error probability may increase without detrimental effect. Since many of the battlefield interdiction targets will be mobile, target acquisition response must also be tied to accuracy. For example, if a weapon is capable of destroying any target within a ten square meter area, it will be effective only if the target can be located within ten meters at the time the ordnance hits. The weapon system must be available when the commander needs it. Battlefield interdiction must have priority over other missions. Using a weapon for battlefield interdiction must not detract from the battle elsewhere. The ideal battlefield interdiction weapon must be flexible. It must be capable of destroying the target in any terrain, any weather and across a broad front. Finally, the optimum weapon must be survivable. It must be able to perform its mission repeatedly without suffering unacceptable losses. Obviously, no single weapon can meet all these specifications. However, some are more capable than others. With these factors in mind, which of the current systems is best?

CANNON ARTILLERY

U.S. Army cannon artillery includes a wide variety of weapons

with diverse capabilities. Since World War II, improvements in munitions, employment techniques and weaponry have been substantial. This is particularly significant considering that over half the casualties of World War II were caused by artillery.² How does artillery compare in relation to the factors chosen for the optimum battlefield interdiction weapon?

Artillery range varies with the caliber of the weapon and type munition used. Mortars, the lowest caliber indirect fire weapon available to an Army commander, have a maximum range of 5650 meters.³ Cannon ranges vary from 11,000 meters for the towed 105-mm howitzer to 20,500 meters for the self-propelled 8 inch howitzer. The 175-mm self-propelled gun has a range of 32,700 meters.⁴ However, it is being phased out and is not currently assigned to active duty units. Artillery is normally positioned so its effective range is approximately two-thirds the maximum range. Thus, cannon artillery is only capable of performing the battlefield interdiction mission to one-tenth the depth required by a corps commander.

Artillery is relatively accurate, although, it is considered primarily as an area coverage weapon. Given the right conditions, the radius of destruction of one round against a soft target is greater than the CEP. Even without perfect conditions, observed fires could be adjusted to obtain sufficient results. Therefore, artillery would be effective against accurately located stationary targets or in cases where fires could be observed. However, it would be inefficient to use it against an unobserved,

moving target or against an unobserved stationary target which could not be located within the kill radius of an artillery impact area. The majority of battlefield interdiction targets are in this later category.

Artillery has many missions on the modern battlefield. It is expected to provide immediate fires to support the maneuver forces. It must be able to provide counterbattery fires to reduce the effectiveness of enemy artillery. It must be able to suppress enemy air defense weapons. Therefore, artillery may not be available when needed because it is firing another equally critical mission. The normal employment procedures may also limit the availability of cannon artillery. The majority of cannon artillery assets are organic to or placed in support of divisions. Almost none are retained by corps. Consequently, cannon artillery may not be available to the corps commander. On the other hand, artillery is not affected by poor weather or darkness. This is a significant advantage since enemy forces could be expected to move any time.

Artillery is capable of shifting fires anywhere within range and may displace to cover other targets. When it does move, its zone of influence is limited by terrain and speed. Army organization makes it unlikely that artillery assets would be rapidly exchanged between corps or even divisions. Consequently, cannon artillery is somewhat limited in flexibility along a wide front.

Artillery is survivable. Shoot and move tactics, camouflage techniques, and electronic emissions control procedures reduce its

vulnerability to enemy artillery and air attack. It is normally kept out of enemy direct fire range. It is capable of firing numerous rounds over an extended period. For example, the 155-mm self-propelled howitzer has a sustained rate of fire of 60 rounds per hour. ⁶

Cannon artillery has many features which make it a suitable weapon for battlefield interdiction, but it also has some severe limitations. The major strength of artillery is its all weather, day and night capability. Survivability is a second factor which makes it an excellent choice. Artillery accuracy attributes may be either a strength or a weakness depending on the type target. However, its limited range and lack of flexibility detract significantly from its capabilities. Further, since it is a scarce resource with several other time critical missions, it may not always be available.

SURFACE TO SURFACE MISSILES

There are two types of Army surface to surface missiles: the Lance and the Pershing. Only the Lance has non-nuclear capability. Therefore, it is the only missile which will be compared to the established standards for a battlefield interdiction weapon.

The range of a non-nuclear Lance is 65 kilometers. ⁷ Like cannon artillery, the Lance missile is normally deployed so its effective range is approximately two-thirds its maximum range. This means it would fulfill the division commander's needs for battlefield interdiction area coverage, but not the corps commander's.

Lance is not as accurate as cannon artillery. However, it

has a greater lethal radius. It has problems similar to cannon artillery of being tied closely to target acquisition system capabilities. It is, therefore, impractical to use it against mobile targets or targets which are inaccurately acquired. Lance is most profitably used against fixed enemy air defense units, supply points, indirect fire support assets and staging areas.⁸

Lance is normally a corps asset. It is attached to a division only when the division operates independently.⁹ A Lance battalion is most often assigned a general support or general support reinforcing mission.¹⁰ This means Lance will be responsive primarily to the corps commander. Adverse weather and night do not affect the availability or accuracy of surface to surface missiles. However, there are a limited number of non-nuclear Lance missiles so any commander will have to use them sagaciously. In addition to having a limited number of non-nuclear warheads, each non-nuclear missile reduces the Lance battalion's capability to carry nuclear missiles. A corps commander may not want to reduce his nuclear capability by even carrying non-nuclear missiles. Furthermore, since Lance is known to be nuclear capable, launching a non-nuclear missile may be misinterpreted by the enemy and lead to undesired escalation. For these reasons, Lance may not be as readily available as a cursory glance may indicate.

Increased response times, decreased mobility and limited numbers of missiles reduce the flexibility of the Lance. In addition, terrain and traveling speed are limiting factors for the Lance just as they are for cannon artillery.

The Lance is as survivable as cannon artillery, perhaps even more so, since it is normally located farther from the forward edge of the battle area. However, it is also an extremely limited resource.

The Lance surface to surface missile has many of the positive features of cannon artillery for use in battlefield interdiction. It has equal survivability, equal overall accuracy, better range and somewhat better availability. On the other hand, it has less flexibility. Perhaps its greatest drawback lies in limited numbers and the potential for the enemy to misinterpret a Lance launch as a nuclear escalatory step.

ATTACK HELICOPTERS

The development of attack helicopters has increased the mobility and firepower of US Army forces. Helicopters have proven to be effective while operating alone or as a combined arms team. Current studies are evaluating their close air support and tank killing capabilities while working in conjunction with Air Force fighters. What kind of a battlefield interdiction weapon would the attack helicopter be?

Attack helicopters employ direct fire weapons. However, the range of the weapon system is limited only by the helicopter's combat radius. When flying out of a forward area rearming and refueling point, attack helicopters are capable of attacking any target within the corps commanders zone of responsibility. Therefore, except for survivability problems which will be discussed later, it is certainly capable of carrying out the entire battlefield interdiction campaign.

Fire from attack helicopters is very accurate. Since they employ direct fire weapons such as the TOW anti-tank guided missile, 2.75-inch rockets and machine guns, helicopters have a high probability of a first round hit. In addition, the helicopter pilot has the ability to fine tune target acquisition data by visually reconnoitering areas and routes identified by other systems. Consequently, they are potentially effective against mobile targets and may refine stationary targets to the point that weapon expenditure is economically feasible. Finally, since the helicopter pilot has immediate feedback on his accuracy, he can compensate for a miss by immediate reattack.

Attack helicopter companies are organic to most divisions. In addition, there are attack helicopter units or an Air Cavalry Combat Brigade assigned to most corps. Because of their capability to concentrate firepower at any point across a wide area, attack helicopters are normally held by higher Army commanders to influence the battle at a critical time or place. Since they are not apportioned to lower combat units, attack helicopters would be available for the battlefield interdiction mission.

The attack helicopter is probably the most flexible current Army weapon system. Because of its high maneuverability, it is suitable for use in any terrain and at any point across a wide front. Its speed allows it to respond to most changes in the tactical situation. In fact, it can be diverted a considerable distance once it has been committed. It is however, limited by weather and night.¹¹

Current Army doctrine regarding the use of attack helicopters does not discuss their use beyond the FEBA. When discussing supporting a penetration, in fact, doctrine specifically cautions them to avoid the shoulders to reduce their exposure to enemy defensive systems.¹² This does not mean they could not be so used. However, they are extremely vulnerable to enemy air defense weapons and small arms fire because of their slow speed. An Army commander electing to use attack helicopters against second echelon offensive or defensive forces would have to weigh their effectiveness against a probable high loss rate. Since attack helicopters are a critical resource that can be used effectively in other missions, it is unlikely they would routinely be used for battlefield interdiction.

Attack helicopters seem to have features which would indicate an excellent battlefield interdiction capability. Perhaps their greatest strength lies in their ability to refine target acquisition data and immediately compensate for first round misses coupled with a range compatible with the needs of the corps commander. Still, lack of survivability is an overriding factor which prevents the use of attack helicopters to attack enemy second echelon forces, supply areas and artillery.

FIGHTER AIRCRAFT

The Air Force has several aircraft designed to deliver ordnance against ground targets. The A-10 was developed solely for the close air support mission. The F-4 is a multi-purpose aircraft capable of supporting ground forces as well as the air to air mission. The F-111 is a highly sophisticated aircraft capable of attacking ground targets in any weather, day or night. The A-7 is an accurate

weapons delivery platform with excellent endurance, Some or all of these aircraft will be available to conduct the battlefield interdiction mission. The criteria established will be applied to the entire group. However, some aircraft may be eliminated by one factor or another.

Although there are techniques to loft ordnance onto a target, the primary delivery method is direct. Like the attack helicopter, fighter aircraft have sufficient range to cover any Army commander's area of responsibility. Again, like the helicopter, fighter range capabilities may be negated by survivability problems.

Because of their increased speed, fighter aircraft are not quite as accurate as attack helicopters. However, "smart" weapons like Maverick, laser-guided bombs and anti-radiation missiles have significantly improved the probability of a first round kill. The GAU-8, 30mm cannon, on the A-10 has high muzzle velocity and accompanying accuracy. Additionally, pilots have the ability to find specific targets which were only roughly located by target acquisition systems. They can also exploit targets of opportunity. Consequently, they are also effective against moving targets. Finally, pilots can generally compensate for first round misses by reattack. Fighter aircraft are, therefore, accurate enough to be economically feasible.

Tactical aircraft may be available to the ground commander in varying degrees. Aircraft allocation is determined by the Unified Commander based on his overall concept of operations. Those allocated to Army commanders may be distributed to subordinate

units. During some phases of the battle, the F-4 may be engaged in protecting rear areas from air attack and F-111's may be striking deep industrial targets. During the entire battle A-10's will be ranging along the FEBA to assist friendly engaged forces. However, because of a fighter's ability to mass at a given point from a wide number of bases, some fighters should be available to ground commanders at all levels to conduct battlefield interdiction.

Fighters are extremely flexible. They are capable of attacking targets in any terrain. They may attack targets along a very wide front, returning from the one extreme of an Army Group's area to refuel, rearm and attack targets on the other extreme. Centralized control of all fighter assets allows Air Force commanders to divert aircraft from one type mission to another, as well as from one place to another. This increases their responsiveness to changing tactical situations. All are capable at night, although less effectively than during the day. Except for the F-111, marginal weather severely decreases tactical fighter capabilities often to the extent that the aircraft may even be unable to fly. The F-111 will have its abilities to strike mobile targets reduced significantly by reduced visibility. Still, even in the poor weather of central Europe, fighter operations are possible almost every day, year round.

There is considerable concern over the survivability of tactical operations. The trend for US fighter aircraft has been to generate a strike package with supporting aircraft to provide anti-aircraft suppression, interceptor protection and electronic counter-measures. European air forces tend toward small flights, usually

two aircraft, penetrating the FEBA at high speed.¹³ There are some indications the US Air Force may also adapt this later approach. In any event the A-10, and to a lesser degree, the A-7, seem to have little advantage over the attack helicopter. Their slow speed make them vulnerable to a wide range of anti-aircraft systems which even the A-10 and A-7 were not designed to withstand. The F-4 and F-111 have sufficient high speed, low altitude capability to be survivable. Current strike packages flown at Red Flag, the Air Force's major ongoing training program, show that the battlefield interdiction mission can be carried out without unacceptable losses.

Fighter aircraft, specifically the F-4 and F-111, have characteristics which enable them to carry out battlefield interdiction missions. Extensive range, the ability to mass fires along a wide front, accurate ordnance delivery techniques and satisfactory expected survivability all favor the use of tactical fighters. On the other hand, commitment to other missions and marginal weather may mean they are not always available.

STRATEGIC BOMBERS

The Strategic Air Command has placed increased emphasis on a conventional capability in recent years. B-52's and FB-111's can be deployed world wide to deliver large tonnages of high explosive bombs, cluster bombs and aerial mines.¹⁴ What capabilities do strategic bombers have for battlefield interdiction? Since the FB-111 capabilities for conventional use are almost identical to those of the F-111, primary emphasis will be on the B-52.

B-52 range is virtually unlimited. When aerial refueled,

they can strike worldwide. They are certainly capable of striking second echelon targets designated by Army Commanders at any level.

Using onboard radar or electronic aids, B-52's are capable of reliable, accurate weapons delivery. Since the pattern of destruction is large, the B-52 is an area weapon system. It is tied closely with target acquisition capabilities since its own ability to locate mobile targets is extremely limited. For this reason, the B-52 would be most effective against fixed targets such as supply or assembly areas. It does not employ mission restrike techniques to compensate for first round misses. Mobile targets in general would not be vulnerable to the B-52. B-52 accuracy capabilities are similar to artillery, only on a much more impressive scale.

The employment of a B-52 shows a level of national determination not associated with most other conventionally capable weapons. With the potential of a conventional war escalating to nuclear war, use of B-52's like the use of the Lance missile could be misinterpreted, although since they have been previously employed in a conventional role this is less likely. If the National Command Authority elected to use B-52's rather than retain them for their strategic role, they would be available to Army commanders using procedures similar to those used for tactical fighters.

Strategic bombers have satisfactory flexibility. B-52's are capable of all weather, day and night operations. They can be used anywhere along a wide front. They are not limited by terrain. However, the Strategic Air Command has not shown the same ability to rapidly divert its assets that the tactical forces have shown.

As the Strategic Air Command attains additional conventional experience, it may overcome this limitation.

Using its extensive electronic warfare capability and high altitude bombing techniques, the B-52 can perform satisfactorily against the anti-aircraft threat. It is most vulnerable to enemy interceptors. Escort aircraft can negate this threat. consequently, the B-52 should be able to perform the battlefield interdiction mission without unacceptable losses.

Strategic bombers seem to have many of the characteristics needed to successfully conduct battlefield interdiction. Their long range, acceptable accuracy, all weather, day and night capability and survivability features favor their use in this capacity. B-52's may not be available, however, since their strategic mission may take precedence. If available, they will have limited impact against moving targets.

SUMMARY

When considering the capabilities of various weapon systems to conduct battlefield interdiction, emphasis was placed on range, accuracy, availability, flexibility and survivability factors. Army and Air Force weapons systems were evaluated against these factors. Cannon artillery does not have sufficient range to meet the needs of division and corps commanders. Furthermore, artillery is already expected to perform so many missions it is unlikely another could be successfully added. The Lance missile has substantial capabilities. However, there is a possibility that use of a non-nuclear Lance could be misinterpreted and undesired escalation

result. Additionally, there are a limited number of non-nuclear Lance missiles which could be depleted before hostilities ended. Attack helicopters have survivability drawbacks which would probably prevent an Army commander from utilizing them in the battlefield interdiction role. From this analysis, Army commanders do not have an organic asset which can execute the battlefield interdiction mission for an extended period.

Fighter aircraft have excellent capabilities. Perhaps the most important are their extensive range and ability to strike mobile targets. Their primary weakness is they lack all weather capability. While some of them are accomplishing a variety of missions one or more types of tactical aircraft should be available for the battlefield interdiction mission. Except for the A-10, survivability is not a significant problem. Strategic aircraft also have excellent capabilities, although the B-52 would probably be ineffective against moving targets and it would require fighter escort to ensure its survivability. The Air Force can provide Army commanders with the battlefield interdiction capability they need.

But, for either tactical fighters or strategic bombers to be successful, they must be responsive to the Army commander. The agency which provides the necessary interface is the Air Ground Operations System which will be discussed thoroughly in the next chapter.

CHAPTER IV

END NOTES

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3. FM 6-20 Fire Support in Combined Arms Operations (Washington: Headquarters, Department of the Army, 13 September 1977), p. C-3.
4. Ibid., p. B-A-2 and B-A-3.
5. Ibid., p. B-6.
6. Ibid., p. B-A-2.
7. Ibid., p. B-A-4.
8. FM 6-42 Field Artillery Battalion, Lance (Washington: Headquarters, Department of the Army, 30 August 1978), p. 4-8.
9. Ibid., p. 6-3.
10. Of the four tactical missions; direct support, reinforcing, general support reinforcing and general support, the latter two provide the most centralized control and are responsive primarily to a higher headquarters.
11. FM 17-50 Attack Helicopter Operations (Washington: Headquarters, Department of the Army, 1 July 1977), p. 1-5.
12. Ibid., p. 4-32.
13. Canby, Dr. Steven L. "Tactical Air Power in Armored Warfare," Air University Review May-June 1979, p. 9.
14. AU-23 United States Air Force-Commands and Agencies: Basic Information (Maxwell AFB, Alabama: Air University, August 1979), pp. 16-20.

CHAPTER V

COMMAND AND CONTROL

The Air Ground Operation system (AGOS) was developed to effectively integrate tactical airpower and ground operations. The Air Force portion of AGOS is the Tactical Air Control System (TACS). The TACS controls the operations of all tactical air resources available to the Air Force Component Commander. Elements from the TACS are assigned to Army units as low as battalion. The Army portion of the AGOS is the Army Air Ground System (AAGS). The AAGS also extends through all Army elements down to battalion. "This system (AGOS) provides the means to initiate, receive, process and execute requests for air support and to disseminate information and intelligence produced by air means." ¹ The AGOS is the interface for tactical fighter operations, tactical reconnaissance and tactical airlift. In this chapter the author will discuss the AGOS role in the planning and execution of Close Air Support, Battlefield Air Interdiction and Interdiction.

Strategic bombers used in a tactical role are incorporated into the TACS by a liaison element from the Strategic Air Command. While the Air Force Component Commander technically does not have operational control of these assets, he is able to execute some direction over them from within the TACS.

DIVISION AND BELOW

The AGOS, at division and below, is primarily execution oriented. It does not have the personnel, communications capability or facilities necessary to plan and manage air assets.

Air Force resources in the division include a senior Air Liaison Officer (ALO), a fighter ALO, a reconnaissance ALO and an Airlift ALO. When the division uses a split main/tactical operations center concept, the fighter ALO is normally located at the tactical operations center. From there, he monitors the immediate air request net to coordinate subordinate requests. He may also submit requests unique to the division. Preplanned requests are processed at the main operations center. At brigade, there are two fighter ALO's who perform both immediate and preplanned functions. At battalion, there are also two ALO's. In addition to the functions performed at higher levels, they also conduct final control over mission aircraft. One of the battalion ALO's may be assigned duties in forward air control aircraft. The ALO's at any echelon are assisted by airmen on a one to one basis. The Air Force personnel at any of these Army echelons are collectively called a Tactical Air Control Party (TACP). Since the TACP operates around the clock, they do not have the manpower to develop tasking orders for fighter aircraft.

The MK-107 or MK-108 communications central, a modified jeep with HF, UHF, VHF and FM radios, and various portable radios are the only communications assets dedicated for Air Force use at division and below. Except for HF, which is used for the Air Force request net, all this equipment is rather low power usable only for short distances, line of sight. Consequently, it would be impossible for the TACP's to directly task fighter units.

The TACP is co-located with the Fire Support Element within the unit operations center. This facility is not physically capable of monitoring the aircraft available to support the Army.

On the Army side, at division and below, the AGOS is represented by the G-3/S-3 air and the Fire Support Coordinator. They work closely with the TACP to coordinate immediate missions and to forecast future requirements.

CORPS

The AGOS at corps has much larger elements and corresponding additional capabilities. In addition to an ALO, there is an Air Support Operations Center (ASOC). The ASOC has sufficient manpower, communications equipment and facilities to manage the daily missions of the entire corps. It is normally located with the corps headquarters. "The primary function of the (ASOC) is to provide fast reaction to immediate requests of ground forces for close air support..."² The ASOC does not plan future fighter operations. However, it can divert preplanned missions to meet immediate requests if approved by the Army. It has a limited capability to control all close air support missions if the Tactical Air Control Center, which will be discussed later, is not operational or if Air Force operations are limited.

The Army interface with the ASOC comes from the Tactical Air Support Element formed by G-3 personnel. Because the ASOC is located at corps, additional liaison is not required.³

ECHELONS ABOVE CORPS

The senior element of the TACS is the Tactical Air Control Center (TACC).⁴ The TACC serves one or more corps. It was originally the Air Force interface to a Theater Army headquarters. However, since reorganization of the Army has eliminated echelons above corps, the TACC no longer has a direct Army counterpart. Now it serves as an intermediate organization to manage the application of air power over

a specific area. The TACC manages the current operations of all preplanned missions including close air support and interdiction. It provides resources to the ASOC for immediate close air support missions. Simultaneously, it uses Army approved preplanned missions to prepare the air tasking order for future operations. The TACC is also the focal point for intelligence to fulfill the requirements of the Air Force Component Commander. ⁵

The Army representative at the TACC is made up from the client corps. They make final determination of preplanned close air support missions and advise the TACC Director regarding Army operations and requirements. Because the organization is ad hoc, their duties are more administrative than managerial in nature. For example, they do not make decisions regarding re-allocation or submit tasking on their own. The TACC Director must go the Army Component Commander for inter-corps re-allocation decisions. ⁶

MANAGEMENT OF RESOURCES

The TACS currently provides command and control for close air support and interdiction using different agencies and procedures. In Europe, battlefield air interdiction is conducted by either or both of these procedures. Since battlefield interdiction has worldwide applicability, the procedures used to control it should be as simple and universally adaptable as possible. Before offering the procedures that should be adopted for BAI, the other two missions should be discussed more thoroughly.

Interdiction is planned and monitored primarily within the TACC. Using guidance provided by the Unified Commander, the TACC develops a tasking order for all the subordinate fighter units. At the same time,

the TACC tasks supporting aircraft like tankers, anti-aircraft suppression, air to air cover and electronic countermeasures aircraft. There are generally no alert aircraft dedicated to interdiction. The TACC, however, can divert resources from one area to another, if conditions warrant.

Using interdiction procedures to control BAI has several advantages and disadvantages. The ability of the TACC to generate total strike packages is a major advantage. This is particularly important as long as the Air Force continues to use this tactic. A second advantage is that the TACC is the focal point for intelligence so it can respond quickly to new target information. It also has a broad overall picture of the activity along the entire front. Since the TACC is at an echelon above corps, it would be able to switch aircraft assets between corps areas if necessary. A major disadvantage for these procedures is the TACC is not experienced in handling immediate requests.

Close air support is planned in the TACC, but is monitored in both the TACC and the ASOC. Approved preplanned requests are compiled in the air tasking order. Support sorties are scheduled as required. In addition, sorties are allocated to immediate missions and turned over to ASOC control. Immediate requests may be initiated at any Army echelon. Higher headquarters may disapprove subordinate requests. If approved, the ASOC executes the sorties by scrambling alert sorties or diverting preplanned close air support missions. If the ASOC runs out of sorties, it asks the TACC for additional resources. The additional sorties may come from another corps, from sorties held in reserve, from interdiction assets or from new aircraft generation.

The close air support procedures also have advantages and disadvantages if used to control BAI. The primary advantage of CAS procedures is that they are planned and processed using preplanned and immediate channels which are evaluated at every level by Army representatives. A second advantage is the experience the ASOC has handling Army immediate requests and the familiarity Army commanders have with this system. The apparent responsiveness of the ASOC to the Army is significant. The ASOC is hindered in the conduct of BAI because it does not have its own assets and would be dependent of the TACC for additional assets or supporting missions. Since it is corps located and consequently corps oriented, it does not have the intelligence capability of the TACC.

Battlefield air interdiction missions currently conducted in Europe are managed by either or both of these two methods. While this works satisfactorily in peacetime, it will most likely cause a great deal of confusion in war, where the demand for all resources will be greater than the availability. If the BAI concept has worldwide application, worldwide procedures should be established so stateside replacement TACS elements, Army units and fighter squadrons can practice them without sacrificing readiness for other potential conflicts or contingencies.

Considering the advantages and disadvantages listed above, this author believes that BAI should be planned and managed using the same procedures as CAS. However, the Army should immediately provide a staff of sufficient size with designated authority to represent the Army Component Commander to develop a Tactical Air Support Element at the TACC capable of processing immediate BAI requests. Once this is done,

the Air Force should extend the present close air support procedures to include the TACC. This extended CAS network could then best be used for battlefield air interdiction.

CONTROL MEASURES

Traditionally the dividing line between close air support and interdiction has been the Fire Support Coordination Line (FSCL). The FSCL is established by an Army commander, usually corps, in coordination with the TACC. The FSCL delimits the area in which air strikes require close coordination with the ground scheme of maneuver and fire. It is normally around 20 kilometers from the FEBA. As Army commanders have become responsible for a deeper battlefield, they want to use their close air resources beyond the FSCL. In many cases these requests have been disapproved because of problems caused by mixing the CAS and interdiction missions. ⁷ To solve this problem, the FSCL could be moved either direction. Moving the FSCL closer would allow the Air Force to strike second echelon forces and targets using interdiction concepts and procedures. However, this would probably be perceived by Army commanders as an undue restriction on their capability to fight in depth and, as such, would be strongly opposed. Moving the FSCL out would allow Army commanders greater depth and flexibility. However, it would cause severe dilution of close air support assets and may cause some aircraft such as the A-10 to fly missions into such a high threat area that they would be rapidly attrited. A compromise of the two solutions may be the best answer: move the FSCL closer to correspond with the limits of direct fire weapons and establish another line at the limit of the Army commanders responsibility. These two lines would clearly delineate three areas; close air support, battlefield

air interdiction and interdiction. As a result, the missions, responsibilities and authority of each Army and Air Force element would be less confused and, consequently, more efficiently managed.

SUMMARY

The command and control of air assets is performed within the Air Ground Operations System. It has elements at every level of command from battalion to the Component Command Headquarters. At division and below, the personnel and equipment are operationally oriented rather than managerially oriented. At corps, the ASOC conducts the daily close air support activities, but, does not manage preplanned requests. Above corps, the TACC, which does not have an Army equivalent, manages the interdiction campaign, establishes the preplanned close air support asking order, and dedicates aircraft for the immediate close air support mission. The battlefield interdiction mission would be best managed using close air support procedures provided the TACC could be integrated into the immediate request system and it could be manned by an Army staff representing the Army Component Commander.

Historically, the FSCL has divided the Air Force missions on the battlefield. The BAI concept has clouded the usefulness of a FSCL. To be effectively managed, BAI responsibilities should be clearly delineated. This can be accomplished by dividing the battlefield into three separate zones; one for CAS, one for BAI and one for interdiction.

CHAPTER V

END NOTES

1. FM 100-26 the Air Ground Operations System (Washington: Headquarters, Department of the Army, 30 March 1973), p. 5-1.
2. AU-23 United States Air Force-Commands and Agencies: Basic Information (Maxwell AFB, Alabama: Air University, August 1979), p. 57.
3. FM 100-26, p. 5-9.
4. In Europe the Tactical Air Control Center is called an Air Tactical Operations Center (ATOC).
5. AU-23, p. 53.
6. Morrow, Major Ronnie K. "Tactical Air Control System: Effects of Army Organizational Changes on Close Air Support Coordination." Masters Thesis for US Army Command and General Staff College, 1977. p. 38.
7. During Jack Frost 77, Gallant Crew 78, Team Spirit 79 and numerous other exercises this author has participated in as an ALO, the ASOC refused to even consider any mission beyond the FSCL.

CHAPTER VI
CONCLUSIONS AND RECOMMENDATIONS

If the United States should become involved in future war, it will probably be against forces using Soviet tactics. Soviet tactics are based on historical experience adjusted for modern technology. They consider their tactics to be scientifically derived and express them in "norms" and standardized principles. Many of these principles are accomplished by the echeloning of forces. Defensive bands give the battlefield formidable depth. Successive units in the attack provide mass and high rates of advance by reinforcing leading units or capitalizing on their gains. They place particular emphasis on high rates of speed because they feel they are necessary for success. The Soviets also depend heavily on artillery. They move all available artillery as far forward as possible to mass fires at the point of attack. Finally, the Soviets place heavy emphasis on their command and control system. Subordinate commanders rely on the advice of their superiors. In many cases, they cannot act without his approval. For example, a defending commander cannot counter-attack without permission. While each of these aspects of Soviet tactics may be considered strengths, neutralizing them may create synergistic demoralizing effects.

Battlefield interdiction is designed to hamper, neutralize or destroy those targets which enable the Soviets to echelon their forces, mass their artillery or control operations. A prerequisite to using battlefield interdiction is finding the desired targets.

The Army and the Air Force have a wide variety of target

acquisition systems. The Army assets are for the most part limited in range. They cannot see the battlefield to the depth required by a corps commander. Air Force assets, on the other hand, are not limited in range. Their primary limitation, in light of Army needs, is timeliness. While many systems can be data-linked to provide real time information, the data-link goes to the Air Force not to the Army. The Air Force processes the information and then provides Army commanders with intelligence they have requested. This delay may be short; but, in many cases, significant, considering the Soviet desire to maintain high rates of advance. This means the Air Force receives information regarding second echelon activities prior to the Army. Consequently, the Air Force should be able to target it more effectively. Furthermore, Air Force assets gather information across a broad front. Air Force intelligence sources may be able to detect a potential threat to a specific corps commander before that threat enters his area of responsibility. This is particularly important when Soviet forces move laterally across corps boundaries.

Targeting, however, is just a first step in battlefield interdiction. The target must be engaged by a weapon system with sufficient range, accuracy, flexibility, availability and survivability.

Although a number of weapons are available for battlefield interdiction, tactical and strategic aircraft, if used in a tactical role, are best suited for this mission. The range of tactical aircraft allows them to penetrate well beyond the depth required by the corps commander and strike anywhere along a very wide front. Tactical aircraft employing advanced weapons have a high probability of a first round hit. In addition, they can immediately determine if a re-attack

is necessary. Taken as a whole, tactical aircraft are extremely flexible. The F-111 is capable of flying missions so long as it has take-off minimums. Other fighters are also capable of all weather ordnance delivery although their accuracy may be significantly degraded. Furthermore, aircraft are not limited by poor terrain, destroyed bridges or blocked roads. Support of ground forces is a paramount feature of the Air Force's existence, therefore, tactical aircraft will always be dedicated to Army use as dictated by the unified commander. Although an Army commander does not command them as he does his own assets, he does determine their utilization within his area of responsibility. Primarily because of their range, accuracy and flexibility, tactical aircraft are the best current weapon system available to conduct the battlefield interdiction mission. Battlefield air interdiction will be a critical use for airpower in the future.

The effective use of airpower for BAI depends on the command and control system that manages it. The Air Ground Operations System has evolved since World War II to provide interface between the Army and the Air Force. The Army portion of the AGOS consists of elements from the G-3, G-2 and Fire Support Coordination staffs. It is most capable at the corps level. The Tactical Air Control System is the Air Force half of AGOS. The TACS element at corps is the Air Support Operations Center. It is responsible for managing the daily close air support package. In this capacity, it monitors the execution of the preplanned schedule and uses allocated assets to meet immediate requirements. The Tactical Air Control Center is the major TACS element. It is located above corps. It does all the preplanning for CAS and interdiction. It manages all the theater air assets and is the focal point for Air Force

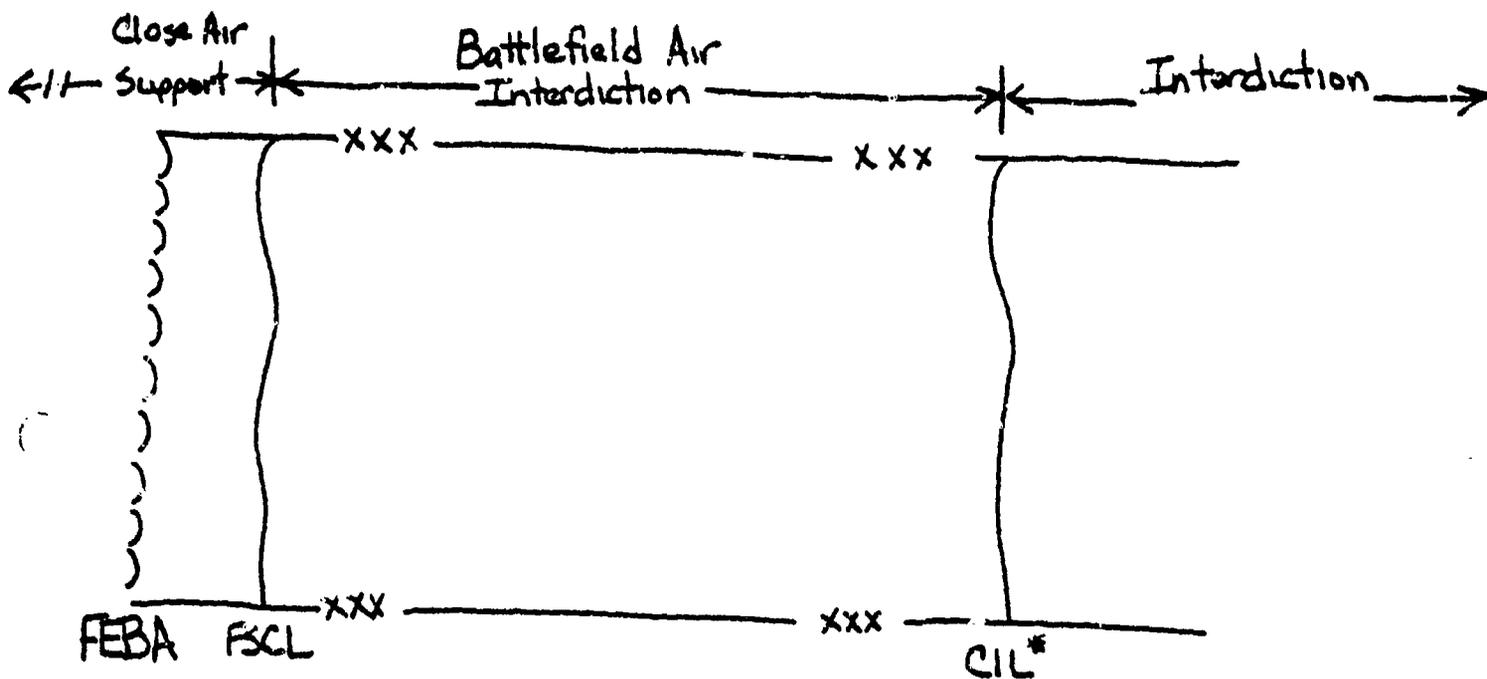
intelligence. AGOS has proved to be an effective system for the management of air resources. Therefore, the BAI mission should also be managed within the Air Ground Operations System.

There are two procedures for managing strike aircraft. The first is used for close air support. It responds to Army developed targets on a preplanned or immediate basis. Since it responds to maneuver units, it is a lower to higher echelon system. The interdiction procedure, on the other hand, is planned based on higher level guidance. Since battlefield interdiction must be able to respond to unit requirements as well as direction from higher level users, the procedures used to manage it should be similar to the CAS procedures. Since the TACC may receive important intelligence, it should also be included in the daily execution of BAI.

Finally, the area in which BAI procedures are to be used should be clearly designated. The Fire Support Coordination Line has been used to delineate CAS areas from interdiction areas. To distinguish an area for battlefield air interdiction, a second line should be developed. This line should be placed at the limits of the Army commander's battlefield responsibility. Meanwhile, the FSCL should be moved closer to the FEBA to reduce the CAS area. (see figure 6)

RECOMMENDATIONS

The BAI concept should be adopted for world wide application. Because of improvements in mobility, firepower and intelligence gathering capability, the Army commander will be responsible for the increased depth of the battlefield in all areas. The detailed integration of fire and maneuver that is associated with close air support is not necessary beyond direct fire range, particularly in the defense. But,



* Corps Interdiction Line

FIGURE 6
 RECOMMENDED FIRE CONTROL MEASURES AND BATTLEFIELD
 AIR INTERDICTION AREA

the autonomous Air Force operations associated with interdiction do not meet the Army commander's needs. World wide application of the BAI principles and procedures will provide Army and Air Force planners a standardized concept for application of airpower in all contingencies.

BAI should be considered a separate Air Force role equal to close air support and interdiction. This will improve allocation of resources. It will increase the emphasis on BAI particularly in the minds of the Army and Air Force leadership. Furthermore, it will provide clearer focus on the problems of PAI which will result in improved techniques and weaponry for this important use of airpower.

BAI should be managed using procedures similar to close air support. Those procedures should be extended to involve TACC response to immediate requests. This will make BAI available along a wider front and yet provide needed responsiveness to the Army commander. The Army should take immediate steps to change the manning of its TACC liaison from corps level to an echelon above corps.

The battlefield should be divided into three distinct areas by moving the FSCL closer to the FEBA and adding a second control line at the limit of the corps commander's area of responsibility. This will more clearly delineate areas for planning and the execution of specific missions. It will enable Air Force planners to better match aircraft and ordnance loads to more effectively service the potential targets in each area.

Battlefield air interdiction may well be the most important use of airpower for the future. Now is the time to develop realistic procedures for its use.

RECOMMENDATION FOR FUTURE STUDY

Future studies of battlefield air interdiction should investigate its use on the nuclear battlefield. The use of nuclear weapons increases command and control problems and requires integration of additional weapon systems. Hopefully, this study will provide a firm base for this additional study.

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