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The study reveals that the US Army places too much reliance on Close Air Support to supplement shortfalls in organic firepower, and that the massive use of Close Air Support required by the Active Defense is a poor use of air power.

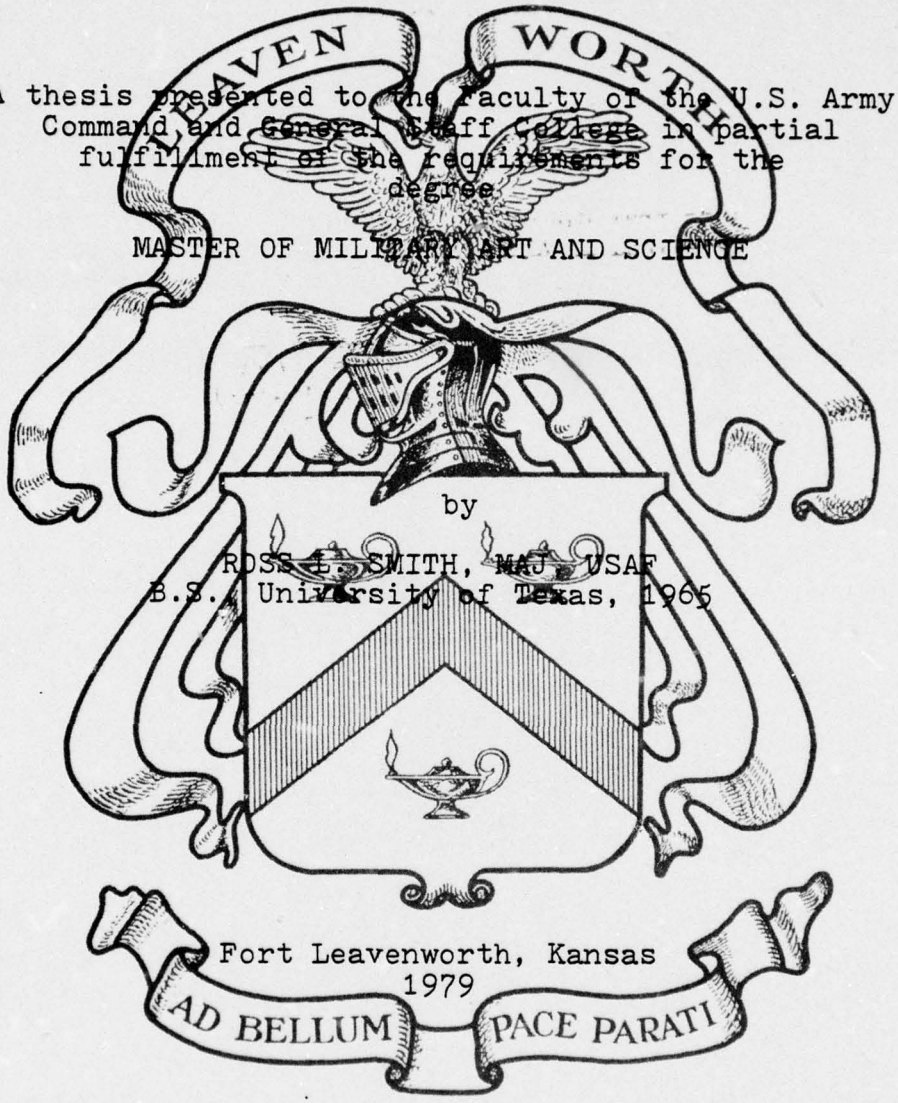
The study recommends that Close Air Support, Battlefield Interdiction, and Interdiction be redefined in Air Force, Army, and NATO manuals.

The study further recommends that Close Air Support be limited to direct fire range of Army weapons, and that the major air effort should be used against the second echelon forces before they reach the main battle area. Finally, the study graphically portrays the air-land battle with the Joint Air Attack Team used for Close Air Support and the target box concept used for high-performance aircraft against the second echelon.

CLOSE AIR SUPPORT - CAN IT SURVIVE THE 80s?

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



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ABSTRACT

CLOSE AIR SUPPORT - CAN IT SURVIVE THE 80s?
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CHAPTER ONE

CLOSE AIR SUPPORT--CAN IT SURVIVE THE 80s

INTRODUCTION

The two most powerful countries in the world are currently deadlocked in negotiations that are aimed at the control of strategic nuclear delivery systems and their respective destructive capabilities. The SALT (Strategic Arms Limitation Treaty) talks have occupied center-stage in the US effort to reduce tensions between the US and the Soviet Union for several years. The resolution of SALT is critical because it will form the foundation for any national nuclear strategy that the United States adopts in the future. SALT, however, is only part of the overall effort to ease military tension. The other major effort is Mutual and Balanced Force Reductions (MBFR)*. MBFR involves negotiations to reduce the conventional forces deployed in Central Europe.

Although MBFR receives less publicity, many feel a greater potential for international confrontation exists if MBFR is left unresolved. This is because SALT affects the survivability of the two superpowers in an all-out nuclear exchange, while MBFR deals with forces which are much less

*For a discussion of MBFR and its relation to force build-up in Central Europe, the reader is directed to p92 of The Military Balance 1972-1973 and p104 of the 1976-1977 issue. These are publications of the London International Institute for Strategic Studies, London, England.

constrained in their use and more likely to be employed to achieve national objectives.

One consequence of the lack of a MBFR agreement is the unprecedented build-up of conventional forces and weapons systems in Central Europe. In order to deter aggression, both NATO (North Atlantic Treaty Organization) and the Warsaw Pact have placed a large portion of their forces in forward deployed positions. The quantity of these forces is only surpassed by the sophistication of the weapons systems of both sides. Innumerable formulas have been developed to determine who now has the edge when technology and personnel are considered. One thing, however, is undeniable - the complexion of any anticipated conventional war in Central Europe has changed dramatically as a result of force build-ups and modern weapon systems.

The weapon systems currently in the arsenals of the Warsaw Pact and NATO forces are so destructive, so accurate, and so sophisticated that tacticians have difficulty coordinating how to employ them on the modern battlefield. To make matters worse, the technology of modern weaponry seems to be outstripping the ability of the tactician to keep up. Weapon systems often reach the field before sound tactics are developed for their employment, or, as is often the case, the same old tactics are employed with a much more sophisticated weapon system.

There are presently the equivalent of 26 army divisions in the German Democratic Republic (GDR). When compared

to NATO forces in the same area, the Warsaw Pact possesses an overwhelming majority in numbers. For example, of the 26 divisions, 12 are tank divisions and 14 are motorized rifle divisions. A Pact tank division contains approximately 325 main battle tanks, while a motorized rifle division contains 266. In addition to the forces deployed in the GDR, there are 32 divisions immediately available in Poland and Czechoslovakia. In main battle tanks alone the Warsaw Pact outnumbers NATO 16,200 to 6,405 in NATO's central region.[1]

Quite naturally, the United States Army has been forced to re-evaluate its doctrine and tactics in light of the Warsaw Pact threat. The product of this re-evaluation is the Active Defense. Application of the Active Defense on the battlefield will have an effect on how the US Air Force employs air power in support of ground operations.

In modern history there have been two wars that have dramatically demonstrated how the technology in weaponry and the proliferation of equipment have changed the strategy and application of firepower on the battlefield. In both cases the conflict involved Israel and the Arab countries, and in both cases the latest state-of-the-art weapons systems of the two superpowers were employed.

The two wars were dramatically different, and the US and the Soviet Union are still trying to unravel the lessons that were learned from these wars. For instance, the 1967 war is called the first war won by air power.[2] This assessment resulted from the devastating effect of a preemptive strike conducted by the Israeli Air Force at the

beginning of the war and by the effectiveness of the combined arms team of armor and air used by the Israeli Defense Force (IDF). By contrast, at the end of the 1973 war many analysts were predicting the inevitable death of the airplane and tank as "king of the battlefield."[3]

The mass destruction of equipment and supplies in the 1973 war shocked even the most sober of military analysts. One account lists the following losses in military equipment.[4]

COUNTRY	AIRCRAFT	ARMORED VEHICLES	SHIPS
Israel	105	810	3
Egypt	182	740	4
Syria	165	860	9
Iraq	21	125	-
Jordan	-	20	-

Of the total number of fighter aircraft lost by Israel, 52 were A-4, 27 F-4, eight Mirage, and five Super Mystere. Since the A-4 flies only in the air-to-ground role and the F-4 doubles in both air defense and ground support, it can be reasoned that the majority of Israeli aircraft losses were during missions in support of ground operations.[5]

Significantly, 30 per cent of all IAF losses are attributed to the ZSU 23-4 mobile gun system and 30 per cent to surface-to-air missiles, while only 15 per cent were attributed to enemy air action. The remaining 25 per cent of the losses were listed as unknown causes.[6]

This change in the complexion of the air war between 1967 and 1973 must affect the future tactics the US Air Force

will use in the event of war in Central Europe. What happened between these two wars and how the application of air power has been affected will be the subject of this study. In particular, the concept of close air support will be critically reviewed and addressed.

PROBLEM STATEMENT

Since 1967, several factors have combined to affect the complexity and complexion of the modern battlefield. These factors directly affect the capability of the US Air Force to perform one of its major missions, close air support. These factors:

- the Army change in defensive doctrine, the Active Defense;
- the rapid advancement in the state-of-the art of modern weapons;
- the proliferation of air defense assets of the Soviet Army; and,
- the mass destruction of weapons on the modern battlefield as witnessed in the 1973 Arab-Israeli War

will be studied in this paper.

SCOPE

This research thesis will discuss new doctrinal and tactical concepts now being considered in the close air support role of the US Air Force. It will further draw conclusions about the future of close air support and make recommendations for the 1980 to 1990 time frame. The emphasis

will be on a possible confrontation between NATO and the Warsaw Pact in Central Europe.

ASSUMPTIONS AND RESTRICTIONS

1. This thesis is unclassified; however, a bibliography of classified material will be published for the reader who has access to classified material and wishes to do more study.

2. Central Europe poses the most difficult scenario to employ close air support.

3. Conclusions drawn in this paper are the author's and do not represent official Air Force doctrine.

THE ROLE OF TACTICAL AIR POWER

US Tactical aircraft perform three basic missions during any conflict. These missions are Counterair, Interdiction, and Close Air Support. Counterair are those operations taken against the enemy to protect friendly combat power. This action includes attacks against enemy airfields, aircraft, and air defense weapons to establish air superiority. Interdiction missions are flown against second echelon forces, supply concentrations, lines of communication, and other targets that support the enemy's war effort. Close Air Support (CAS) is the direct support of ground maneuver forces engaged with the enemy.

The support of Army ground forces through the use of CAS is a mission specified in AFM 1-1. This operation can

be defined as employment of air power such that each mission requires detailed integration with the maneuver and fire support plans of the ground commander. The ground commander may call for sorties against preplanned targets or targets of opportunity. Typically, targets include enemy forces in direct contact with friendly forces, air defense targets in the leading echelon of forces, artillery batteries, command and control centers, and enemy troop movements or concentrations.[7]

The distinction of CAS from other USAF missions is that it is employed in direct coordination with the Army ground commander and is limited to targets generally found in the main battle area (MBA) and covering force area (CFA). The outermost limit of CAS on the battlefield is generally accepted as the fire support coordination line (FSCL)*. At any given moment, either the enemy or the US is capable of inserting forces outside the limits described above. These forces could also require a CAS effort. Although the physical boundaries help to visualize where CAS can be employed, perhaps the single most important feature of CAS is its detailed integration with the ground commander's scheme of maneuver and fires.

This detailed integration is required because aerial munitions are employed in close proximity to friendly forces.

*I use the term "generally accepted" because of the fluid nature of the modern battlefield.

CAS normally is controlled and directed by an observer with a detailed knowledge of the battlefield situation. The observer may be either an Air Force forward air controller (FAC) or an Army forward observer (FO).

Actual control is achieved by using radio nets. When a CAS flight enters the area, the flight leader (FL) of the CAS aircraft establishes radio contact with FAC or FO and receives a target briefing. The FAC or FO may identify the target by marking it with smoke or other means easily recognizable from the air. After the FL has positively identified his target, he is cleared to attack the target.

The coordination required in this scenario should be apparent. First, the CAS aircraft must be received and integrated into the overall battle scheme. Traveling at speeds often in excess of 500 KTAS and having come from 100 to 200 miles away, the flight will be controlled by a FAC/FO who is under fire and probably has been for some time. What the FL sees from the air and the FAC/FO sees from the ground must be resolved into a mutual understanding.

In past wars, this coordination was conducted in relatively low threat environments. Air superiority was achieved early, and offered the pilot freedom of action over the battlefield. In the Vietnam War, there was no opposing air force or sophisticated air defense system in South Vietnam. This offered a permissive environment for the employment of CAS. The sophisticated air defense systems now deployed with the Warsaw Pact seriously challenge

the Air Force's ability to establish air superiority, and without air superiority, the mission of CAS must be seriously challenged on the modern battlefield.

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CHAPTER TWO

US ARMY DOCTRINE--THE ACTIVE DEFENSE

The US Army is currently changing its defensive doctrine from the Mobile Defense to the Active Defense. This chapter will address the major differences between the two defenses and discuss how this change in Army doctrine affects the employment of air power over the modern battlefield.

THE MOBILE DEFENSE

In the early sixties, the United States enjoyed a superiority in both weapon systems and combat power. As the principal mechanized army in the world, the US developed a defense that gave divisions a relatively narrow frontage to defend with a highly mobile force. The concept was to have a small covering force stationed in the forward area of the division. This force would warn of any attack, engage the enemy early to determine his strength, and canalize him into kill zones or areas suitable for counter-attack.

The division maintained the bulk of its combat power in a strong mobile reserve positioned for offensive action. A series of delaying actions were fought by small units, forcing the enemy onto a battleground selected by the defender. Figure 1 shows a typical divisional overlay employing the Mobile Defense.

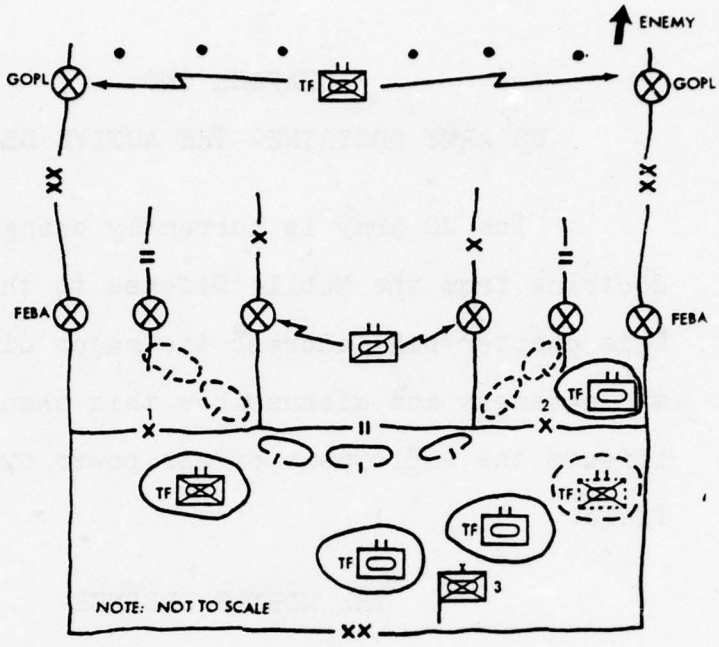

Figure 1

Schematic of the Mobile Defense[1]

At the forward edge of the battle area (FEBA), company-sized units established forward battle positions on canalizing terrain. These "die-in-place" battle positions resisted to the point that the enemy concentrated his forces in an effort to break through the main defense. Thinking he had achieved a penetration, the enemy commander would commit the bulk of his force. When the enemy reached the kill zone, the defending commander closed the trap by counter-attacking with a strong reserve force. This force was the preponderance of the division's tank and mechanized units.

Using their superior mobility and fire power, they would stop the enemy attack and then destroy him.

As viewed from the air, this canalization of the enemy and the following counterattack resulted in a narrow line of contact. Any forces moving on either side of the line of contact could be easily identified from the air. This allowed for the relatively easy close coordination and control of Air Force assets in CAS roles.

The viability of this defense is based on the defender possessing superior mobility and fire power. In the early seventies it became apparent to most military analysts that the US no longer enjoyed either of these prerequisites. While our weapon systems remained technologically superior, the sheer number of enemy weapon systems made the Mobile Defense tactically unsound.

THE CHANGE IN THE THREAT

Tactical doctrine is foremost based on the threat it must address. This section will show how the Warsaw Pact has increased and continues to increase its threat to NATO and US forces deployed in the central region.

Figure 2 is an analysis of the growth of the Warsaw Pact forces in relation to NATO from 1968 to 1977. The main battle tank is used as a comparison because it is the principal weapon system that dominates the modern battlefield, and, therefore, almost all defensive tactics first deal with a counter to the tank.

		NORTHERN & CENTRAL EUROPE			SOUTHERN EUROPE		
		NATO	WARSAW PACT	OF WHICH RUSSIAN	NATO	WARSAW PACT	OF WHICH RUSSIAN
ARMORED DIVISIONS	*1968	26/7	70/23	44/14	15/5	30/10	15/5
	1973	9	31	21	6	8	3
	1977	11	31	19	6	6	3
MECHANIZED DIVISIONS	*1968	46/15	100/33	50/17	55/18	80/27	42/14
	1973	15	36	20	31	19	4
	1977	18	36	21	35	27	7
MAIN BATTLE TANKS	1968	4,800	11,500	6,000	1,600	4,300	1,100
	1973	6,000	16,000	10,000	2,100	5,200	1,600
	1977	7,000	19,000	11,000	4,000	7,500	2,750

*Figures for 1968 are brigade equivalent on the left. I have converted these to division equivalents on the right at the rate of 3:1.

Figure 2

The Growth in Forces in the Warsaw Pact and NATO Since 1967[2]

The table can be misleading if only the figures are studied. For instance, in 1968 in the central and northern region of Europe, the Warsaw Pact had 6,700 more main battle tanks than NATO. By 1977 that difference had reached 12,000. But, that tells only part of the story. The tank force of the NATO countries was far superior to the Warsaw Pact tank force of 1968. The Soviet tank divisions were upgrading to the T-62 in 1968, while other Pact divisions were predominantly made up of T-54s and T-55s. These tanks were technologically inferior to NATO's M-60s, Chieftains, and Leopards.[4]

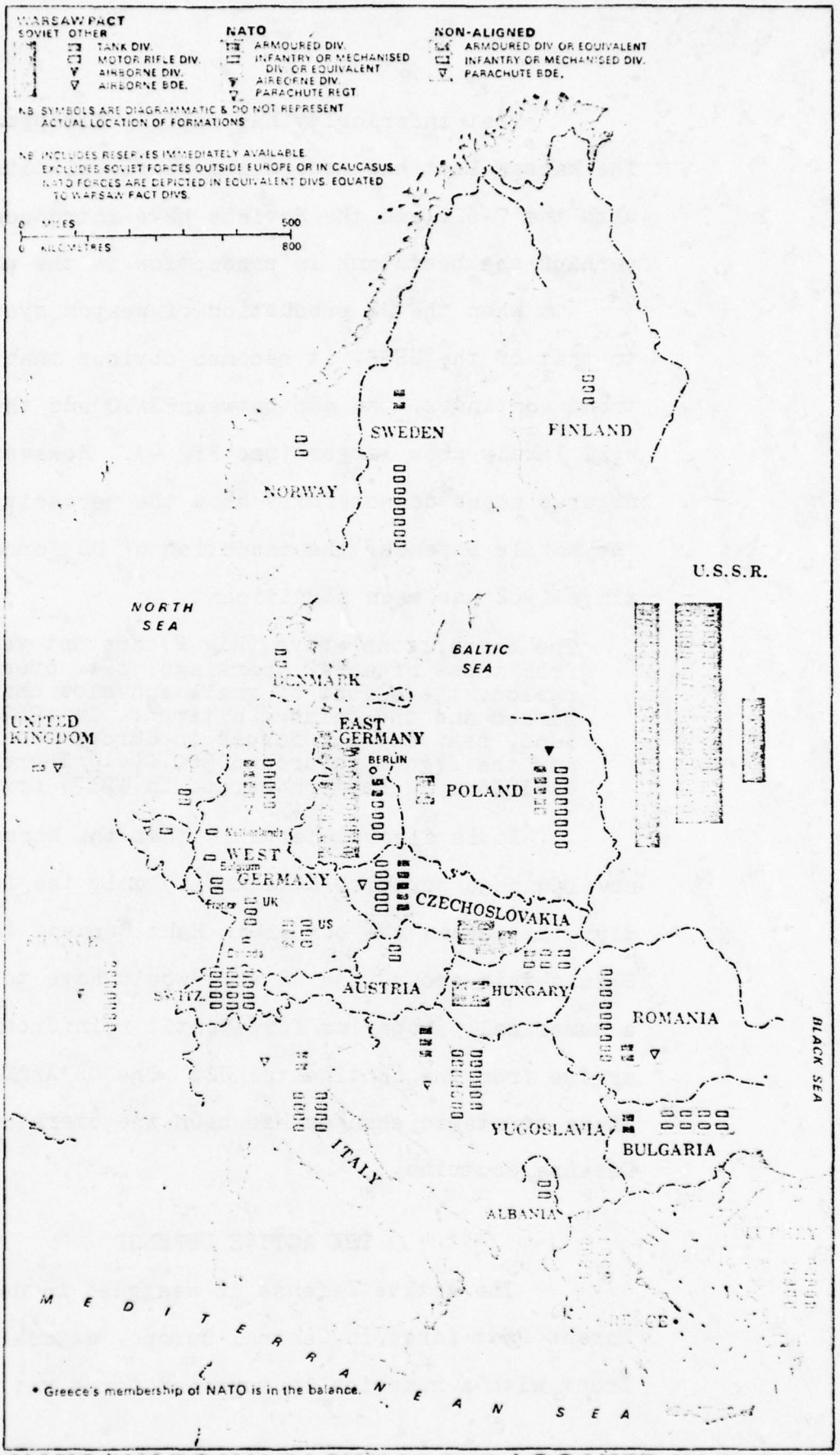

Figure 3: NATO/WARSAW PACT FORCES LOCATED IN EUROPE

That inferiority has rapidly disappeared since 1968. The Warsaw Pact has modernized nearly all its tank divisions with the T-62, and the Soviets have introduced the T-72, perhaps the best tank in production in the world today.

When the US production of weapon systems is compared to that of the USSR, it becomes obvious that if the present trend continues, the gap between NATO and the Warsaw Pact will likely grow larger (see Fig 4). However, equipment figures alone do not fully show the necessity for abandoning the Mobile Defense; the reduction of US forces in Europe since 1962 has been significant.

> The comparisons above (Fig 2) are not very different from those of a few years ago; but, over the longer period, the effect of small and slow changes can be marked and the balance altered. In 1962, the American land, sea, and air forces in Europe totaled 434,000; now the figure is around 300,000. There were 26 Soviet divisions in Eastern Europe in 1967; now there are 31.[3]

It is also conceivable that the Warsaw Pact could now launch a surprise attack with only the forces stationed directly across the border in East Germany (see Fig 5). Should this occur, the US Army would have to defend against a numerically superior force until reinforcements could arrive from the continental US. The US Army response to these strategic changes has been the emergence of the Active Defense doctrine.

THE ACTIVE DEFENSE

The Active Defense is designed to defend against a Warsaw Pact force in Central Europe, attacking on a narrow front with a numerically superior force ratio of up to 6:1.

US-USSR MILITARY PRODUCTION 1970-75

Approximate yearly average:

	USA	USSR
Tanks	450	2,500
APC	1,450	3,800
Artillery	150	1,400
Helicopters	600	1,000
Tactical Aircraft	300	1,000
Surface Ships	600	40
Missile Subs	less than 1	7

TOTAL HOLDINGS OF GROUND FORCE EQUIPMENT
(Excluding Obsolete Reserves)

Tanks	9,000	42,000
APC	23,000	41,000
Artillery (including mortars and multiple rocket launchers)	9,000	27,000
Helicopters	9,000	2,500

FIGHTER AND ATTACK AIRCRAFT

Fighter Interceptor Aircraft	374	2,550
ABM Launchers	0	64
Strategic SAM Launchers	0	10,000
Tactical Attack (incl Naval)	2,300	5,000

In general Soviet totals include more obsolescent hardware.

Figure 4
THE ARMS RACE[6]

It is the principal defensive doctrine used at the US Army Command and General Staff College, the senior military tactical school of the US Army, and will likely maintain its status at least through the 1980s. The differences between the Mobile Defense and the Active Defense will be highlighted in this section.

To understand the employment of the Active Defense requires a working knowledge of the concept, role, and mission of the covering force area (CFA), covering force (CF),

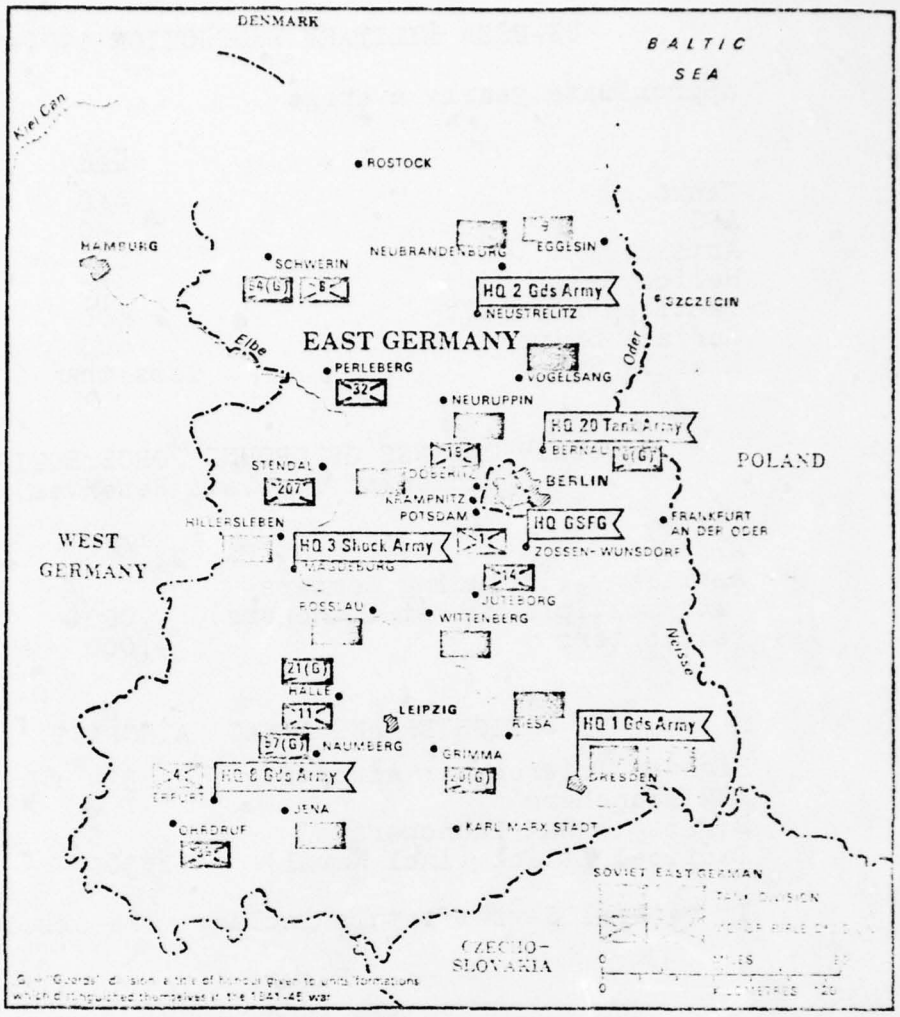

Figure 5

SOVIET FORCES IN EAST GERMANY

and the main battle area (MBA). A graphical overlay of these areas is shown in Figure 6. The CFA and the MBA are shown as they might be at the outbreak of hostilities in Central Europe. The CFA would initially be bounded on the east by the international border and on the west by the Fulda River. In order to establish fire control measures, the division commander would designate these two geographical features respectively as the initial fire support coordination line (FSCL) and the forward edge of the battle area (FEBA). The MBA would extend from the FEBA to the divisional rear boundary.

The purpose of the CFA is to provide the CF an area in which to absorb the initial thrust of the enemy and allow sufficient depth to conduct a series of delaying actions that will impede the progress of the enemy. The covering force will be attempting to trade this space for the time that is required to prepare the MBA for the major defensive effort of the division.[8]

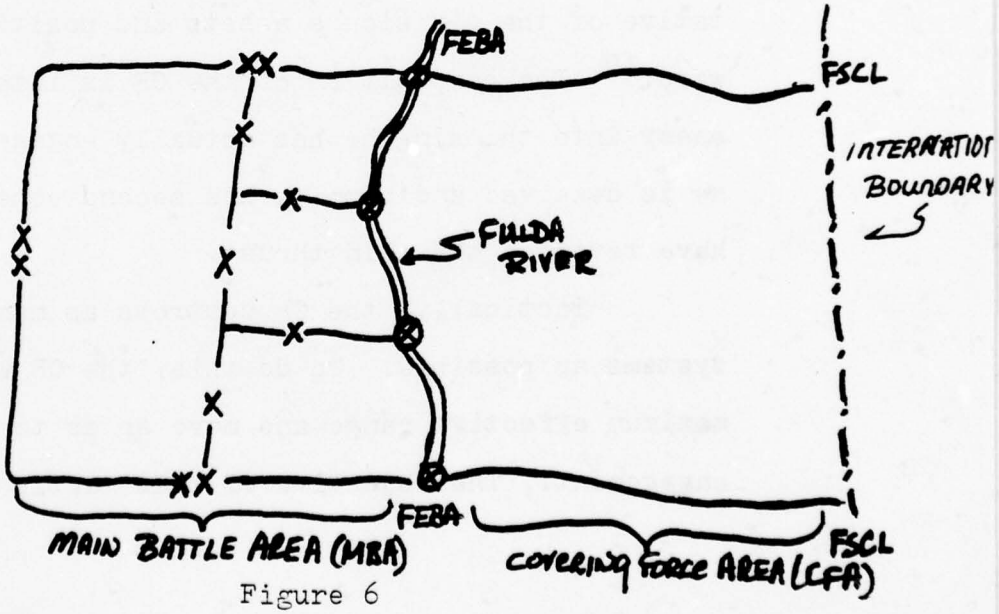

Figure 6

Schematic of Main Battle Area & Covering Force Area

The CF will oppose the enemy attack first. Using a series of prepared positions, knowledge of the terrain and highly mobile forces, the CF performs four vital tasks.

1. Cause the enemy to reveal the location, direction, and strength of his main thrust;

2. Deceive the enemy to prevent him from determining the strength disposition and location of the MBA;

3. Strip away the air defense umbrella of the first echelon; and,

4. Gain the critical time element needed to prepare the MBA.[9]

Unlike the CF of the Mobile Defense, the CF of the Active Defense will be a heavily reinforced task force of mechanized and armor assets, usually a cavalry unit. It will carry its own engineering support and often be reinforced from division or corps assets with additional engineers. In addition, artillery support will be representative of the division's assets and positioned well forward.[10] The composition of the CF is intended to deceive the enemy into thinking he has actually engaged the main body. If he is deceived and commits his second echelon, the CF will have revealed the main thrust.

Tactically, the CF destroys as many enemy weapons systems as possible. To do this, the CF will engage at maximum effective range and move so as to avoid decisive engagement. The objective of this tactic is to draw the

enemy out from under his air defense umbrella and away from his forward artillery. Critical anti-armor weapons are continually recycled by engaging from one battle position and then moving three to five kilometers rearward to engage again.[11] While the CF is doing its job, the main body of the division is preparing positions in the MBA where the main defense will be conducted.

As opposed to the Mobile Defense, the majority of the division's fire power and maneuver units will be well forward in the MBA (see Fig 7). Although the counterattack is still used in the Active Defense, the emphasis is different. In the Active Defense, the counterattack is achieved by smaller forces with more importance placed on counterattack using indirect fires and attack helicopters.

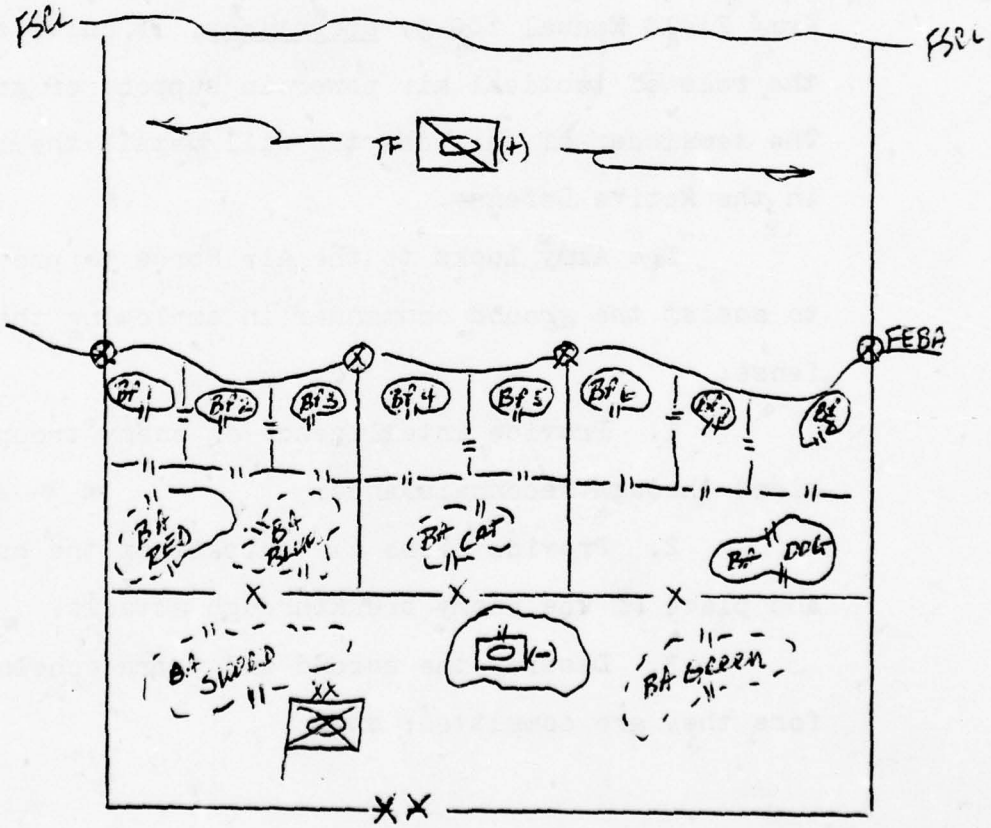

Figure 7
Schematic of the Active Defense

Since the success of the defense depends on the destruction of the enemy in the MBA, the concentration of the proper fire power at the proper time is critical.[12] The Active Defense must therefore rely on the ability of units to break contact and reposition themselves within the MBA. It is through this maneuver that the defense in depth is achieved.[13]

AIR POWER IN THE ACTIVE DEFENSE

The Army has placed a high priority on the use of air power in the close air support role to assist the ground commander in the critical breakthrough phase of the Warsaw Pact. The average fighter squadron in Europe devotes 25 per cent of its daily flying time in close air support training.[14] *Army Field Manual 100-5,* Operations, is quite specific about the role of tactical air power in support of ground operations.[15] The remainder of this chapter will detail the role of air power in the Active Defense.

The Army looks to the Air Force to provide four tasks to assist the ground commander in employing the Active Defense:

1. Provide intelligence on enemy troop concentrations through reconnaissance;

2. Provide close air support at the critical time and place of the enemy breakthrough attacks;

3. Destroy the second and third echelon forces before they are committed; and,

4. Interdict enemy supplies of ammunition, fuel, and replacement weapon systems.[16]

Of the four, close air support and the destruction of the second and third echelon forces will have an immediate effect on the success of the Active Defense. "Close air support will be required for forward engaged elements in the area of the breakthrough attack. It must be provided massively, in time, at the critical point."[17]

Once located, interdiction and battlefield interdiction of the second and third echelon forces can be accomplished with a minimum of coordination. However, as targets get closer to the MBA, the degree of difficulty of identification and coordination with the ground commander's scheme of maneuver increases dramatically over that of Mobile Defense.

The primary reason for this difficulty is that the battlefield of the Active Defense is not nearly as clear from the air. Two principal factors obscure the picture. The first is the lack of a definitive line of contact. The second, and perhaps the most important, is that at any given time enemy as well as friendly forces are moving throughout the battlefield. Positive identification of close air support targets will be exceptionally difficult in this environment. Analogs of movement and target identification show that as the number of battlefield movements increase with the Active Defense (Fig 8) the difficulty of target identification increases proportionately (Fig 9).

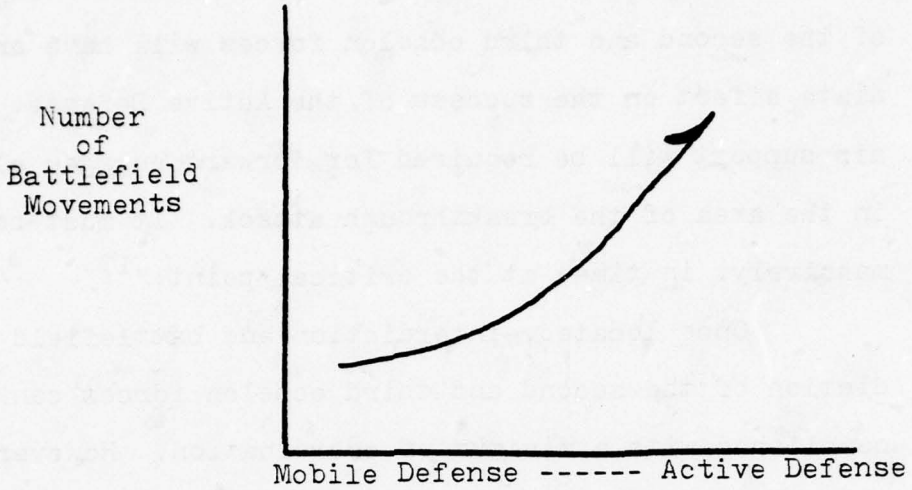

Figure 8

Battlefield Movements

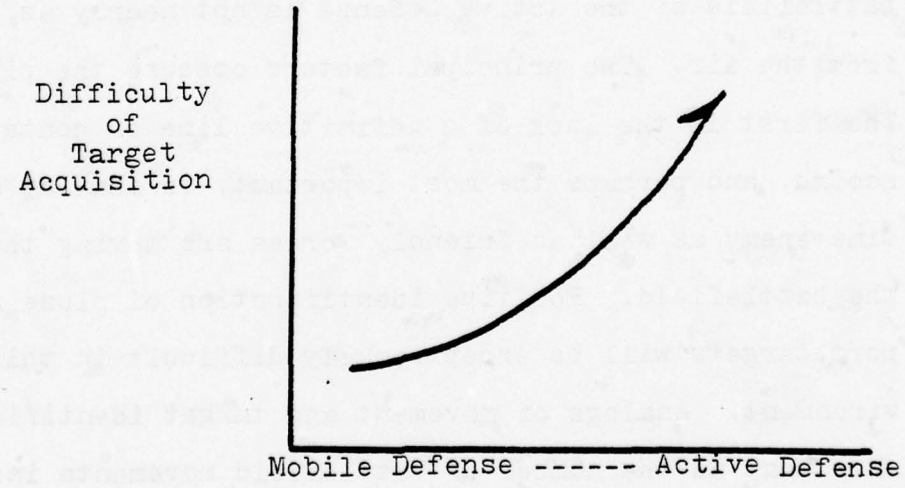

Figure 9

Target Acquisition

The massive movement factor of the Active Defense alone adds a new dimension to the modern battlefield. This movement and the increased size of the LOC and main battle area significantly affect CAS missions.

Specific tactics and weapons systems employed on the modern battlefield also affect the application of CAS. For example, the US Air Force is placing a heavy reliance on precision guided munitions. These munitions require the pilot to acquire the target before releasing the weapon; should weather, tactical smoke, or battlefield smoke obscure the battlefield, these munitions are worthless. Advances in electronic warfare could also disrupt the air-to-ground communications so vital to the CAS mission. Finally, air defense weapons significantly reduce the amount of time the pilot has to positively identify CAS targets. The significance of the air defense threat is the subject of the next chapter.

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2. The Military Balance 1968-1969, (London: International Institute For Strategic Studies, 1969), p. 53, The Military Balance 1972-1973, pp. 87-89, The Military Balance 1976-1977, pp. 97-101. (Numbers were taken from three different tables for each year and combined into one table for easy comparison.)

3. John Erickson, "The Warsaw Pact," in The Soviet War Machine, ed. by Ray Bonds (London: Salamander Books Ltd., 1976), p. 236

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9. Ibid.

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16. Ibid., p. 5-9.

17. Ibid., p. 5-4.

CHAPTER THREE

AIR DEFENSE ASSETS OF THE SOVIET ARMY

In the preceding chapter, the Air Force capability to destroy second and third echelon targets and provide CAS to troops in contact was identified as an integral part of the Active Defense. This concept of fighting as a part of the Army's combined arms teams is a mission to which the USAF is totally dedicated. In a statement given to Air Force Magazine in September 1975, the then Air Force Chief of Staff, General David C. Jones, stated:

> Our first job in TACAIR is to help blunt and stop the armored thrust. This doesn't mean that the total air effort would go to close air support and battlefield interdiction. We would have to maintain localized air superiority to keep the enemy off our backs so we could operate. The interdiction targets I'm talking about aren't deep in enemy territory. They are the ones that threaten us in the battle area and are related to our job of defending NATO territory.

There can be no question then that CAS is a mission the Air Force is dedicated to perform. What can be questioned is how the increasing sophistication of modern weapons, particularly the proliferation of air defense systems in the Soviet Army, affects the capability of the Air Force to do this mission.

Certainly a most important aspect of the CAS problem is the Soviet ability to effectively counter an allied air threat in the CFA and the MBA. During the 1973 Arab-Israeli War, the Israeli Air Force (IAF) was caught completely by

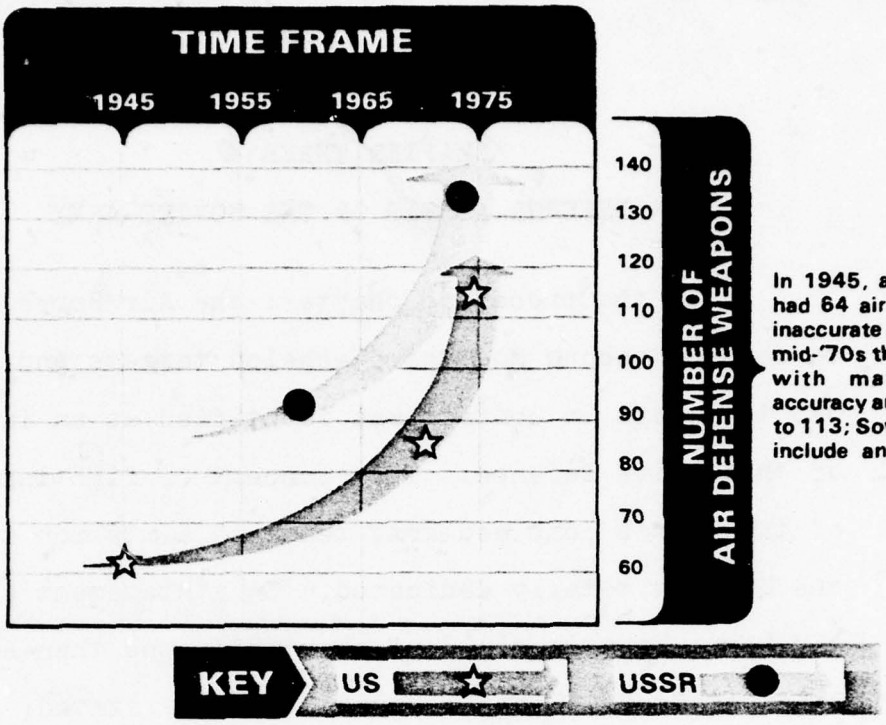

Figure 10
Number of Air Defense Weapons

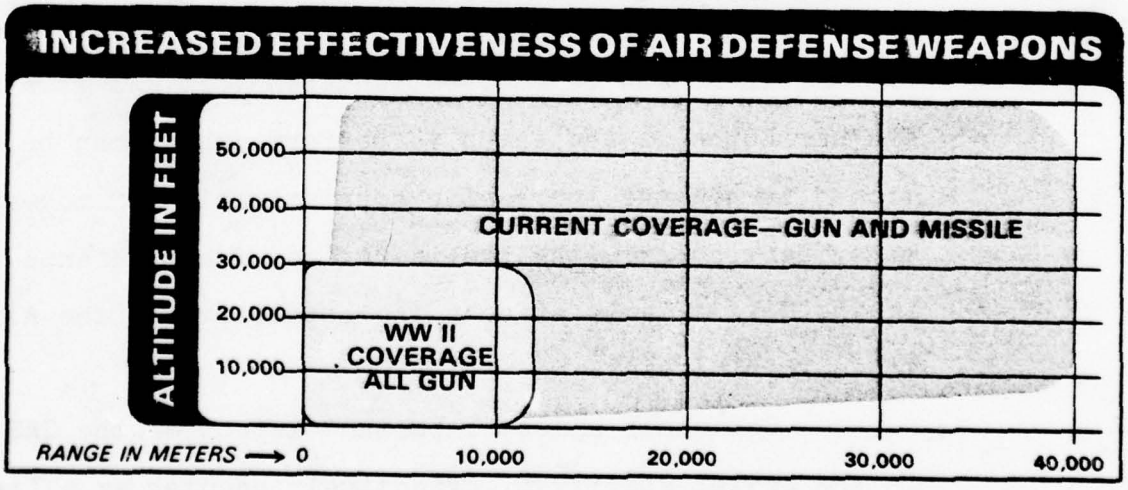

Figure 11
Increased Effectiveness of Air Defense Weapons

surprise by the effectiveness of the Egyptian air defense system. The magnitude and effectiveness of this threat must be studied to appreciate its effect on the employment of tactical air power.

The 1973 Arab-Israeli War was a turning point in US appreciation for the Soviet air defense threat. Up until 1973, the most sophisticated air defense system witnessed by US aircrews was in North Vietnam. This system was composed of multiple caliber antiaircraft artillery and the SA-2 Guideline surface-to-air missile (SAM).

The Soviet/Warsaw Pact air defense system of today is one of the most formidable ever fielded. Its development is not dissimilar from the growth in numbers and sophistication of Warsaw Pact tank forces. For example, relative rates of increase in air defense weapons since World War II is clear in Figure 10. Even more important is the combat effectiveness of these systems. Figure 11 further shows how these weapon systems now virtually blanket the battlefield.

An analysis of the Soviet Army air defense system in 1967 would have shown a heavy reliance on antiaircraft artillery (AAA). SAM systems were just beginning their full integration into the divisions. By contrast, the Soviets now have a highly sophisticated and overlapping SAM system that complements the AAA assets of the division. This air defense system is attached to the combat maneuver units and is completely mechanized to allow it to keep up with the

rapid rates of advance called for in Soviet doctrine. It has the capability to engage attacking aircraft from altitudes below 500 feet and up to 90,000 feet, leaving virtually no airspace uncovered.

A look at each of the major SAM systems and the ZSU 23-4 AAA system is worthwhile to gain an appreciation for the overall system.

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Figure 12

SA-2 Guideline
(Source: The Soviet War Machine, p225)

The SA-2 Guideline is a medium to high altitude mobile air defense missile widely deployed in the Warsaw Pact. It has seen service in both Middle East wars and in Vietnam. The missile has been in service since 1957 and has several modifications. One version seen in a 1967 military parade in Moscow is thought to have a nuclear warhead.

The SA-2 is used in conjunction with the Fansong radar, which operates in the E, F, or G bands. Although basically a beam rider, the SA-2 is said to have been improved with a terminal guidance radar during the 1973 Arab-Israeli War and the possibility of an optical guidance technique for improved electronic counter counter measures (ECCM)[3].

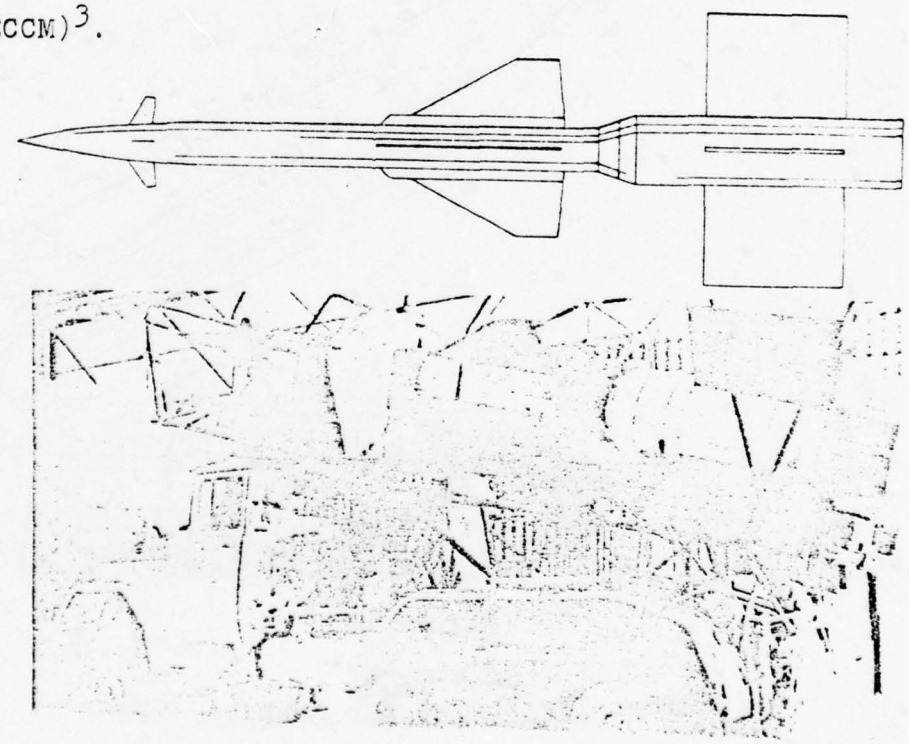

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Figure 13

SA-3 Goa and Transporter
(Source: The Soviet War Machine, p226)

The SA-3 Goa is widely deployed in Warsaw Pact countries and the Middle East. It was used extensively in the 1973 Arab-Israeli War and is designed as a short range low altitude point defense system. Although not deployed with the Warsaw Pact armies, it is found in sufficient numbers at fixed sites to pose a problem to interdiction missions.

Guidance is provided by the Low Blow radar (I/J Band) in conjunction with the Flat Face target acquisition radar. As many as six targets can be tracked simultaneously, and two missiles can be guided at the same target simultaneously.[4]

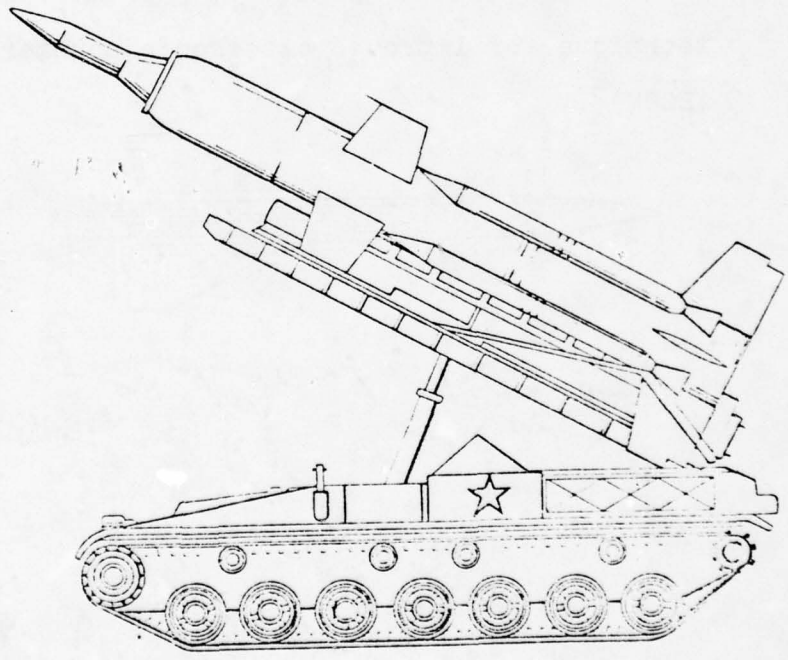


Figure 14

SA-4 Ganef
(Source: The Soviet War Machine, p226)

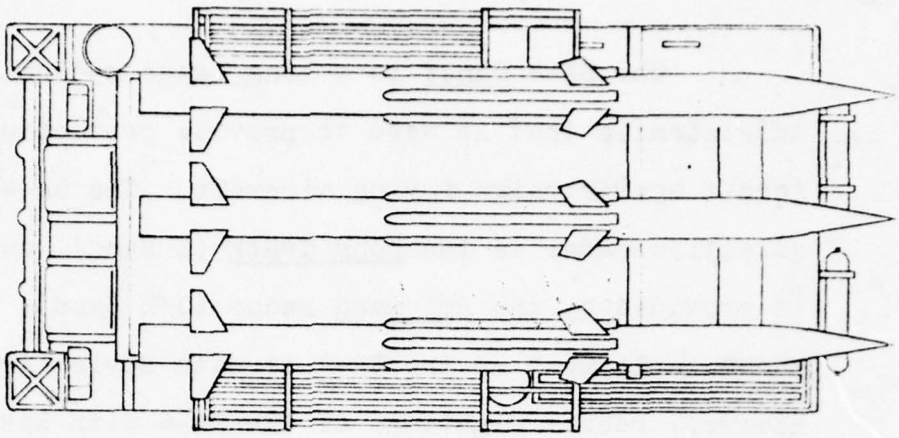
The SA-4 Ganef is a long range medium to high altitude missile that is used to provide protection to ground forces against high flying aircraft. The SA-4 target acquisition radar is the Long Track (E Band), and guidance is provided by the Pat Hand radar (G/H Band). The only known deployment of the SA-4 is with Soviet Army units; however, recent sightings of the SA-4 with East German markings may indicate a decision to begin providing Ganef to Warsaw Pact countries.[5]

When deployed with the Soviet Army, the SA-4 operates in conjunction with the SA-6. Nine batteries are deployed with the Soviet Army, three forming the front belt 10 km behind the FEBA, and six forming the second belt another five kms back.[6]

The SA-6 Gainful system is designed as a mobile battlefield air defense system for short range, low to medium altitude targets. It was used by both the Egyptians and the Syrians in the 1973 Arab-Israeli War and was extremely effective.

The SA-6 uses Long Track (E Band) target acquisition radar and the Straight Flush fire control radar. Guidance is in a multi-frequency band using H and I Bands with final intercept by a semi-active homing radar using a continuous wave (CW) transmitter.[7] Some tracking functions can be performed optically.

The SA-7 Grail is a hand held and fired heat-seeking missile. Its US equivalent is the Redeye. The SA-7 was



The launch vehicle normally carries its missiles pointing to the rear (photo, page 41)

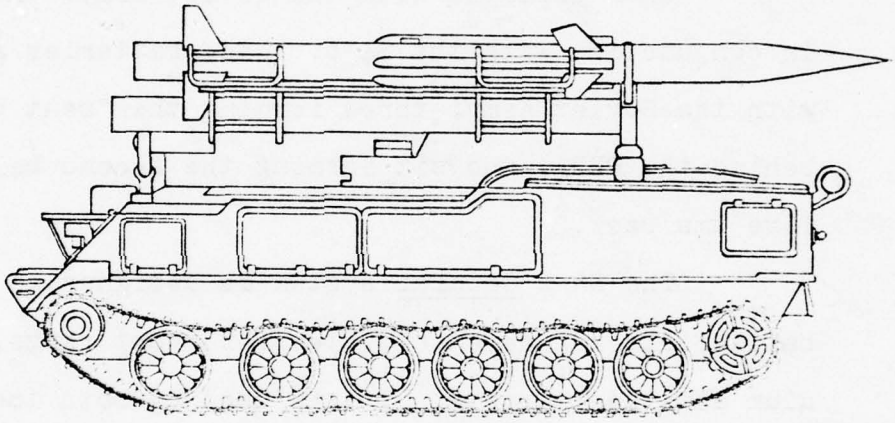


Figure 15

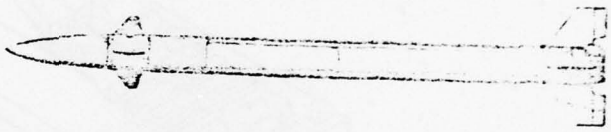
SA-7 Gainful
(Source: The Soviet War Machine, p227)

used in both Vietnam and the Arab-Israeli Wars with limited success against low flying aircraft and helicopters. It is widely deployed throughout the Warsaw Pact, Middle East, and other Soviet client-nations.

The SA-8 is the newest in the Soviet system of mobile air defense systems. The advanced state-of-the-art of this

Figure 16

SA-7 Grail
(Source: Jane's Infantry Weapons-1978, p582)



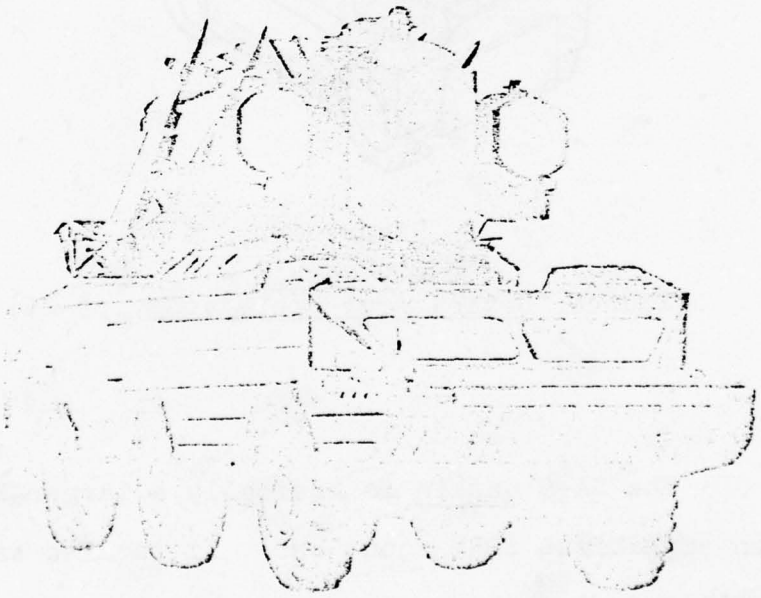


Figure 17

SA-8 Gecko
(Source: The Soviet War Machine, p227)

system allows the missiles and acquisition and guidance radars to all be confined on a single vehicle. It is designed for very low altitude and short range. Guidance frequencies for this system are uncertain; however, the arrangement of the radar indicates a capability to engage two targets simultaneously by using a separate guidance frequency for each missile. The SA-8 is deployed only with Soviet units.[8]

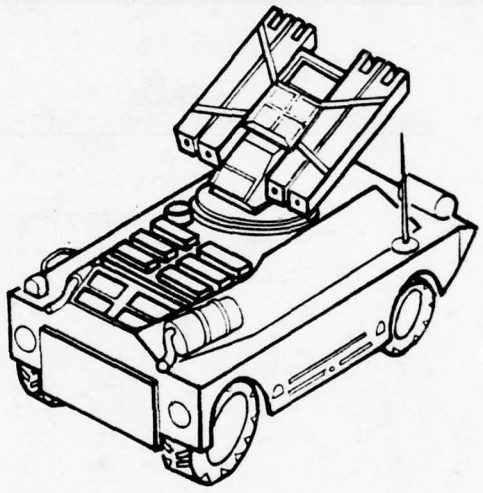


Figure 18
SA-9 Gaskin
(Source: Soviet Army Operations, p5-25)

The SA-9 Gaskin is basically a larger SA-7 mounted on an amphibious BDRM scout car. It is also capable of low altitude and short range engagements. The target is probably optically acquired and tracked by the operator.

The SA-9 has the capability to link into the search radars or tie into radio nets to assist the operator in target acquisition. The SA-9 is deployed only with Warsaw Pact forces.[9]

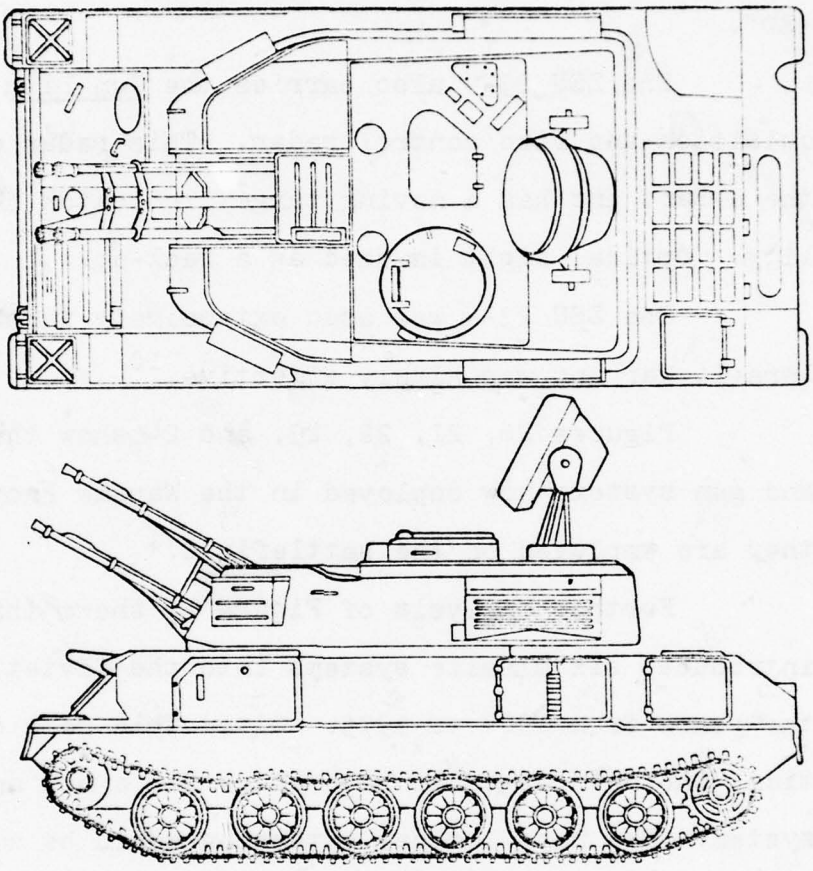


Figure 19
ZSU 23-4
(Source: The Soviet War Machine, p189)

The ZSU 23-4 is a highly mobile antiaircraft gun first introduced into the Soviet Army in 1965. It has been deployed in large numbers throughout the Warsaw Pact and other Soviet client-countries.

Mounted on a PT-76 light tank chasis which is identical to the SA-6, the ZSU 23-4 is capable of firing 800-1000 rounds/min from each of its four barrels. The turret rotates through 360°, and the gun elevation is from -7° to +80°.

The ZSU 23-4 also carries the Gun Dish target acquisition and fire control radar. This radar operates in the J-Band and has a moving target indicator (MTI) capability. Optical sight is used as a back-up.

The ZSU 23-4 was used extensively in the 1973 Arab-Israeli War and was highly effective.[10]

Figures 20, 21, 22, 23, and 24 show the AAA missile and gun systems now deployed in the Warsaw Pact and how they are employed on the battlefield.*

Further analysis of Figure 21 shows that the Soviets introduced six missile systems into the Soviet Army during the years from 1964 to 1975. Given this rate of proliferation, the Soviets could be overdue for a new antiaircraft system. The most logical extension would be a hand-held and fired infrared system with a head-on capability. Should a system of this nature enter the Soviet Army, it would be a quantum jump in an already formidable arsenal.

*These are unclassified figures, and, while they are representative of the overall capabilities of the systems, the reader may find a more detailed description of each of the system's capabilities in DIA and DA or DAF classified literature. One such document is the USAF Tri-Command Manual 3-1.

	GUIDELINE SA-2	GOA SA-3	GANEF SA-4	GAINFUL SA-6	GRAIL SA-7	GECKO SA-8	GASKIN SA-9
Guidance Principle	Command	Command Radar Term Homing	Command	Semiactive Homing	Infrared	Command	IR
Missile Length (mm)	10,700	6,705 (22')	9,000	6,200	1,250	3,200 (10'6")	1,370 (4'6")
Missile Diameter (mm)	500[1]	487 (1'6")	800	335	70	209 (8'25")	70 (2'9")
Range (km)							
Maximum	40-50	24	70	30-35	3.5	12.5	7
Minimum	—	—	—	4	—	—	—
Altitude (km)							
Maximum	27	13.5	27	11	3.5	6.5	4.7
Minimum	1.5	—	1.5	.75	.5	.5	.2
Warhead	HE	HE	HE	79.7kg (176 lb) HE	HE	HE 90.7-99.8kg (90-110 lb)	HE 2.5kg (5.5 lb)
Fuze	Proximity		Proximity (est)	Proximity (est)	Impact	Proximity	
Speed (mach)	3.5	2.0	2.5	2.8	1.5	2.0 (est)	1.5
No Msls Carried	1	2	Air Transportable 2	3		4	4
Year Developed	1957	1964	1964	1967	1966	1975	1974

[1]Second stage diameter.

Figure 20

Soviet Air Defense Missiles
(Source: US Army HB 550-2, p4-5)

Weapon Characteristics	14.5-mm[1] ZPU-4	23-mm[1] ZU-23	23-mm[2,3] ZSU-23-4	57-mm[1,2] ZSU-57-2	57-mm[1,3] S-60
Crew	5	5	4	6	7
Basic Load (rd)	4,800	2,400	Unk	316	200
Ammunition	AP/API	HE/HEI AP/API	HE/HEI AP/API-T	HE/HEI AP/API	HE/APH[1]
Rate of Fire (rpm, tube)					
Cyclic	600	800-1,000	1,000	105-120	105-120
Practical	150	200	200	70	70
Maximum Range (m)					
Horizontal	8,000	7,000	7,000	12,000	12,000
Vertical	5,000	5,100	5,100	8,800	8,800
Effective AA	1,400	2,500	3,000	4,000	6,000
Elevation (deg)	+90	+90	+80	+85	+85
Depression (deg)	+8.5	-10	-7	-5	-4
Traverse (deg)	360	360	360	360	360
Muzzle Velocity (m/sec)	1,000	970	970	1,000	1,000
Vehicle	Towed	Towed	Modified PT-76	Modified T-54	Towed
Speed (km/hr)	N/A	N/A	44	48	N/A
Cruising Rg (km)	N/A	N/A	260	400	N/A
Engine	N/A	N/A	240 hp 6-in line, Diesel	520 hp V-12 Diesel	N/A
Trench	N/A	N/A	2,800	2,700	N/A
Step (mm)	N/A	N/A	1,100	800	N/A
Slope (deg)	N/A	N/A	30	30	N/A
Tilt (deg)	N/A	N/A	Unk	30	N/A
Ford (mm)	N/A	N/A	1,070	1,400	N/A

9-20

[1]Optical fire control system only.
[2]Self-propelled system.
[3]Has radar-directed fire control system.

Figure 21

Soviet Army AAA Gun Systems
(Source: US Army HB 550-2, p4-4)

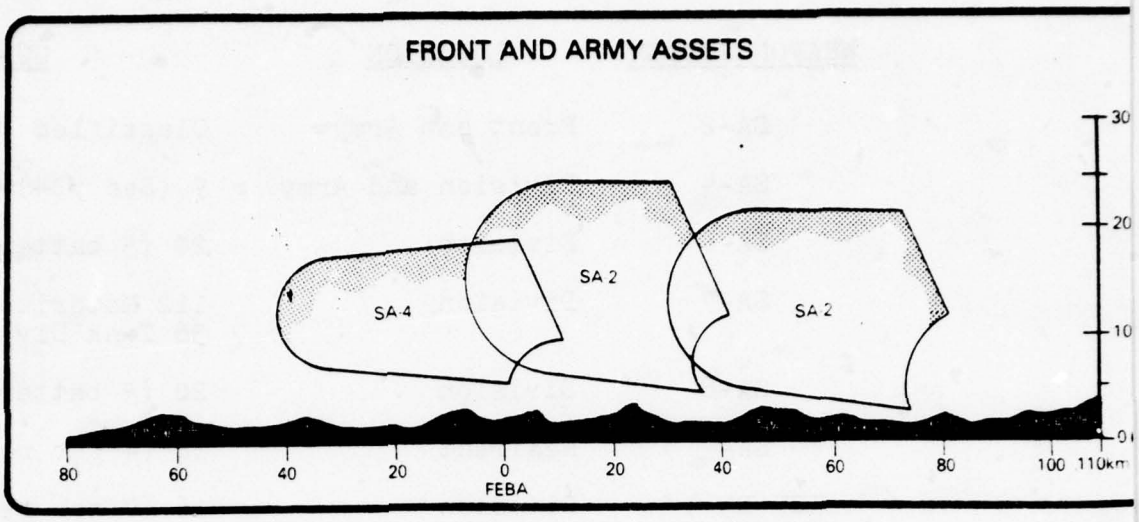


Figure 22

Front and Army Assets
(Source: Soviet Army Operations, p5-26)

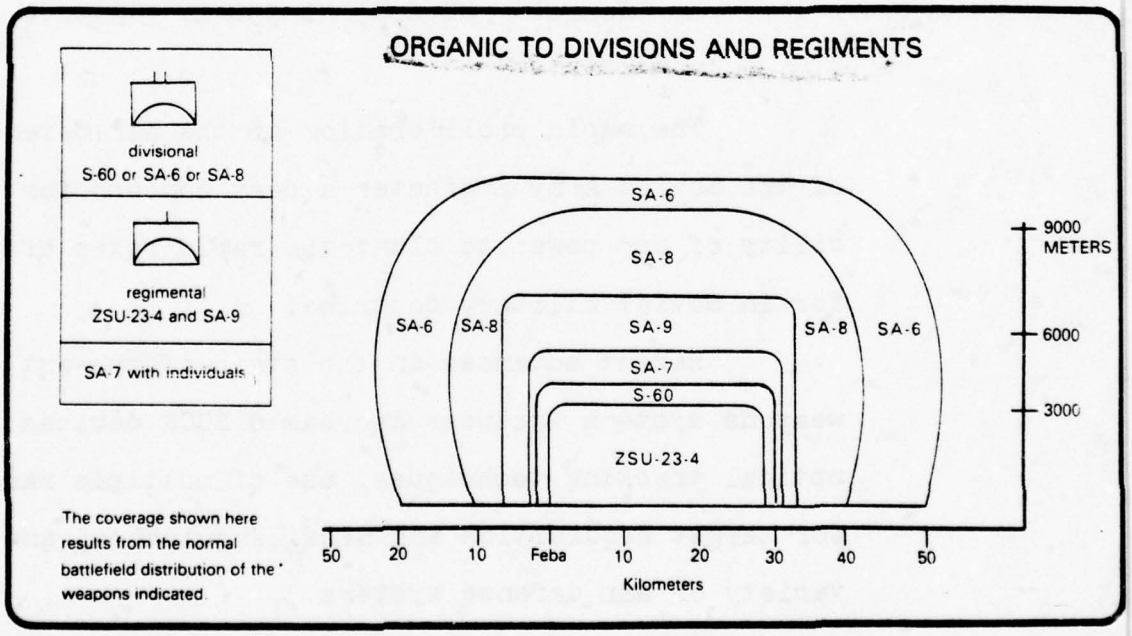


Figure 23

Soviet Division Air Defense Assets
(Source: Soviet Army Operations, p5-26)

WEAPON SYSTEM	LOCATION	QUANTITY
SA-2	Front and Army	Classified
SA-4	Division and Army	9 (See p34)
SA-6	Division	20 (5 batteries of 4 each)
SA-7	Division	112 Motorized Rifle Division 36 Tank Division
SA-8	Division	20 (5 batteries of 4 each)
SA-9	Regiment	16 (4 per regiment)
ZSU 23-4	Division	16 (4 per regiment)
S-60	Division	24 (4 batteries of 6 each)

Figure 24

Location and Distribution of
Air Defense Assets in Soviet Army
(Source: US Army HB 550-2, Ch 5)

The rapid proliferation of the air defense assets of the Soviet Army indicates a deep concern for the capability of air power to blunt the rapid rates of advance called for in Soviet military doctrine.

Recent advances in the state-of-the-art of these weapons systems includes increased ECCM devices such as optical tracking techniques, use of multiple radar bands for target acquisition and missile guidance, and a wide variety of air defense systems.

Against this threat the ability of high performance fighters such as the F-4, F-16, and A-7 must be questioned. On the cluttered modern battlefield envisioned in Central

Europe, pilots of fast moving aircraft will certainly have difficulty distinguishing friendly forces from opposing forces in the CAS situation. If unhindered, the enemy air defense threat will prohibit orbiting in the area of the FEBA and restrict tactics to low level high-speed approaches with a "pop-up" delivery mode.* Even under optimum conditions, a pop-up delivery limits the pilot to 5-15 seconds to acquire the target, meet the required munitions delivery parameters of the ordnance he is carrying, and release his weapons. These delivery conditions will result in less than the optimum accuracy required for the close support of troops in contact. Therefore, to employ CAS effectively in a high threat environment, the Air Force and Army must possess the capability to jam and suppress the enemy air defense threat.

The Air Force currently does not possess this capability in an operationally deployed system, although it is developing this capability with the EF-111. This aircraft utilizes advanced technology to detect, identify and selectively jam the wide variety of radar emitters described in this chapter. When employed in the CAS role, the EF-111 would escort CAS aircraft into the target area and suppress the enemy radar system while the CAS missions attacked enemy armor.[11]

A system of this type is essential to the overall success of the air-land battle and the ability of the Air Force to perform the CAS mission as required in Central

*See glossery of terms for definition.

Europe. When employed in conjunction with the E-3A Airborn Warning and Control System (AWACS), the EF-111 would be a major contribution in the effort to overcome the Soviet lead in both ground and airborn electronic warfare.[12]

Without an ECM system to suppress the Warsaw Pact air defense system, CAS in Central Europe will be too costly in aircraft to be a significant factor in the air-land battle. The 1973 Arab-Israeli War is an excellent example of the use of CAS against a sophisticated air defense system and will be studied in the next chapter.

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5. Pretty, p. 77.

6. Gatland, p. 226.

7. Ibid., p. 227.

8. Pretty, p. 79.

9. Ibid., p. 80.

10. Ibid., p. 91.

11. "Jane's All the World's Aircraft Supplement," Air Force, Vol. 62, No. 2, (Washington: Air Force Ass., Feb, 79), p. 69.

12. Ibid., p. 70.

CHAPTER FOUR

LESSONS FROM THE 1973 ARAB-ISRAELI WAR

> War acts as a catalyst to development, and even short, limited conflicts can have a profound influence on future operations. The recent Arab-Israeli confrontation contains lessons, not yet wholly clear, for tactical air operations.[1]

As shown in the previous chapters, the complexity of ground maneuvers and the Soviet air defense system dramatically affect the application of CAS on the modern battlefield. The 1973 Arab-Israeli War is a case in point and though fought on terrain unlike that found in Central Europe, can be used to highlight many of the problems of CAS in any conflict that might occur in Europe in the near future.

The 1973 War is significant for two reasons: it introduced into battle new weapon systems that had not been used before and it demonstrated the violence and high consumption of resources that can be expected on the battlefield of Central Europe. The 1973 War saw the introduction of precision guided munitions (PGM) such as the TOW and Sagger anti-tank guided missile and the first massive use of mobile battlefield surface-to-air missile systems. The massive losses of equipment in the 1973 War was a major difference between it and any previous wars. The following table is illustrative of the difference in equipment lost in the 1967 War and the 1973 War.

	Aircraft		Armored Vehicles		Warships	
	1967	1973	1967	1973	1967	1973
Israel	40	105	100	810	0	3
Egypt	340	182	600	740	4	4
Syria	50	165	50	860	0	9
Iraq	20	21	0	125	0	0
Jordan	20	0	150	0	0	0
	470	473	900	2,535	4	16

Figure 25

Comparison of Losses Between 1967 and 1973 Arab-Israeli Wars

An analysis of the Israeli Air Force (IAF) losses in the 1973 War will render valuable insight into the formulation of doctrine and tactics for CAS in future confrontations. Specifically this chapter will deal with IAF losses in the execution of the air-land battle and highlight the lessons learned regarding the use of air power in the air-land battle.

At the outset of the 1973 War, the IAF possessed approximately 500 combat aircraft. Separated by major aircraft type, the IAF had 150 F-4E Phantoms, 190 A-4 Skyhawks, 60 Mirage III, and 20 Super Mysteres.[4] In the IAF air order of battle each aircraft type is given a specific mission that equates to the USAF missions of Counterair, Interdiction and Close Air Support. For instance, the Mirage was used exclusively for air superiority missions, the A-4 was

used exclusively for CAS and the F-4, though occasionally pressed into the CAS role, was predominately used for interdiction missions.[5]

Because the IAF employs particular types of fighters in specific roles and missions, it is possible to determine mission loss rates by analyzing losses by aircraft type. For instance, of the 105 aircraft lost by the IAF, 52 A-4 Skyhawks and 27 F-4E Phantoms were shot down.[6] By applying these numbers to the total losses and missions, it can be seen that at a minimum, IAF losses in the air-to-ground role (i.e., CAS and interdiction) totalled 79 aircraft or 75.3% ($\frac{52 + 27}{105}$) of all IAF losses. Of the 79 aircraft lost in the air-to-ground role, at least 66% ($52/79$) were lost during CAS missions.

Since the Arab countries used Soviet air defense weapons and were trained by Soviet advisors, it is equally important to analyze losses by the air defense system responsible for downing the aircraft and by where on the battlefield aircraft were lost. The actual number of aircraft shot down by specific weapon is a classified figure, however, it is known that at least 60% of all losses were directly attributed to the SA-6 and ZSU 23-4. Another 25% of the losses are attributed to "unknown causes".[7] While the SA-6 and ZSU 23-4 figures are relatively straight forward, the 25% figure deserves at least an educated guess as to what might account for such a high rate of unknown causes.

IAF tactics to counter the deadly combination of the SA-6 and ZSU 23-4 have been widely published. These tactics included the use of electronic jammers, emitting bundles of foil (chaff) to deceive enemy radar operators, a low altitude run-in to the target of less than 100 feet and at high speed followed by a classical pop-up attack and finally a last minute high "G" evasive maneuver designed to cause a missile to overshoot when the pilot sees the missile in flight. All of these actions are designed to complicate radar acquisition, cause the missile to lose its radar lock-on, or complicate the tracking ability of the ZSU 23-4 gunner.[8]

Any pilot who has ever flown a fighter at high airspeed and low altitude will assure you that a large portion of the pilot's time is devoted to the single task of avoiding impact with the ground. In a combat environment, even the most experienced pilot can succumb to the overload of tasks with which he must cope. Flying into the ground or being forced into small arms fire traps is therefore not unlikely using these tactics. When aircraft are lost in this manner, the cause is officially listed as unknown if it can not be definitely attributed to a weapon system. Most fighter pilots know that regardless of how the loss is classified, the actual cause can be attributed to a threat that requires the use of tactics that put the pilot in a difficult flight regime. In the case of the 1973 War, that threat was the SA-6 and ZSU 23-4.

It is also significant to note that loss rates were not evenly distributed throughout the battlefield. "The majority of losses incurred by the IAF were A-4s over the forward edge of the battlefield (FEBA)..."[9] Therefore, a close look at the air-land battle along the FEBA during the first few days of the war will provide some insight into the problem of CAS on the modern battlefield.

By attacking on the brink of both a Moslem and Jewish holiday, the Arabs had caught the Israelis at a low state of readiness.[10] With a simultaneous attack on two fronts by Syria and Egypt the situation of the Israeli Defense Force (IDF)* quickly became critical, and for the first 24 hours of fighting, the IAF was for all practical purposes the only counter-attack force available to ground forces.

This situation forced the IAF into the position of employing CAS without the benefit of a planned suppression of enemy air defense (SEAD) campaign, a situation not too dissimilar from the predicament NATO forces might find themselves in if the Warsaw Pact were to attack from its garrisoned positions as described in chapter two.

The consequence of conducting CAS without a SEAD campaign was dramatically demonstrated by the air-land battle in the Golan Heights on 6 and 7 October. The Syrian Army massed 700 tanks and 7,000 infantrymen on a narrow front for their initial attack. Against this force, the

*The Israeli Defense Force is the ground component and will be referred to throughout this discussion as the IDF.

IDF had a brigade composed of less than 180 tanks.[11] With reinforcements at least 24 hours away, the IDF was outnumbered as much as 12:1 in some areas and by 7 October, the ability of the IDF to hold the Golan Heights was in serious question. To stem the tide, the IDF called on CAS as they had in the 1967 War. But the Syrians had learned a serious lesson about airpower in 1967 and were determined not to be victimized by the IAF this time. Where the IAF had been a dominant factor in the 1967 War, 1973 would prove to be different. Even though the massive use of CAS did finally turn the tide of the battle, the cost to the IAF was prohibitive.[12]

During the first full day of fighting, the IAF experienced the loss of 40 aircraft (30 A-4 Skyhawks and 10 F-4E Phantoms); 38% of their entire losses in the 1973 War. This equates to an 8% loss of the total IAF inventory; a 16% loss of the A-4 inventory; and a 7% loss of the F-4E inventory in one day of fighting.[13] A UN observer in the Golan Heights, whose position had been bypassed in the first hours of the fighting, counted 30 IAF aircraft shot down by the SA-6 alone during this initial day of fighting.[14]

An account of this battle by Elizabeth Monroe and A.H. Farrar-Hockley in the Adelphi Papers vividly portrays what has become one of the major lessons of the 1973 War.

> In past times they would have looked to the air to relieve the pressure of superior numbers. Now the Israeli ground attack fighters were unable to give them more than fleeting assistance; for above the Golan Heights, as above the Sinai, the pilots were caught often by SA-6 missiles. Those that came in low were struck by the ZSU 23-4s. By mid-afternoon the loss rate became intolerable - to the extent that all sorties were suspended.[15]

The experience in the Golan was not much different in the Sinai. In the afternoon of October 6, the IAF flew 446 sorties against the Egyptian Army and lost 13 aircraft.[16] This amounts to a 2.91 loss rate per 100 sorties.* If A-4 losses continued at this rate for one week, the A-4s would have ceased to exist as a viable combat force during the war. Because of the expense of aircraft, no nation stockpiles aircraft replacements; therefore, if NATO forces were to experience similar loss rates in Europe, the potential combat capability of NATO air power will be rapidly depleted.

It should be pointed out that the sighted loss rate of 2.91/100 sorties is not mission specific. It includes both CAS and interdiction missions. Therefore, if only CAS missions were considered, the loss rate per 100 sorties would undoubtedly be much higher.**

Loss rate per 100 sorties does not in itself indicate the cost or effectiveness of a specific mission. For instance, if a defensive weapon forces a pilot to jettison his ordnance load to avoid being shot down, or degrades the

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*According to RB 100-2 Egyptian and Syrian aircraft losses in CAS may have been as high as 35 aircraft for every 100 sorties!

**The WSEG Report #237 Vol IV May 75 contains an account of losses by mission type. This report is classified SECRET.

ability of the pilot to hit his target by causing him to fly a specific tactic, then the defensive weapon system has achieved its purpose of protecting the ground forces. An effective air defense system achieves two types of attrition on the opposing air force. One is visible attrition, which consists of the number of aircraft actually shot down; and the other is invisible attrition, measured by the number of sorties that are ineffective as a direct result of the air defense system.[17]

The primary reason that the IAF losses were so high was not the fact that they overlooked the lethal potential of the SA-6, SA-7, and ZSU 23-4 systems. Israeli intelligence knew of their existance and had gathered some information about them during the so-called War of Attrition from 1967 to 1973.[18] The IAF miscalculation was to assume that tactics from another war against another system would be effective in the 1973 War. This was a costly miscalculation.

Two factors enabled the IAF to finally overcome the Arab air defense system: the lack of the SA-4 missile system in the Arab air defense system[19] and the joint SEAD campaign conducted in the Sinai Front.[20]

As previously noted in chapter three, the SA-6 system was designed to be employed in conjunction with the SA-4 missile system. In the Soviet air defense system, the two systems compliment each other by providing high and low altitude coverage of the battlefield. Under most circumstances, the SA-4 acquisition radar initially identifies

the target and determines range, azimuth and altitude. A controller then assigns the target to either the SA-4 or SA-6 battery. The SA-4 usually takes the high altitude long range targets and the SA-6 is assigned the short range low altitude targets. Without the acquisition radar of the SA-4, and the long range high altitude capability of the SA-4 missile, the SA-6 becomes vulnerable to high altitude attack.[21] Although the IAF was able to successfully use this tactic in the 1973 War, NATO air forces will certainly not have this perogative in any Central European conflict against Warsaw Pact equipped armies.

The second factor, and perhaps the biggest single lesson to be learned from the 1973 War from an Air Force point of view, was a joint Army/Air Force SEAD effort to open a corridor in the Egyptian Army air defense belt in the Sinai. The operation was named Operation Gazelle and was conceived and executed because it was apparent to Israeli planners that without opening a corridor for the IAF to work in, ground operations would have to remain severely limited.[22] The IDF had learned from the 1967 War that the most effective combination on the battlefield was the combined arms team of the tank and the airplane. It was painfully clear to the IAF that until the Egyptian air defense belt could be penetrated, the IAF was hamstrung and the ground forces could not mount any serious counter offensive of their own.[23]

Between 15 and 17 October, Gen Arik Sharon led a ground force that opened a corridor for the IAF by destroying

10 SAM sites. This gave the IAF sufficient room to penetrate the air defense belt and to begin a systematic attrition of the remaining SAM sites. By the time a cease fire had been declared, the IAF had reduced from 61 to 8 the number of operational SAM sites in the Sinai.[24] With the SAM threat reduced, the IDF combined arms team of ground and air forces were able to establish a bridgehead on the West bank of the Suez Canal and by the end of the war, they had completely surrounded and cut off the Egyptian Third Army from its source of supply.[25]

While the air defense threat of the Arab forces was clearly a threat during the 1973 War, the Warsaw Pact possesses an even more formidable threat because it has more systems and a greater diversification of systems. As Professor Moshe Ahrens said after the 1973 War:

> ...their integrated anti-aircraft systems - primarily SAM missiles., but also radar guided cannons like the ZSU 23-4 and 57 mm - succeeded in certain cases in neutralizing what most of us consider to be one of the best air forces in the world.[26]

Without careful planning and sound tactics, those same systems are just as likely to neutralize NATO's air forces.

The overall effect these systems have on the ability of any air force to employ CAS sorties is monumental. Maj. Gen Benyamin Peled, Commanding Officer of the IAF in the 1973 War summarizes the evolution of the CAS lesson in this way:

> The instances of close support in all other wars after WWII were always under extremely benign conditions; no enemy opposition, complete freedom to reconnoiter the area, and almost 100% safety from any meaningful ground opposition from the enemy.
>
> The situation in real wars has been that the missile has actually denied the capability of the pilot to float around the battlefield safe from normal anti-aircraft artillery, looking down non-chalantly on the ground to find his target, report it or attack it at will.[27]

To counter the air defense threat, CAS aircraft must carry sophisticated ECM equipment for self protection and adapt tactics that decrease both his time to acquire the target the pilot's ability to hit the pin point targets that are required in a CAS mission. Because of the threat, most pilots of high performance aircraft consider more than one attack in the target area to be suicidal.[28]

From the Israeli point of view, when operating in a high threat environment the utility of CAS must be carefully weighed against the capability of the CAS mission to destroy enemy forces. LT Gen David Elazar, IDF Chief of Staff in 1973, says this of CAS:

> Even before 1973, I considered the subject of CAS the last priority task of the Air Force... The October War reconfirmed my belief that CAS is costly in casualties, and that there is no positive ratio between the relatively great losses and limited results.[29]

Both Gen Elazar and Gen Peled agree that there are times when CAS must be used. There will always be situations where a ground position of vital importance is in jeopardy of being over-run and requires the massive firepower that TACAIR can rapidly concentrate. Nevertheless, CAS requires

the use of air power against targets that are dispersed. This is a poor application of the combat power of an aircraft and the gains achieved will always be minor when compared to the amount of effort expended.[30]

The Israeli viewpoint is that TACAIR assets should be employed against massed ground forces before they have deployed into battle formation. In fact, according to Gen Peled, by his definition of CAS, there have been only seven occasions in all the Arab-Israeli wars that CAS was employed by the IAF.[31]

Obviously then, CAS has a different meaning depending on your perspective of the battlefield. Gen Peled's definition of CAS appears to mean CAS in the classical sense. That is, air strikes against enemy troops in relatively close combat with friendly forces and under the direct control of FAC.

As will be seen in the next chapter, the 1973 War seems to have spawned a broad discussion on just what constitutes CAS and interdiction and where each respectively stop and begin.

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CHAPTER FIVE

DOCTRINE AND TECHNIQUES FOR CAS

> One other thing about close support. Used unwisely it will cost you a lot, but close support done in the correct manner, on the type of intelligence we know we should have and I think we can get, is a different matter.[1]

The previous chapters have addressed the environment in which CAS missions will occur in Central Europe. The Arab-Israeli War was an example of the high attrition rates that CAS missions can expect in this environment. A study of this war has resulted in a renewed emphasis on the doctrine and application of CAS. An analysis of the major Army, Air Force, and NATO documents dealing with CAS has shown a definite need for clarification of doctrine. This chapter will deal with the CAS doctrine contained in AFM 1-1, Basic Air Force Doctrine, TACM 2-1, Tactical Air Operations, FM 100-5, Operations, ATP 33, (NATO) Offensive Air Operations, ATP 27, (NATO) Tactical Air Doctrine.

FM 100-5 is the capstone of Army doctrine and is designed to be used by commanders and trainers at all levels. It is the bible for the Active Defense. The following statements are taken from FM 100-5 concerning the use of CAS in the execution of the active defense:

- CAS must be provided massively and at the proper point of the breakthrough attack.[2]

- CAS must be provided, regardless of the difficulty or cost, when the Army requires it.[3]

- The most effective use of TACAIR is to isolate the battlefield by attacking second echelon and third echelon targets - battlefield interdiction.[4]

One conclusion that can be drawn from these statements is that in their present configuration, Army divisions are incapable of halting a major Warsaw Pact offensive operation with conventional organic firepower. Because of a lack of organic firepower, the Army's principal doctrine for the defense of Central Europe must rely on the use of massive CAS during the early stages of the enemy's main offensive effort.

The IAF learned some hard lessons about CAS in the 1973 War, but it should be emphasized that Israeli doctrine did not call for the use of massive CAS in order to be successful. Poor intelligence and hesitation to mobolize resulted in Israel having to rely on CAS to blunt the enemy attack. This had castastrophic results for the IAF, and it appears that any doctrine that relys on a massive commitment to CAS requires re-evaluation.

From my personal experience with the Active Defense while a student at the Army Command and General Staff College, I feel it is a viable concept, however, the Army must increase its organic firepower to be able to win the first battle without relying on CAS.

The reason is obvious. If the Warsaw Pact were to launch a surprise attack under weather conditions that severely curtailed the use of CAS, would the Army be able to conduct a successful defense?

> There are certain times when an aircraft cannot be employed. Those of you from Europe know that may be as much as 50% of the time... So a ground force commander must take into account that visibility may be a simple reason why he should be able to carry out his plan alone.[5]

On the other hand, Air Force doctrine appears to suffer from being pulled in too many directions at one time. The lessons of the 1973 War did not go unheeded by the Army, Air Force or our NATO allies. Each has placed a demand on air power to meet its particular needs. By trying to satisfy all parties TACAIR doctrine appears to be losing its definition. AFM 1-1, TACM 2-1, ATP 27, and ATP 33 are examples where CAS doctrine differ and has the appearances of eroding in definition.

Three terms are contributing to the ambiguity of this doctrine: CAS, interdiction, and battlefield interdiction. CAS and interdiction are primary AF missions as specified in JCS Pub 1 and AFM 1-1. The distinction between the two has always been that CAS requires integration with the ground commander's scheme of fires and maneuver and that interdiction missions only require a unified planning effort by the ground and air staff.[6] In order to distinguish the two missions, the FSCL was established as point beyond which interdiction began and CAS ended.

Our NATO allies hold the position that the system of CAS as practiced by the US will not work in the European scenario. The 1973 War further convinced them that CAS as practiced by the US Air Force:

- Relys too heavily on the centralized command and control of the TACS.
- Does not appreciate the threat of the Warsaw Pact air defense threat along the FEBA, and
- Does not appreciate the effectiveness of battlefield interdiction.[7]

The latest versions of TACM 2-1 and AFM 1-1 (Draft) have attempted to address the term battlefield interdiction in relation to the traditional missions of CAS and interdiction. AFM 1-1 (Draft) states:

> The portions of the air interdiction campaign which may have a direct or near-term effect upon surface operations--sometimes referred to as battlefield interdiction--must be coordinated with the ground commander's maneuver plan.[8]

Both TACM 2-1 and AFM 1-1 use the same definition of BI and emphasize the difference between <u>coordination</u> with the ground commander versus <u>coordination and integration</u> which is required for CAS. However, TACM 2-1 further states that CAS and BI may be inseparable on the modern battlefield, and further differentiates the two by requiring a FAC for CAS but not for BI.[9]

Although neither AFM 1-1 (Draft) nor TACM 2-1 addresses the use of the FSCL as the dividing point on the battlefield for interdiction and CAS, both manuals use the following graphic as a visual depiction of the three terms:

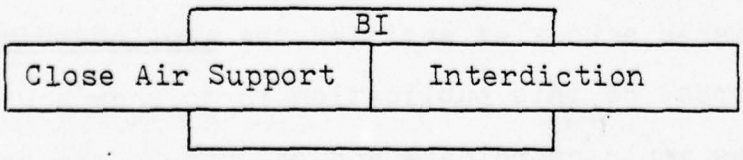


Figure 26
Source: AFM 1-1 (Draft) p 20

Since the defnintion of CAS and interdiction has not changed in the two manuals, the line separating them on the graphic should represent the FSCL. According to the graphic, battlefield interdiction overlaps both CAS and interdiction and could therefore occur on either side of the FSCL. The problem is that presently BI is only a notional term. Although receiving increased emphasis in both Army and Air Force literature, the ground commander can only request CAS or interdiction through Tactical Air Control System, and he is only allocated sorties as CAS or interdiction.[10]

NATO publications further add to the confusion. The governing directive for NATO air doctrine is ATP 33. Although the latest working draft of ATP 33 had not been ratified as of 1 January 1979, it does not address the term battlefield interdiction. This is in stark contrast to ATP 27, which specifically addresses all three terms: CAS, interdiction, and BI (called BAI, Battlefield Air Interdiction in NATO). The major distinction made by ATP 27 is that the FSCL is the dividing point for CAS and interdiction. As such, BAI is an interdiction mission and lies on the interdiction side of the FSCL.[11]

This distinction is important in the conduct of the air-land battle. For example, the Air Land Forces Agency (ALFA) has published a booklet entitled the Air-Land Battle Primer. The purpose of this publication is to show how air and ground forces would coordinate and be used in the conduct of operations against a Warsaw Pact force. Through a

series of snapshots of the battle, the Air-Land Battle Primer portrays how air assets might be applied in this battle. BI is not mentioned in this publication.

The Air Land Programs Office (ALPO) has published an overlay that depicts the use of air power on the battlefield (Fig 27). This overlay closely resembles the concept of BI as discussed in AFM 1-1 (Draft) and TACM 2-1 but leaves the FSCL out. This is a further ambiguity in the use of airpower on the battlefield.

As mentioned earlier, TACM 2-1 distinguishes the use of a FAC as the one difference that can be used to separate CAS and BI. According to ATP 27, in the European setting, CAS can only be accomplished under three conditions of control and coordination:

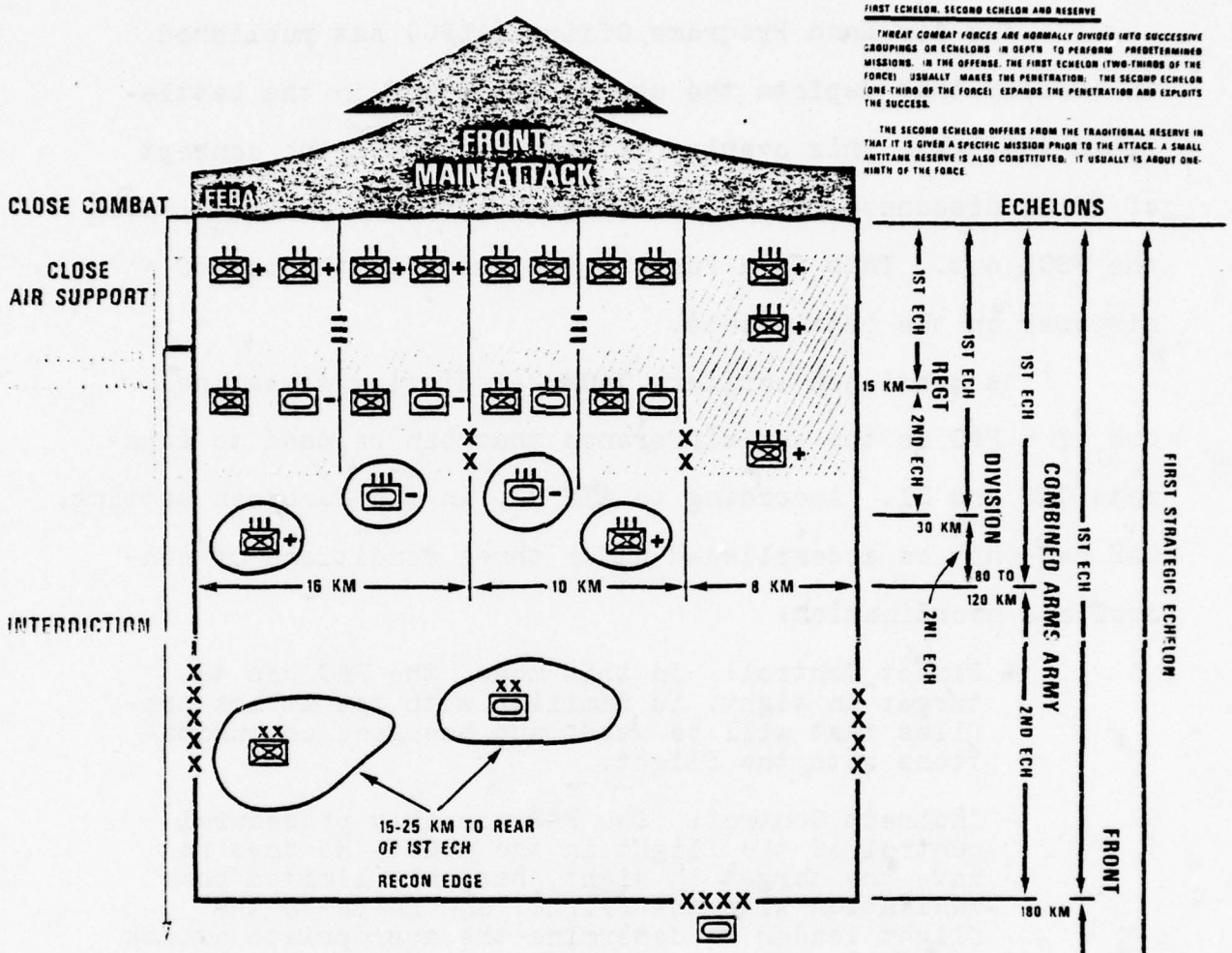
- Direct Control: In this mode, the FAC has the target in sight, is familiar with the attack profiles that will be used, and has good communications with the flight.

- Indirect Control: The FAC has only procedural control of the flight in the mode. He does not have the target in sight, has only limited communication with the flight, and relys on the flight leader to determine the appropriate attack tactics.

- No FAC Control: CAS without FAC control is only allowed in emergency situations and then only if the ground commander assumes responsibility for any friendly troop casualties resulting from the air strike.[12]

In fact, it is difficult to meet the conditions of direct control in a high intensity conflict. But by adding "direct FAC control" to the definition of CAS, it is possible to work toward a change in the treatment of CAS doctrine and to clarify how to apply TACAIR in the air-land battle.

APPLICATION OF ALLIED AIR POWER VERSUS SOVIET OFFENSIVE OPERATIONS



FIRST ECHELON, SECOND ECHELON AND RESERVE

THREAT COMBAT FORCES ARE NORMALLY DIVIDED INTO SUCCESSIVE GROUPINGS OR ECHELONS IN DEPTH TO PERFORM PREDETERMINED MISSIONS. IN THE OFFENSE, THE FIRST ECHELON (TWO-THIRDS OF THE FORCE) USUALLY MAKES THE PENETRATION; THE SECOND ECHELON (ONE-THIRD OF THE FORCE) EXPANDS THE PENETRATION AND EXPLOITS THE SUCCESS.

THE SECOND ECHELON DIFFERS FROM THE TRADITIONAL RESERVE IN THAT IT IS GIVEN A SPECIFIC MISSION PRIOR TO THE ATTACK. A SMALL ANTITANK RESERVE IS ALSO CONSTITUTED. IT USUALLY IS ABOUT ONE-NINTH OF THE FORCE.

❶ CLOSE COMBAT. FIGHTING AT CLOSE QUARTERS WITH THE ENEMY UTILIZING SMALL ARMS, BAYONETS AND OTHER LAND WEAPONS. (AR 310-25)

❷ CLOSE AIR SUPPORT. CLOSE AIR SUPPORT OPERATIONS PROVIDE RESPONSIVE, SUSTAINED AND CONCENTRATED FIREPOWER SUPPORT TO SURFACE FORCES. THESE OPERATIONS ARE CLOSELY INTEGRATED WITH THE FIRE AND MANEUVER OF FRIENDLY SURFACE FORCES. (AFM 1-1 DRAFT)

BATTLEFIELD INTERDICTION MAY HAVE A DIRECT EFFECT ON SURFACE OPERATIONS AND MUST BE COORDINATED BUT NOT INTEGRATED WITH SURFACE FORCES FIRE AND MOVEMENT. (AFM 1-1 DRAFT, AAFCE 80-2)

❸ INTERDICTION. AIR INTERDICTION OPERATIONS ARE CONDUCTED TO DESTROY, NEUTRALIZE OR DELAY THE *ENEMY'S MILITARY POTENTIAL BEFORE IT CAN BE* BROUGHT TO BEAR AGAINST FRIENDLY FORCES. THESE OPERATIONS RESTRICT THE COMBAT CAPABILITY OF ENEMY FORCES BY DISRUPTING THEIR LINES OF COMMUNICATION AND DESTROYING THE SUPPLIES THAT SUSTAIN AN EFFECTIVE LEVEL OF ENEMY ACTIVITY. WHILE AIR INTERDICTION OPERATIONS ARE NOT NORMALLY INTEGRATED WITH THE DETAILED FIRE AND MOVEMENT OF GROUND FORCES, THEY ARE PLANNED AND CONDUCTED AS PART OF A UNIFIED EFFORT TO ACHIEVE A COMMON OBJECTIVE. (AFM 1-1, ATP 33, ATP 27)

Figure 27

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Air power is inherently an offensive weapon. It is capable of rapidly massing and projecting its firepower when and where it is most needed. Because of this capability, air power is the one conventional weapon that allows the joint commander to take the battle to the enemy. CAS is a defensive role for air power in that it requires an extensive effort to organize and control, and requires the pilot to attack individual targets. BI by contrast, allows air power to be projected offensively against the enemy before he reaches the line of contact. By attacking the enemy while he is massed or moving, will result in a larger kill ratio per attack and therefore, is a more efficient use of air assets.

Since by definition, BI are sorties against forces which have a direct or real time impact on the battlefield situation, it could be concluded that unless BI is addressed by the theater commander in the apportionment and allocation process, a serious problem in the management of the air-land battle could result. Unless BI is defined as an Air Force mission, it cannot be apportioned, allocated or requested by the ground commander.

The definition of BI should then be specifically addressed so that it can be used as a mission term instead of a notional term. This would have a positive effect on the air-land battle by allowing BI missions to be requested through the TACS and allow ground commanders to plan for its use in the formulation of their operation plan.

The following definitions might be the result of a re-evaluation of these terms:

- Close Air Support: CAS operations are those operations in support of engaged ground forces that require detailed integration with the fire and maneuver of friendly surface forces and are under the direct control of a ground or air forward air controller.

- Battlefield Interdiction: BI operations are missions directed against enemy forces that have a direct and real time effect on surface operations. These forces are normally found in close proximity to the FSCL and include the second echelon regiments of the lead division and the second echelon divisions supporting the main attack. They must be closely planned and coordinated with the ground commander but require neither the detailed integration of CAS nor the use of a FAC.

- Deep Interdiction: Deep interdiction operations are conducted to destroy, neutralize or delay the enemy's military potential before it can be brought to bear against friendly forces. These operations restrict the combat capability of enemy forces by disrupting lines of communication and destroying the supplies that sustain an effective level of enemy activity. These missions must be jointly planned and coordinated as a unified effort directed toward a common objective.

This re-definition of terms will benefit the conduct of the air-land battle in the following manner:

- CAS will be limited to an area that a FAC can control. This area would be approximately 3-4 kms from the FEBA and closely parallel the direct fire range of conventional weapon systems.

- By using direct fire range, it follows that CAS targets will normally be in contact with friendly forces. This will require the use of precision guided munitions and an aircraft that can work in a small target area. It will also require an aircraft that can survive while using tactics that require multiple attacks in the target area.

- Any weapon system that can meet these requirements will also be able to stay below the missile envelope of most Warsaw Pact air defense systems.

- By limiting the scope of CAS, a poor utilization of TACAIR can be limited.

- CAS can be better tailored to the active defense. It could be used either as a counterattack force, a final protective fire for units unable to disengage with the enemy, or as a delaying force during either movements or retrograde operations of the Active Defense.

- Finally, all of these reasons lend themselves to the use of two weapons systems designed specifically for this role: the advanced attack helicopter (AAH) and the A-10 CAS aircraft.

By defining BI as a mission, the ground commander is given a new dimension in his battle plan and will accrue the following benefits:

- The ground commander can plan for the use of ear-marked sorties to use against the second echelon.

- By designating second echelon forces, the requirement of FAC control is eliminated because of the distance from friendly forces.

- The inherent offensive nature of air power can be used to attack enemy concentrations and isolate the battlefield.

- BI lends itself to area munitions rather than PGM. Therefore, Air Force planners can plan for specific types of weapon loads and have the right load for the right mission.

- BI lends itself to the Active Defense by slowing down the commitment of the second echelon into the MBA and giving the ground commander more time to effect his defensive scheme.

- BI can be likened to long range artillery to the ground commander.

- BI is adaptable to high performance aircraft like the F-4, F-16, F-15, and A-7, who unlike the AAH and A-10 cannot effectively separate friendly forces from enemy forces in a high threat environment.

- Because most of the second echelon BI targets are either in column formation or in assembly areas, there will be gaps in the air defense belt. High performance aircraft can better exploit these gaps during SEAD operations; or if required, penetrate the air defense umbrella and strike area targets without a SEAD operation.

- By designating BI as a mission, Air Force pilots can train and develop tactics specifically for its application.

- Finally, as concerns the redefinition of CAS and BI, the Tactical Air Control System as it exists today will not have to be altered to accommodate this change.

JAAT - JOINT AIR ATTACK TEAM

The JAAT, which consists of the AAH and A-10 working together as a combined arms team, has been shown to be an effective fighting unit on the modern battlefield. This tank killing team has shown it is responsive, surviveable and lethal when employed as a combined arms team.[13] The joint operation of the JAAT offers a solution for many of the CAS problems inherent in high performance aircraft.

The first of these is target acquisition. The A-10 is designed to operate in the combat environment at about 2/3 of the speed of the high performance fighter (350 vs 550-600kts). This speed difference significantly increases target acquisition time for the pilot. A second factor that favors the A-10 is turn radius. The straight wing design of the A-10 allows it to decrease the maneuver space over the battlefield and decrease the time between reattacks. When compared to other fighters, this advantage allows the A-10 to use one hill mass to screen his next attack rather than several hill masses required by the high performance fighter.[14]

Communications jamming will be a real threat on the

modern battlefield.[15] Since CAS normally requires the control and coordination of a FAC, any communications jamming will hamper the CAS effort. The JAAT will be working in close proximity to each other which will improve the capability of good communications because of the short ranges required to transmit and receive. Additionally, the redundancy of radios (VHF, UHF, and VHF/FM) greatly inhance the ability of the JAAT to get the detailed information needed to complete the CAS mission.

The AAH is uniquely designed to operate along the FEBA in support of army forces. By using PGM like TOW and Hellfire, and the 20/30mm cannon, the AAH is a formidable anti-armor weapon system.[16] Like the AAH, the A-10s anti-armor capability is significant. The A-10 can carry 16,000 pounds of ordnance and achieve 10-12 tank kills per sortie.[17]

Because of its ability to rapidly relocate on the battlefield, the AAH can gain an equivalent firepower of 5:1 over an enemy attack and as much as 20:1 advantage during exploitation operations.[18] Thus, combining the AAH and A-10 into a responsive anti-armor force will increase the survivability and the effectiveness of both weapon systems.[19]

The doctrinal requirement for an Air Force forward air controller can be greatly reduced or eliminated by using the JAAT for most CAS missions. The major reason a FAC is required is to establish a tie-in with the ground forces so that CAS missions are integrated with the maneuver and fires of the ground commander. By using the JAAT for CAS, the AAH

provides this tie-in. Increased training of the JAAT could enable the control and coordination of CAS to be turned over to section or platoon leaders of the AAH companies or battalions. Another alternative already in practice, is to place GFACs in scout helicopters with Army pilots. This makes far more sense on the modern battlefield where mobility is the key to any operation. A GFAC at battalion level has limited mobility and would seldom be in the right place on the battlefield when needed for CAS. The scout helicopter, by contrast, has complete mobility throughout the battlefield and can rapidly respond to any situation. This greater mobility also greatly increases his surviveability.

The use of scout helicopters by army attack helicopter companies and battalions is fully described in FM 90-1 and the JAAT Tactics How to Fight Manual. For instance, the JAAT tactics manual has the scout and the GFAC reconnoiter the target area, select firing positions, locate air defense threats and brief their respective flight leader or team leader. It therefore appears that either could do the job of controling and coordinating the CAS effort.[20]

The significance of the JAAT is that it is the perfect system to perform the CAS mission. Although either system alone can accomplish CAS, as a team the JAAT possesses more firepower, can maintain contact longer, and is more surviveable. Separating the team decreases both the surviveability and lethality of both systems. Although the AAH can provide CAS independantly, the A-10 doctrinally must have a FAC.

The JAAT has received increased emphasis since proving its effectiveness in the Hunter-Ligget exercise, and the Air Force is now deploying six squadrons of 108 A-10 aircraft to Europe this year. These aircraft will deploy to forward operating bases (FOB) where they will work closely with the ground forces and AAH units they will support in the event of war.[21]

Both USAF and Army planners envision the A-10 and AAH will be able to provide almost continuous daylight CAS, especially during the first 24-48 hours of a conflict. The A-10 has demonstrated an ability to fly high sortie rates per day and is currently meeting 98% of all scheduled training sorties. This is such a high reliability rate that the 81 TFW no longer schedules spare aircraft to meet the daily flying schedule.[22] The limiting factor on sortie generation rates for the A-10 appears to be only aircrew availability.

Pilots of the 81 TFW have been assigned to sectors along the FRG/GDR frontier. These sectors are 75-100 miles long and about 20 miles deep. The pilots will be required to operate in these sectors without the use of maps or navigation aids and with a minimum of radio communications.[23] Flying under these conditions, at low altitude, and in a combat environment and in an aircraft capable of high sortie generation rates, may cause the current 12 hour maximum aircrew duty day to be decreased to ten hours.[24] A ten-hour aircrew duty day will increase the number of pilots required in A-10 squadrons. One way of obtaining these pilots would

be to reduce the number of GFACs assigned to Army units and train Army scout pilots in this function.*

The Soviet threat shown in chapter two requires the Army to concentrate on the first echelon division. It is paramount that the Army have the necessary organic firepower to accomplish this mission alone. When, in localized cases, Army firepower is insufficient, CAS will be required. The JAAT, working as a combined arms team, is ideally suited to perform this mission because of its mobility on the battlefield, firepower, accuracy, and surviveability. Nevertheless, CAS as redefined, must remain a relatively low priority mission for air power.

It is the second echelon regiments and divisions that represent the major threat to the ground commander. If the full weight of these forces is brought to bear on the Active Defense, the shear weight of numbers could defeat NATO in Central Europe. BI is the mission directed against these forces and is designed to attack armor in column before they deploy into battle formations or in assembly areas where they are concentrated. BI is designed to isolate the first echelon regiments and divisions and allow the inherent advantages of the defender to overcome the numbers imbalance in the MBA.

*A more detailed discussion of aircrew requirements during extended periods of operation may be found in DARA Report 4940, Continuous Land Combat, Emanski, J.J., Sept 77.

> Close support will be the exception to the rule in the future with the Air Force being obliged to concentrate on isolating the field of battle, maintaining superiority in the air and destroying forces in and near the field of battle.[25]

CONCENTRATED CAS/TARGET BOX

A method of employing CAS massively during a specified time frame has been conceptualized for the use in wargames conducted in the SCORES computer at FT Leavenworth, Kansas. Although the initial concept involved a counter-offensive operation, it is just as easily applied to a defensive scenario. The concept is titled "Concentrated Close Air Support" and is encluded in this paper as appendix B. Essentially concentrated CAS involves the use of a sortie surge capability. The type of CAS defined in this concept is actually battlefield interdiction. In a defensive scenario, this concept might be accomplished in the following manner.

One or more AF tactical fighter wings (TFW) with an air-to-ground primary mission, would be apportioned to an Army Corps for a specified period during the defensive operation. The TFW would establish liason with the Corps operations center and the Air Support Operations Center (ASOC).

The Corps area of interest would be divided into sectors and assigned to individual squadrons within the TFW. By coordination with Corps, ASOC, and Ground Liason Officer (GLO) at the wing level, likely avenues of approach, canalizing terrain, and known troop concentrations would be identified within each sector. The sectors would then be further divided into target boxes. Each target box is developed

based on the likelihood of enemy targets appearing in these areas and the feasibility of aircraft to locate and destroy the targets with a high degree of confidence. The predominance of these target boxes should initially lie in the second echelon regimental area and the second echelon division area, since in these areas, the attacking forces would be moving in columns or concentrated in assembly areas.

Several low altitude high speed corridors would be established through the corps area making maximum use of terrain masking features so that both ingressing and egressing fighters avoid enemy radar detection. Contact points between corps and division rear boundaries would be established to facilitate target assignment and the relay of final instructions or information that might assist pilots. Easily identifiable initial points would be used as a fanning out point to a number of target boxes (Fig 28).

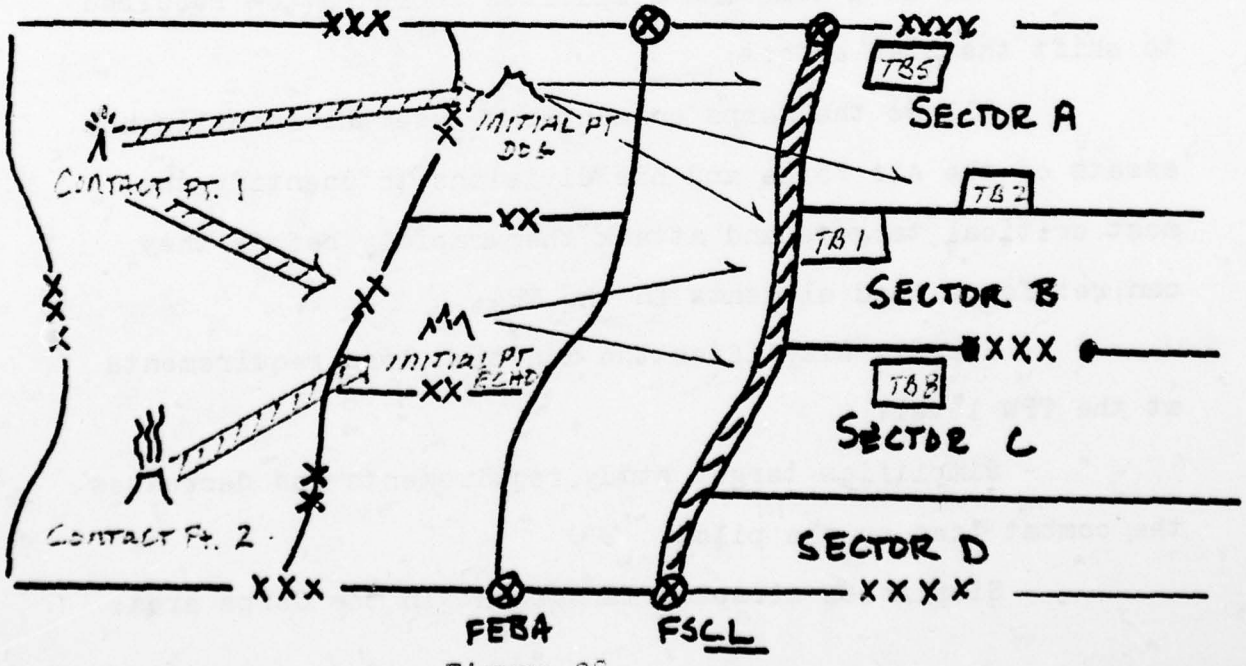

Figure 28

Target Box Concept

When used with the active defense, this system has the following advantages for attacking aircraft:

- It is easily used by high performance fighters;
- By using sortie surge, it maximizes the principles of mass and surprise;
- Concentrates on massed enemy forces when they are the most vulnerable;
- Offers minimum exposure time to enemy air defense systems;
- Overloads air defense command and control nets;
- Makes the best use of area munitions;
- Minimizes communication and control procedures below the Corps level;
- Does not require the use of a FAC;
- Allows scarce ECM assets to be concentrated;
- Simplifies the Joint SEAD effort by concentrating on one sector at a time and simplifies coordination required to shift the SEAD effort;
- Allows the Corps commander to use the intelligence assets of the Air Force and his divisions to identify the most critical targets and attack them rapidly before they can reinforce lead elements in the MBA;
- Greatly simplifies the munition load requirements at the TFW level;
- Simplifies target study requirements and decreases the combat load on the pilot;
- Simplifies airspace management in the Corps area;

- Adheres to the principle of centralized control - decentralized execution; and finally,

- With increased ECM and SEAD is adaptable to medium altitude tactics at night and during periods of inclement weather.

Clearly the most limiting factor in this concept is that sortie surge rapidly depletes the combat effectiveness of a TFW. The maximum surge capability that can reasonably be expected is 48-72 hours. This will be followed by an extended period when the TFW must greatly reduce operations to recoup aircrew and maintenance capability.

As such, concentrated or sortie surge operations must be considered carefully and employed only in a calculated risk strategy. The target box concept, however, is applicable throughout the duration of the conflict and for all types of operations in the vicinity of the FSCL.

The target box concept is currently the best method of employing BI. Although ideally suited for high performance aircraft, the target box concept should be augmented by AF Wild Weasle (WW) and EF-111 ECM support. It can be employed effectively without either, if used in conjunction with sortie surge and with a minimal Army SEAD effort.

The following discussion is based on the concept of the Active Defense employed against an attacking opposing force similar to the Warsaw Pact. The discussion will use chapter three of the Air-Land Battle Primer as a base, and modify the conceptual snapshots to fit the CAS and BI

definitions as modified. The JAAT and target box techniques will be the foundation for CAS and BI respectively.

The most accepted scenario for a Warsaw Pact attack in Central Europe would result in an Army Corps of three to five US division equivalents defending against a Warsaw Pact Front of two or more Soviet Combined Arms Armies. The two forces would be arrayed on the battlefield in rough approximation to the diagram below. At a minimum NATO expects to have 48 hours of warning of such an attack. The immediate problem for NATO commanders will be to identify the area of the main attack and to concentrate forces to blunt this attack. According to Soviet doctrine the NATO commander can expect to be outnumbered 3-5 to 1 in tanks, 6-8 to 1 in artillery and 4-5 to 1 in manpower.[26] In order to offset these ratios, the defense of NATO will rely on the effective application of NATO's air assets to the air-land battle.

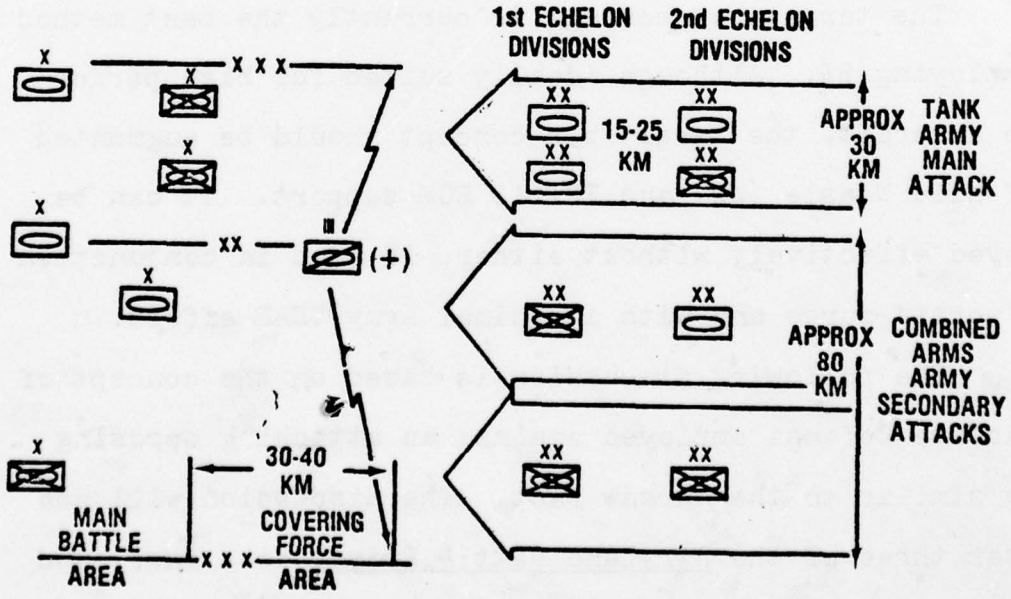

Figure 29
Array of Forces; US Corps vs Warsaw Pact Front

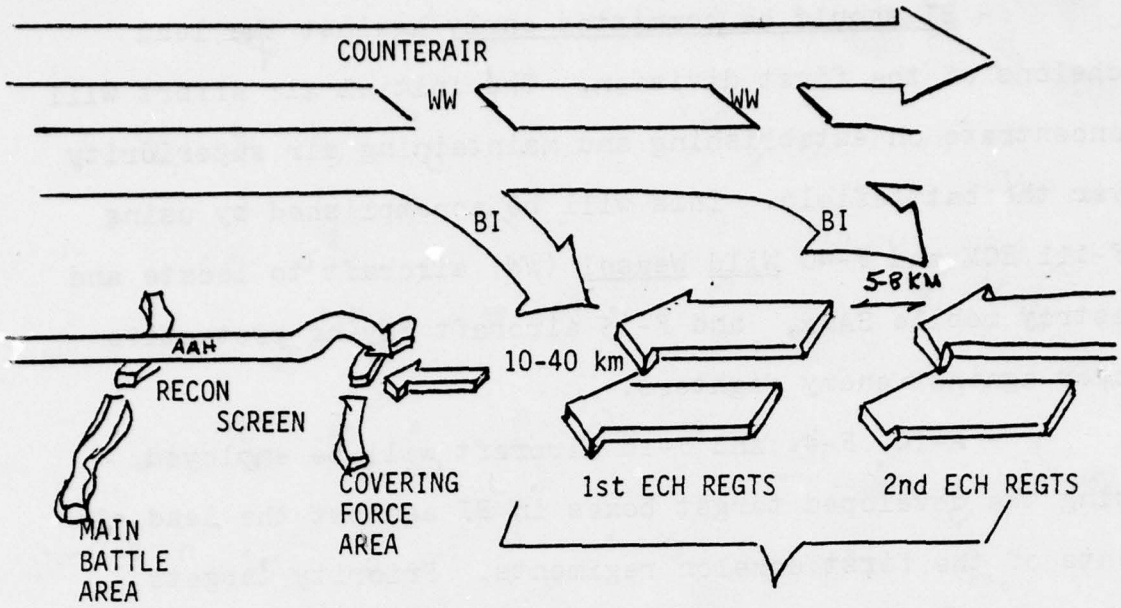

Figure 30
Initial Contact

- As the enemy forces mount their attack, the initial contact will be between the CF and the recon screen of the first echelon divisions. If intelligence has been effective and NATO has received at least 48 hours warning, assembly areas, air defense positions, and possible avenues of approach will have already been identified. If the target box concept is to be used effectively, it will be important to grant border crossing authority as soon as the first elements of the recon units make contact with the CF.

- <u>CAS should not be required during this phase</u>. AAH of the division will be used in the direct fire role and can be rapidly moved around the CFA to reinforce the CF units as required.

- BI should be committed early against the lead echelons of the first division. The initial air effort will concentrate on establishing and maintaining air superiority over the battlefield. This will be accomplished by using EF-111 ECM and F-4G Wild Weasel (WW) aircraft to locate and destroy mobile SAMs, and F-15 aircraft flying protective cover against enemy fighters.

- A-10, F-4, and F-16 aircraft will be employed using the developed target boxes in BI against the lead elements of the first echelon regiments. Priority targets will be armor and artillery, but because a high percentage of the weapons will be wide area munitions,* many air defense systems will be damaged.

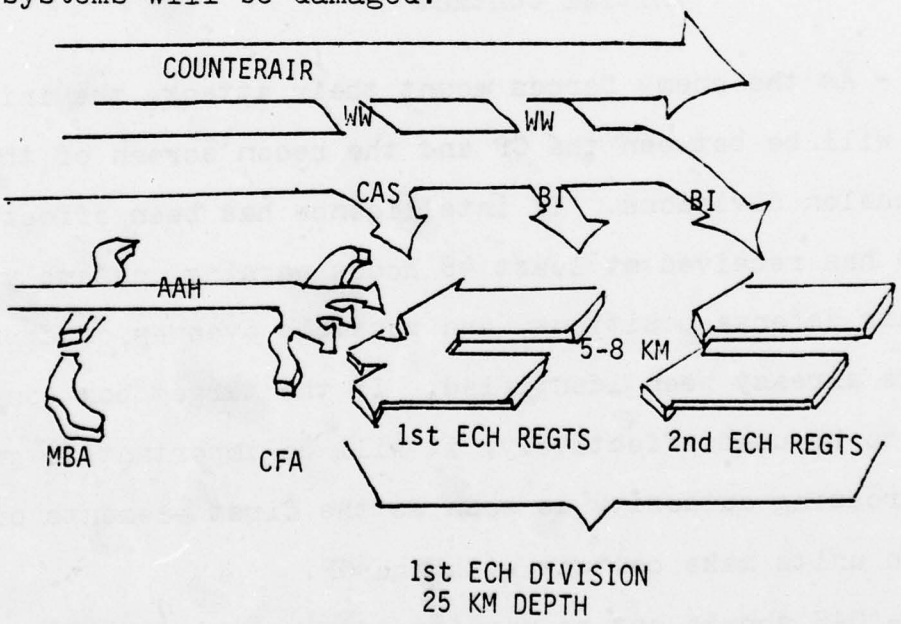

Figure 31
Closure of Lead Regiments

*For a discussion of new air delivered munitions see "Developments in Air Warfare" National Defense, Sept-Oct 78, p42.

- WW aircraft will concentrate on locating and destroying SA-4 command and control facilities with particular attention on the Longtrack target acquisition radar.

As the first echelon regiments close on the CF, WW strikes will continue to seek out SA-4 systems and AD command and control functions. EF-111 ECM aircraft will provide and maintain corridors for BI aircraft and counterair operations will be maintained at a high level.

- Division AAH continue to provide direct fires to the CF in the way of overwatch and as a counter-attack force to cover forward unit withdrawal and movement.

- CAS will be employed for the first time but the commitment should be kept light. The JAAT will be committed from assets available to the Corps Commander. The JAAT can be used directly in CAS or committed against massed targets that have been slowed down by defensive obstacles in the CFA.

- BI will continue to be heavy against the first echelon regiment but will concentrate on locating and destroying the Division Artillery Group (DAG) of the first echelon division. BI against the second echelon regiments will concentrate on locating the division tank reserve and destroy its combat power before it can be committed against the defense.

- Deep Interdiction missions will be light with a primary responsibility of locating and harrassing the second echelon divisions.

As the CF engages the lead regiments, Army firepower increases. One of the main functions of the CF in this phase

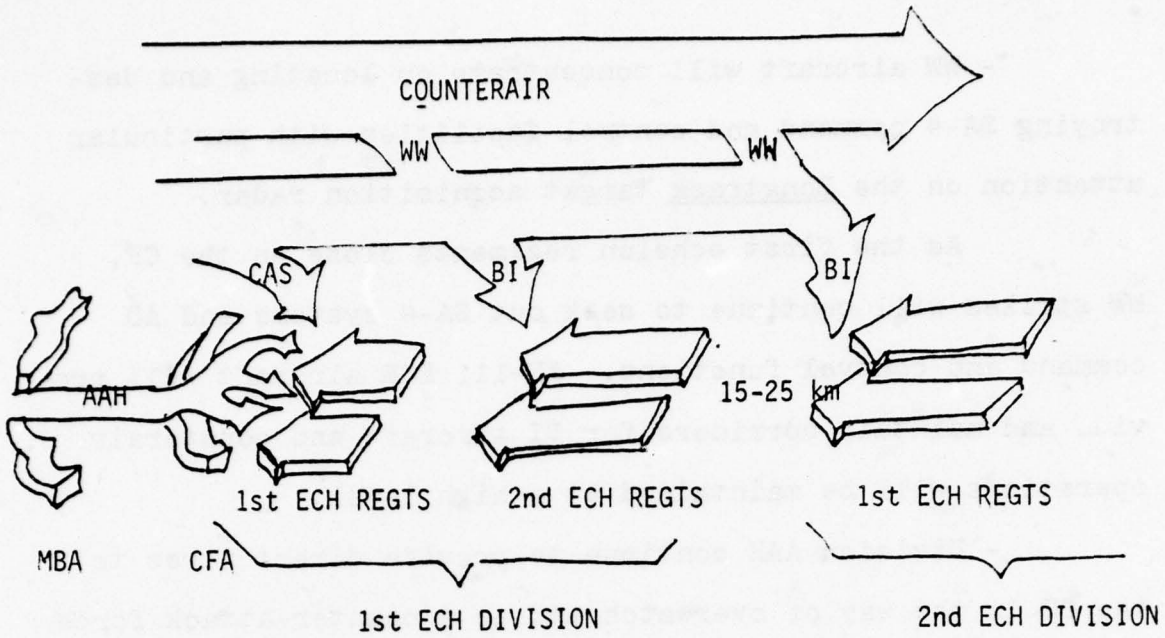

Figure 32

Covering Force Delay

is to cause the second echelon divisions to be committed and reveal the main attack axis. As this happens, second echelon regiments and divisions will increasingly expose their positions and begin moving in column toward the FEBA. This will result in gaps in the air defense umbrella as a result of fewer air defense systems being in firing positions.

- CAS requirements should remain limited; however, the Corps JAAT assets will be committed as enemy forces are compressed by mine fields, abatis, and river crossing operations.

- <u>BI continues against the second echelon regiments and the second echelon divisions</u>. A-10s will concentrate on the second echelon regiments while high performance aircraft concentrate on the large columns of the second echelon division.

- WW operations will continue to suppress SA-4 units in the second echelon division and EF-111s will maintain corridors into the second echelon.

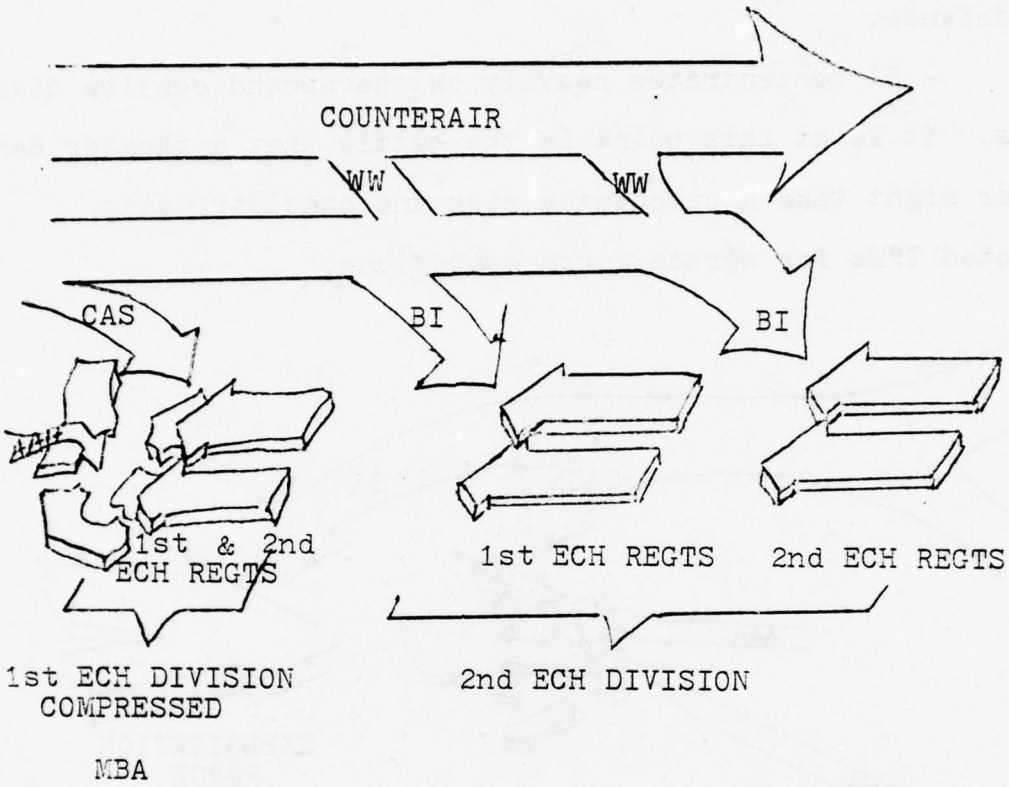

Figure 33
Main Battle Area Engagement

As the first echelon division reaches the MBA, it encounters the full weight of the defensive firepower. Fighting from prepared positions and reinforced strongholds, the active defense will begin to wear away the combat power of the first echelon division. Army units should have sufficient firepower to contain the remnants of the first echelon division. By this time, the enemy commander will have committed his second echelon divisions into the main axis of attack.

- <u>CAS increasingly becomes a factor at this point</u>. JAAT counter-attacks will cause heavy armor losses to the enemy and prevent him from exploiting gaps or weaknesses in the defense.

- BI concentrates heavily on the second echelon divisions. It is at this point in the battle that a theater commander might take a calculated risk and consider using selected TFWs for sortie surge operations.

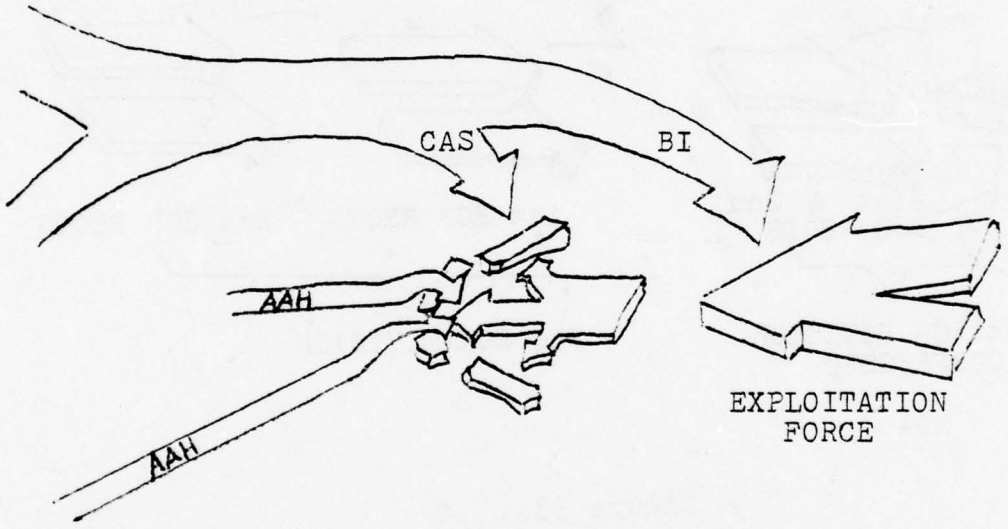

Figure 34
The Breakthrough

The breakthrough is the least desirable situation for the ground force commander because it requires a rapid relocation of his forces to prevent the enemy from conducting exploitation operations in the division rear area where relatively undefended supply and maintenance functions are conducted. In order to prevent a complete retrograde operation, the Corps Commander must quickly counter-attack with maximum firepower.

- JAAT will be heavily used during this phase to deny high speed avenues of approach to breakthrough units, conter-attack, prevent division supply and maintanance areas from being overrun, and provide flank security forces with increased firepower.

- BI missions must be massive against the exploitation force. If sortie surge has not previously expended resource availability, it must be used now. If sufficient systems have been eliminated in the first echelon division some BI missions will be diverted to provide CAS.

- The Army SEAD effort will obviously become minimal at this point, and all available EW and WW assets will have to be committed to suppress the air defense assets of the exploitation force.

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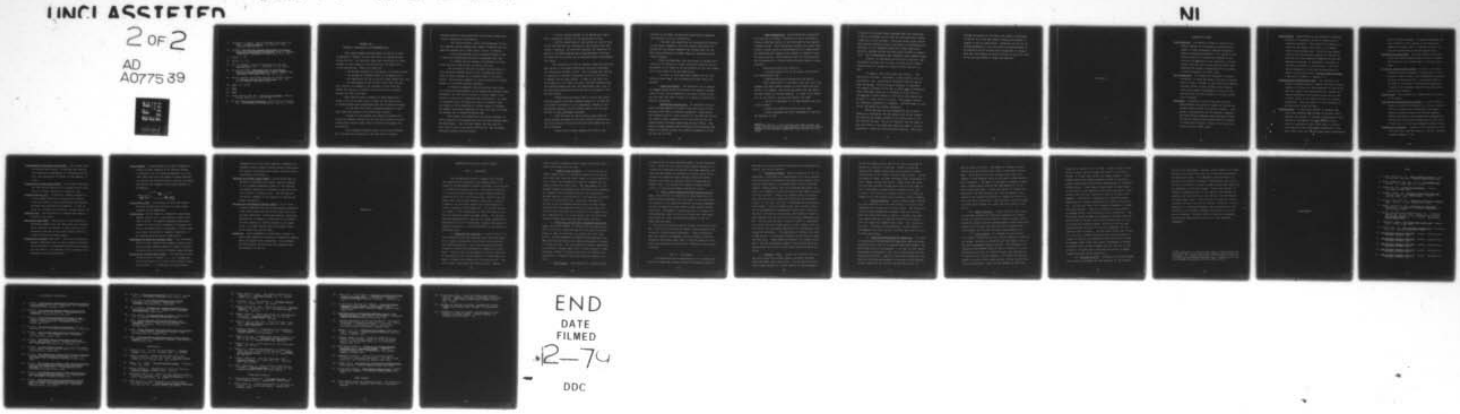

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CHAPTER SIX

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This thesis studied the AF mission of CAS as it might be employed to support the air-land battle in Central Europe during the 80s. Four specific areas were identified for study because of their impact on CAS doctrine and its application on the battlefield. These four areas are:

- the US Army doctrine for the defense of Central Europe;
- the growing air defense threat of the Warsaw Pact;
- the application of CAS in the 1973 Arab-Israeli War; and,
- the development of CAS doctrine since the 1973 War.

This chapter will summarize the findings of this study and answer the question of whether CAS can survive as a mission through the 1980 time frame.

Since CAS is flown in support of Army operations, a study of how the US Army plans to fight the air-land battle in Central Europe was accomplished with the following findings:

- the US Army will fight outnumbered against an opponent armed with weapons of at least equal quality;
- because of the quantity and quality of Warsaw Pact forces and weapons systems, the US Army will conduct an active defense that requires high levels of movement throughout the battlefield;
- the increased movement factor in the Active Defense will increase the difficulty of the CAS pilot to discern

friendly forces on the battlefield and increase command and control problems for CAS missions;

- the Active Defense, unlike its predecessor the Mobile Defense, places maximum Army organic firepower well forward and retains only a light force, if any, in reserve;

- the Active Defense relys on massive levels of CAS to stop the breakthrough tactics of the Warsaw Pact; and,

- in Central Europe, weather and darkness will preclude the use of CAS as much as 50% of the time.

One conclusion that can be drawn from this study is that the Active Defense relys on CAS to supplement shortfalls in Army firepower at a critical stage in the first battle. This doctrine appears to risk the defense of Central Europe on a favorable weather situation.

It should be apparent that any doctrine that relys on a factor as unpredictable as the weather has inherent flaws. Therefore, the Army should develop a doctrine based on its ability to carry out a defensive plan unilaterally. In order to accomplish this, the Army will have to increase either the number of units committed to Central Europe or increase its organic anti-armor capability to the point that a successful defense can be conducted without CAS.

This thesis also studied the air defense systems currently employed by the Warsaw Pact and how these systems effect the CAS mission. The 1973 Arab-Israeli War was used as a case study of CAS on the modern battlefield. The following findings surfaced from this study:

- the air defense systems of the Warsaw Pact represent a formidable obstacle to the application of CAS,

- IAF CAS losses were so high during the initial days of the 1973 War that all requests for CAS missions were cancelled; therefore, the Army must increase its capability to assist in the SEAD campaign while simultaneously containing the enemy until air power can be employed without unacceptable loss rates.

The combination of the air defense threat and the movement factor on the modern battlefield seriously challenges the traditional concepts of CAS. This challenge has resulted in ambiguity in doctrine concerning the use of CAS and BI to support the air-land battle. A study of the basic doctrine manuals of the Army, Air Force, and NATO combined with the lessons gleaned from the 1973 Arab-Israeli War, lead to the following perceptions about the use of air power in the air-land battle:

- Traditional CAS using a FAC to control and direct fighters against individual targets engaged in the MBA will be extremely difficult, if not impossible, because of communications jamming, the air defense threat, and the limitations of high performance aircraft.

- Both the Army and the Air Force agree that the second echelon regiments of the first echelon division and the second echelon divisions offer the best targets for the use of airpower.

- These second echelon targets are found in the

vicinity of the FSCL, an area that traditionally separates the missions of CAS and interdiction.

- The TACS only apportions and allocates CAS missions to the ground commander. With the current definitions of CAS and BI, the ground commander can neither plan for, nor make timely decisions to attack these all important second echelon targets.

These findings imply that the current doctrinal definitions of AF missions no longer accurately describe the requirements of air power on the battlefield nor are they responsive to the needs of the air-land battle.

- In order to more adequately address the air-land battle as seen today, the following definitions should be adopted:

- Close Air Support: CAS operations are in support of engaged ground forces that require the detailed integration with the fire and maneuver of friendly surface forces and are under the direct control of a ground or airborn forward air controller.

- Battlefield Interdiction: BI operations are missions directed against the enemy forces that have a direct and real time effect on surface operations. These forces are normally found in close proximity to the FSCL and include the second echelon regiments of the lead division and the second echelon divisions supporting the main attack. They must be closely planned and coordinated with the ground commander but require neither the detailed integration of CAS nor the use of a FAC.

- Deep Interdiction: Deep interdiction operations are conducted to destroy, neutralize or delay the enemy's military potential before it can be brought to bear against friendly forces. These operations restrict the combat capability of enemy forces by disrupting lines of communication and destroying the supplies that sustain an effective level of enemy activity. These missions must be jointly planned and coordinated as a unified effort directed toward a common objective.

These definitions will result in:

- incorporating BI into an AF mission with distinctive requirements, and

- apportioning and allocating both CAS and BI.

This re-definition of doctrinal terms will also help organize and apply weapon systems in the overall air-land battle. For example, this study has shown that the JAAT is the best system for the CAS mission. In order to be responsive to the needs of the air-land battle, the JAAT:

- should be addressed by the apportionment and allocation system.*

- should be controlled at Corps level, and*

- should represent the major commitment of Army and AF resources to CAS.

*Since the JAAT is a joint combined arms team concept, the actual control and use of these assets in the air-land battle deserves a more detailed examination than provided by this study.

A fallout of this JAAT study indicates that the reliability of the A-10 airframe is such that the limiting factor during combat may be pilot fatigue. Since Army scout pilots and AF FACS perform corollary duties, one method of increasing pilot shortfall in A-10 squadrons would be to train Army scout pilots to perform the FAC role and return AF FACs to cockpit duty. This recommendation also requires a more detailed study.

Finally, by separating the CAS and BI missions, high performance aircraft will be able to attack second echelon targets using the target box concept without the use of a FAC.

In summary, this study asked the question, "Can CAS survive the 80s?" The answer to that question is an unequivocable "yes" -providing we understand what CAS <u>is</u> and what CAS <u>is not</u>. CAS <u>is</u> a mission designed to supplement the organic firepower of the Army in those <u>rare</u> circumstances where individual units are in jeopardy of being over-run. CAS <u>also is</u> a costly mission in both effort and assets; and as such, is a poor use of air power. CAS <u>is not</u> a panacea for fighting outnumbered or outgunned. Doctrine based on this faulty conclusion will suffer tragically.

The AF and Army can best address the use of CAS by agreeing to distinguish the CAS mission from the BI mission. The Army has the organic capability to perform much of its own CAS with the AAH. The AF, by using BI, has the means to take the battle to the enemy and attack him when he is most vulnerable. These are two distinctive missions. While CAS,

through the vehicle of the JAAT, must remain a commitment of the AF, BI is the best means of employing airpower in support of the air-land battle. Therefore, BI must be addressed separately in the allocation and apportionment of AF resources and AF doctrine must be adjusted to accommodate this fine-tuning of current doctrine to meet the needs of the air-land battle of today and tomorrow.

APPENDIX A

GLOSSARY OF TERMS

Active Defense: The method or system of flexible and elastic defense on the mechanized battlefield designed to fight successfully against numerically superior attacking formations. The concept of the active defense is to defeat the attacker by confronting him aggressively and continually from successive positions with strong combined arms teams fighting from mutually supporting battle positions in-depth throughout the battle area.

Air Interdiction: Air operations conducted to destroy, neutralize, or delay the enemy's military potential before it can be brought to bear effectively against friendly forces, at such distance from friendly forces that detailed integration of each air mission with the fire and movement of friendly forces is not required.

Allocation: Allocation is the process that converts apportionment into specific numbers of sorties and assigns these sorties to a specific mission. Allocation is performed by the AF Component Commander. The ground force commander takes allocated sorties for CAS and assigns them against specific targets. In Europe this decision is made at the Allied Tactical Air Force (ATAF) level.

Apportionment: Apportionment is the process of assigning priority to counterair, Close Air Support and interdiction missions. This process is normally conducted at the theater army level, or in Europe, Joint Forces Command level. Priorities are determined by the Joint Forces Commander in conjunction with the Air Force Component Commander and the Army Component Commander, by assigning a percentage of the total air assets to each mission. (For a detailed explanation of how this process works the reader is directed to ALPI, Air-Land Phase Interface, 1 May 1978, or TACM 2-1, Chapter 11.)

Battlefield Air Interdiction (BAI): Air operations conducted to destroy specific targets that have a strong bearing of influence on the operations of land forces. They are flown in the battlefield area, require detailed coordination with ground forces and can have a direct effect on the enemy's ability to continue operations. They are subject to joint planning and are conducted beyond the FSCL.

Covering Force: In the active defense, a combined arms force that operates well forward of the main battle area for the purpose of fighting a significant active defense to disorganize and destroy enemy forces prior to reaching the main battle area, to deceive the enemy as to the location and composition of the main battle area, and to strip away enemy reconnaisance

and air defense elements. It seeks to identify the size, direction, and location of the enemy main attack and to gain time for friendly forces to deploy and concentrate in the main battle area.

Covering Force Area (CFA): The area forward of the main battle area which begins along the line of contact and extends to the forward edge of the main battle area.

Direct Air Support Center (DASC): A mobile, air transportable facility designed to operate with a corps tactical control center or an independent divisional tactical operations center. The primary task of the DASC is to provide a fast-reaction capability to satisfy the immediate requests from Army forces tactical air support.

Direct Fires: Fire directed at a target which is visible to the aimer.

Fire Support Coordination Line (FSCL): A line, normally placed on terrain identifiable from the air, beyond which all targets may be attacked by any weapon system (including aircraft and special weapons) without coordination with established headquarters. The effects of any weapon system may not fall short of this line or in any way endanger friendly troops.

Forward Air Controller: A member of the tactical air control party who, from the ground or the air, controls aircraft engaged in CAS.

Forward Edge of the Battle Area (FEBA): The forward limit of the main battle area. It excludes the covering force area and is designated to coordinate fire support, the positioning of forces, or the maneuver of units.

Forward Line of Own Troops (FLOT): A line which indicates the most forward positions of friendly forces in any kind of military operation at a specific time.

Forward Observer (FO): An observer, normally assigned to a fire support team FIST, operating with forward units and trained to adjust ground and naval gunfire and pass back battlefield information. In the absence of a forward air controller, he may control CAS.

Indirect Fire: Fire delivered at a target which cannot be seen by the aimer.

Main Battle Area (MBA): That portion of the battlefield extending rearward from the point where the covering force completes the handoff of enemy forces to the defending force and in which the decisive battle is fought to defeat the enemy attack.

Offensive Air Support (NATO term): The term offensive air support operations (OAS) is used in NATO to describe allied tactical air operations which directly support the land battle. OAS consists of CAS, tactical reconnaissance, and air interdiction.

Pop-up Attack: A pop-up attack is a tactic designed to reduce aircraft exposure to air defense systems. It intails a very low altitude approach to a point (PUP) where the pilot can begin an attack designed to optimize the pilots ability to acquire the target and deliver his ordnance with minimum exposure to AD systems.

Pop-up Point (PUP): The location at which CAS fighter aircraft quickly gain altitude for enemy target acquisition and engagement.

Sortie Surge: Sortie Surge is a program for generating maximum sorties over a short period, usually less than 72 hours. To generate maximum sorties, maintenance of non-critical components is delayed until the sc tie surge period is completed. Sortie surge will result in periods of degraded capability of air assets after the sortie surge period.

Suppression of Enemy Air Defense (SEAD): The coordinated effort of CAS, indirect fire support, direct fires, and electronic warfare systems to defeat or prevent effective fires by enemy air defense weapon systems.

Tactical Air Control Center (TACC): The operations center of the Air Force component of a joint command and is the equivalent to the senior Army tactical operations center. It is dedicated and operationally

responsive to the Air Force component commander for airspace control, ground tactical sensor surveillance, air support coordination and control, and air strike coordination and control

Tactical Air Control Party (TACP): An Air Force team organized to coordinate and direct close air support. It is a forward operations element of the tactical air support system and is attached to each army unit from division to maneuver unit. The TACP advises the ground commander on all aspects of tactical air support operations.

Tactical Air Coordination Element (TACE): An Air Force element integrated into the corps tactical operations center which serves as the AF focal point for joint air-land operations, controlling missions, directing tactical air in support of corps forces, and assisting Army planning on matters related to air operations. The TACE replaces what was formerly known as the corps TACP and the DASC.

Target Box: Areas designated on identifiable terrain in which enemy targets are expected to appear and against which air support will be employed. Air corridors and identifiable pop-ip points are preplanned and coordinated with the AF.

APPENDIX B

CONCENTRATED CLOSE AIR SUPPORT CONCEPT

PART I - BACKGROUND

The Concentrated Close Air Support (CAS) Concept was developed during gaming of the SCORES Europe I, Sequence 3A Counteroffensive scenario although it can be used in a defensive situation as well. The scenario depicted a five division Corps tasked to break through successive defensive belts on a very narrow front, exploit into the enemy rear, encircle and destroy a tank army. Tactical airpower's air-to-ground capabilities were employed to achieve planned air-land objectives. To maximize the Tac Air impact, it was concentrated in time and space to produce the required effects on enemy forces. The desired massing/concentration of land and air forces necessitated modification of Tac Air employment concepts and methods of command and control. Five considerations of the gamed air employment were:

a. Integrated Air-Land Plan. A Corps/Tactical Air Force operations plan was prepared which prescribed general air support requirements and timing for the period of the upcoming operation. This plan replaced the current process of submitting preplanned air requests on a daily basis. The plan lays out the phases of the air operation as they apply to the ground operation. It describes the types of targets anticipated with listed priorities. Specefic target coordinates could not be given; however,

target sectors encompassing major enemy forces were designated within each division zone.

b. Concentration of TACAIR. To avoid dilution of TACAIR capabilities, air operations would focus on key enemy forces that posed the major threat to the counteroffensive, rather than responding to specific requests for air support across the Corps front. The requirements of preplanned requests and ground alert associated with immediate air requests were eliminated since air was committed at maximum capacity to the battle at a rate desired to achieve overall air-land objectives. Attaining sufficient air strikes to assure adequate neutralization of enemy forces required that wings generate sorties at surge rates with aircraft being directed into the battle in an orderly flow. This regulated flow of strike assets into the battle prevented airspace saturation and undesirable orbiting.

c. Flexibility to Shift Air Throughout the Battlefield. Sufficient numbers of fighters must be readily available to be quickly committed against time sensitive target groups as they are acquired in a dynamic and fluid land battle. Maximum advantage of modern target detection systems would be realized by last minute assignment of targets to strike aircrews. The plan prescribes that as objectives are achieved, airpower would shift to other sectors. Enemy reactions, changes in target priorities, air defense considerations or weather would also affect the decision to shift.

d. SEAD Support. The extensive air defense threat

did not allow CAS to be employed casually across the battlefield. Strike aircraft need planned support operations to successfully penetrate and operate over enemy defenses. Concentrated CAS operations permitted available scarce EW resources to concentrate their defense suppression effort against only those air defenses within a prescribed geographic area. The planned CAS schedule allowed integration of air and ground defense suppression assets.

e. Recce, Surveillance and Target Acquisition Support. Recce assets are committed to Corps operations to provide ground commanders with a picture of the battlefield. The success of this operation enables the ground commanders to plan and employ Air/Land assets to best achieve battle objectives. Employment of concentrated Air to support Air/Land objectives requires precise and near real time target acquisition to insure optimum effectiveness of the fire power made available.

2. The resulting Concentrated CAS Concept visualized an optimum flow of airstrikes against enemy forces threatening the success of planned ground operations. Target information and final control arrangements could be passed to aircraft enroute to the battle area. Thus, a flexible source of fire power was continuously available for response to the tactical situation.

PART II - THE CONCEPT

Air operations which concentrate air in a target area would not change the current Tactical Air Control System or-

ganization, but would affect planning actions, procedures for control, and strike direction.

a. Fragmentary Orders. Central direction of all air operations is provided by an abbreviated frag, which contains only the essential information required to get fighters into planned target sectors; coordinate their strikes with SEAD support, reconnaissance, CAP, and refueling operations; and notify air elements at Corps and below of the fighter strikes they are to direct. Precise air targets would be assigned only when specifically known and timing can be confidently stated. In this way, the frag is shortened and transmission time reduced. Tactical fighter wings load aircraft according to the weapons mix percentage as specified in the frag. The frag's flexibility allows wings the freedom to surge to their maximum rate as long as the TOT-window commitments are met. The air plan and daily frag will specify a commitment of sorties into each target sector so that friendly units in that sector can anticipate generating and coordinating timely targeting information. The commitment of fighters into each target sector c n be adjusted verbally during the day inside the frag cycle. Intelligence collectors, fire support planners , and CAS coordinators adhere to the current Corps directed target priorities as they select enemy forces to be struck.

b. Enroute Control. Fighters are funneled into target areas along low altitude ingress corridors that mask them from enemy radar acquisition. Control facilities provide limited enroute air traffic control to insure spaced

arrival at contact points and IP's as well as warnings of hostile air activity in the area. Verbal instructions changing the fragged target area can be passed to effect timely shifts of air forces to other target sectors. Strike and support flights can then coordinate final adjustments to their ingress tactics and timing. Identifying high speed low altitude corridors through Corps and Division areas assits in providing airspace control separation from Army aviation. The final act of enroute control is to hand the fighter off at the contact point to sector control elements.

c. Strike Direction. Priority enemy targets throughout the battlefield will be identified by all source intelligence at various Army and Air Force levels. The Concentrated CAS Concept emphasizes procedures that can routinely make last minute decisions to apply air against time sensitive targets and has the required flexibility to rapidly shift air operations between Corps areas. Four factors are envolved: direction of CAS operations, target selection, arrangements for final control, and major decisions to shift to other Corps areas.

(1) Directing Concentrated Air Operations. The overall direction of Concentrated CAS operations would be accomplished at Corps level by an expanded DASC/TACP element. The DASC submits sortie requirements to the TACC for each sector based upon an awareness of the size of enemy forces and target group priorities. Some TOT's would be allocated by frag order to Divisions and Brigades in advance, as the planning process identifies the echelon that can best direct air

against objective forces. Assignment of targets to those flights would be accomplished without further DASC involvement. The distinction of this concept from current procedures is that maneuver units do not need to submit detailed air requests. The amount of planned air support is based upon a higher echelon view of the requirements of air to assist the ground plan. During the battle, as targets are identified, the DASC can make the final assignment of air assets to the appropriate echelon of command or directly to the final strike controller. The TACS would direct aircrews to contact that element for target and final control information.

(2) Target Selection. Target selection takes place at different echelons for different categories of targets: troops in contact provide primarily close-in targets. Army operations centers provide somewhat deeper targets based upon analysis of available Army and Air Force reconnaissance/intelligence, and the TACC provides targets deeper still.

(3) Final Control. Air elements at each echelon will normally determine the final control method by assessing the target the tactical situation, and the capabilities of the aircraft/weapons systems involved. The procedures for conducting the terminal phase of the air strike will be determined by proximity of friendly forces, and availability of various final control elements. To process the maximum number of aircraft into target sectors, control restrictions should be mimimized. There are two methods for the final

direction or control of air strikes. Control of CAS strikes within a sector would be either FAC control for troops in contact. or flight lead control for deeper targets. Strike flights would have planned secondary targets as backup to prevent undesirable orbiting when communication or targeting problems occur. These backup targets would be deep enough in the sector to not require close control and would include targets like artillery locations or heavily traveled road segments. Successfully integrating and conduction these operations will require coordination of seberal TACS echelons. At Division, TACP's will assume an expanded air target direction function. They will primarily act upon targets of engaged forces, and function as sector controllers. The Corps DASC having assumed an expanded air planning function, would primarily concern itself with executing the air plan by finding and targeting deeper forces while at the same time making CAS available to Division Commanders for use against close in targets. The DASC would assign CAS flights to a Division's targets when priorities dictate support of troops in contact, and otherwise direct the strike of deeper targets under flight lead control procedures or through available strike control elements such as Fast FAC or SCAR aircraft. The DASC would coordinate the strike of deeper targets with the sector controllers.

(4) Decision to Shift. Shifting air strikes between Corps sectors designated for the operation is the responsi-

bility of the Corps/DASC; however, higher echelons will make the decision to shift the focus of air-to-ground operations to other Corps areas. Air commanders execute planned air operations to maximize airpower's effectiveness and survivability, shifting air in mass to other sectors when objectives are achieved or priorities change. Direct Army (Group) influence on these decisions is provided by Army elements assigned to the TACC level that are familiar with the Theater (or Army Group) plans. The plan must be capable of supporting major decisions to shift air forces. Since air is to be employed in a concentrated manner and sustained until major objectives are achieved, piecemeal diversions of aircraft are not intended. Periodic shifts in reaction to weather would be the responsibility of the Air Force Component Commander.*

* This appendix is a direct quote from a briefing extracted from the files of tne Tactical Air Command Liason Office, Ft. Leavenwoth, Ks. Neither the author nor the date of the briefing could be assertained from the files. Permission for use in this paper was obtained from the TACLO office.

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