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# STUDY PROJECT

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CLOSE AIR SUPPORT: ANOTHER LOOK

BY

LIEUTENANT COLONEL JOHN J. COLLINS

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CLOSE AIR SUPPORT: ANOTHER LOOK

AN INDIVIDUAL STUDY PROJECT

by

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ABSTRACT

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The subject of close air support has been examined and analyzed time and time again. Most studies use as a starting point that the close air support mission is one that can be effectively accomplished in a high threat environment using a fixed wing aircraft. The threat capabilities are acknowledged to be significant. The advocated design or technological enhancement is presumed to negate the threat capability to the point where fixed wing close air support in the forward battle area is accomplished with acceptable loss rates and with high degrees of accuracy. The requirements of CAS need to be examined from a point of view of what needs to be accomplished in the forward battle area, what tasks the pilot must accomplish and under what conditions, and what type of machine is best suited to accomplish the mission. The cost of technological advances in fixed wing aircraft is high in dollar terms: the cost of ineffective use of the assets of war can be incalculable. Fixed wing CAS in the front line area of a fluid nonlinear battle is not a survivable option. In addition, its effectiveness as an extension of the ground commander's fire support system is questionable. Rotary wing aircraft offer distinct advantages in effectiveness and survivability.



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# CLOSE AIR SUPPORT: ANOTHER LOOK

## CHAPTER I

### INTRODUCTION

The discussion of close air support for the Army is one that never seems to end. There is always another aspect to the execution of the mission that requires some additional ink. This paper will most likely not close the cover on the subject. It will attempt to provide an objective view of the close air support arena. The approach to be used will be to define the modern battlefield environment as it relates to the aircraft that must operate over it. Given the battlefield, the requirements of a close air support mission will be discussed. This discussion will include aircraft requirements. Once the environment and the requirement have been determined, the aircraft characteristics that best suit the situation will follow. Command and control aspects and integration of the close air support mission into the overall theater airland operation will also be addressed.

The battlefield that will be examined in this paper is one that exists in the European Theater. It can be argued that a war in Europe is not the most likely conflict scenario. Few would argue, however, the fact that it does represent the most lethal and complex scenario that we may face.

Two additional factors should be considered. First, conflicts in other areas will most probably include significant portions of the European threat array. Second, the equipment and procedures that will function effectively in the European scenario can also function in a less complex environment. The converse would not be true.

Close air support is defined in Air Force Manual 2-1 as:

air action against hostile targets in close proximity to friendly forces . . . . requires detailed integration of each air mission with the fire and movement of those troops.<sup>1</sup>

It can be argued that close air support can be thought to include a broader spectrum of operations in support of the field commander. This distinction will not be argued here. The battlefield that will be addressed is one on which both sides have access to a full range of modern weapons systems, command and control equipment and radio electronic warfare devices. The setting will be one that approximates that of Western Europe.

#### ENDNOTES

1. U.S. Department of the Air Force, Tactical Air Operations-Counter Air, Close Air Support, and Air Interdiction, Air Force Manual 2-1, 2 May 1969, p.6-1.

CHAPTER II  
THE BATTLEFIELD ENVIRONMENT

The United States Army, in Field Manual 100-5, describes the high and mid-intensity battlefield as being "chaotic, intense and highly destructive".<sup>1</sup> It further describes the environment as one that is "nonlinear". That is one in which the definition of forward and rear areas becomes blurred due to the speed of the operation, the lethality and depth of the fires and the maneuvering that will be required to defeat large and effective enemy formations. "Throughout the battle area, attack and defense will often take place simultaneously as each combatant attempts to mass, economize locally, and maneuver against his opponent".<sup>2</sup> In addressing the training required for successful operations in the modern complex combat environment, Field Manual 100-5 states that the Army must train commanders

...to react to changes which require fast, independent decisions based on broad guidance and mission orders. Such practices enhance the morale, confidence, and effectiveness of small units and improve the performance of higher levels of command as well.<sup>3</sup>

Four basic tenets of Airland battle are: "initiative, agility, depth and synchronization".<sup>4</sup> These tenets require quick independent actions that are coordinated to achieve the maximum effect over a broad range of space, time and resources. The manual states: "In the chaos of battle, it is essential to decentralize decision authority to the lowest practical level because overcentralization slows action and leads to inertia."<sup>5</sup>

Indications are that the Soviet forces will attempt to use speed and deception to their advantage in conducting their operations. Colonel David Glantz, in his article on Soviet operational art and tactics, quotes Soviet sources stating:

Through the means of focused operational and tactical maneuver, Soviet forces will attempt to preempt, disrupt or crush forward enemy defenses; penetrate rapidly into the depths of the enemy's defenses along numerous axes; and by immediately intermingling their own and the enemy's forces and by other direct actions, deprive the enemy of the ability to respond effectively...In essence what has emerged is a Soviet concept of land-air battle juxtaposed against the U.S. concept of Airland Battle.<sup>6</sup>

Given the nonlinear nature of the battlefield, the emphasis placed upon speed of operations and surprise, situational awareness and command and control systems will be heavily tasked. Fluidity will characterize all sectors of the operation. Data on the location and movement of friendly and enemy combatants will require continual input to the command and control system. The need for current accurate intelligence information will be high. That information will be extremely perishable, particularly data involving the forward areas of the battle. Communications systems will be heavily taxed with the flow of information at all levels of command. Due to the critical need of the communications systems to effectively support operations in a highly fluid environment, they will be a high priority target of direct action and of electronic combat measures. We can anticipate moderate to severe disruption to those systems, at least at the local level in the forward areas of battle. This area is one in

which communication and coordination are critical. Emphasis will need to be on independent, decentralized operations based upon the local commander's stated objectives and minimum communications. The more fluid the battlefield becomes, the more difficult will be the task of identifying the decisive points for the application of power and the more time critical the application of that power will become. Technological advances in the areas of sensors, command and control communications, and the range and accuracy of weapons will help offset, to some degree, the impact of enemy pressure on control of the battle.

The targets on this battlefield of the future must be assumed to have increased survivability due to improvements in armor and due to increased hardening of facilities where practical. The use of deception to obscure both targets and operations must be considered a given in this environment. Hardening and deception have a negative effect upon our ability to locate and effectively destroy targets. In a fluid nonlinear arena, these tasks are compounded.

Decentralized execution will be required to conduct battlefield operations at the tactical level. Commanders will require control of multiple modes of firepower that can be used in a flexible integrated maneuver plan designed to provide the maximum effectiveness against the critical node of the enemy's offense or defense. This decentralized execution should not be communications intensive. The commander's intent and battle scheme need to be clearly

communicated to all subordinate commanders and sections, including his concept of integration of components in order to facilitate decentralized execution. This communication of intent and concept of operations may require periodic meetings with subordinate elements. Effective and reliable radio electronic communications will be more likely in local geographic areas where the effects of terrain and electronic countermeasures will be minimized. Advances in communications technology may enhance this area to some degree given wide availability of equipment and the lack of successful countermeasures development. The volume of message traffic required from and to all participants in the local battle will demand that communications to and from each component be at the minimum essential level.

The decentralized execution of the battle at the local level will require an effective centralized control in order to ensure that the theater operational objectives are met. Information on unit progress, enemy force concentrations, force status of reserves, and other changing information will need to be assimilated in order to make the optimum use of available resources. In order to optimize the effect of available resources, commanders at all levels must combine them in ways that cause the relative advantage of each component to be maximized. This will produce the greatest synergistic effect of the combined elements and project the greatest impact upon the enemy.

An element that can be overlooked in the conduct of battle is that of the airspace over the battlefield.

This includes forward areas particularly but also applies to rear and deep areas. Coordination between artillery, air defense systems, support operations, close air support, and transiting flights will need to be effectively conducted on a continuing basis. This will put additional demands on the command and control as well as communication systems at all levels of command. This finite resource will have to be managed by commanders considering not only the local battle but also the requirements of apportioned air power operations. As airspace requirements increase in complexity so will the degree of coordination required. Operations should be structured to minimize the coordination required by reducing demands on the commanders communication systems.

Air defense systems on both sides of the battle will be formidable. Increases in the "g" capabilities of surface-to-air missiles allow them to successfully engage faster, more maneuverable targets. Improved RADAR technologies allow simultaneous tracking of multiple targets and reduced susceptibility to electronic countermeasures. Advances in the sophistication and application of infrared technologies can be expected to continue. The passive nature of these systems make them more difficult to defend against. Development of ultra high speed projectiles and directed energy weapons will further negate the advantages of speed and maneuverability in defensive strategies. The density of air defense weapons can only be expected to increase through time.

This increase in density will cover the entire spectrum above the battlefield, from treetop level to the edge of space and beyond. The air environment over the forward battle area can easily be described as extremely hostile. Our own air defenses can be assumed to make similar technological progress. One problem faced by both sides is determining the friend or foe status of any aircraft operation in their areas of responsibility. Such systems as IFF can aid in identification of friendly aircraft but can also be used by adversaries to identify and engage targets. Coordination and communication will have to play a major role in minimizing losses in this environment. This requirement places increased demands on an already heavily tasked command and control system.

The man-made factors influencing the battlefield environment are not the only considerations that must be dealt with. Operations during hours of darkness and during periods of bad weather further compound the problem and increase the hostility of the environment. Terrain that would be considered an advantage during daylight and good weather periods can become another threat to the aircraft component of the firepower mix.

#### ENDNOTES

1. U.S. Department of the Army, Operations, Field Manual 100-5, May 1986, p.2.

2. Field Manual 100-5, p.3.

3. Field Manual 100-5, p.7.
4. Field manual 100-5, p.15.
5. Field Manual 100-5, p.15.
6. Col. David M. Glantz, U.S. Army, "Operational Art and Tactics", Military Review, December 1988, pp.35-36.

## CHAPTER III

### THE CLOSE AIR SUPPORT REQUIREMENT

Close air support (CAS) has been described in a number of ways. Examples have been used from World War I, World War II, Korea, and Vietnam as well as from the experience of other nations such as Germany, Israel, etc. Major Command Manual (MCM) 3-1 states: "CAS is air action against enemy targets in close proximity to friendly forces."<sup>1</sup> John A. Warden in his book, The Air Campaign, defines close air support as "any air operation that theoretically could and would be done by ground forces on their own, if sufficient troops or artillery were available".<sup>2</sup> MCM 3-1 further states:

Due to the proximity of friendly forces to the targets being engaged, detailed integration of each mission with the fire and movement of those forces is required. For this reason CAS missions must be executed under positive control.<sup>3</sup>

Warden is less specific but states that, "Ground commanders are basically in charge of close air support in the sense that they specify the targets".<sup>4</sup> For the purposes of this paper we will use the MCM 3-1 definition as the definition of close air support and the broader concept that Warden uses to define air support of ground forces. Close air support provides a mobile, concentrated extension of the ground unit's fire support system and is geared to unit objectives and integrated into the local commander's scheme of maneuver and concept of operations.

Close air support as defined in MCM 3-1 incorporates con-

control aspects that include such elements as forward air control (FAC), deconfliction with other operations, ground commander approval for execution, friendly and enemy force situation, target identification and marking means. These elements require communications between the ground commander in need of support and the aircraft commander who will supply that support. The actual transaction can be much more complex, involving as many as fifteen steps to complete. Examples of these are as follows: 1) scout detects target; 2) target is reported to the unit; 3) unit tells tactical air control party (TACP) that it needs close air support (CAS); 4) TACP requests CAS to Air Support Operations Center (ASOC); 5) TACPs at intermediate echelons hear request, coordinate if appropriate; 6) ASOC coordinates with the senior ground force headquarters, which approves the request; 7) ASOC calls the Tactical Air Control Center (TACC) to scramble CAS ground alert fighters; 8) TACC calls a Wing Operations Center (WOC) to scramble the alert fighters; 9) if fighters are on airborne alert or are diverted from another mission, the ASOC will contact a Control and Reporting Center (CRC); 10) The fighters then enter a Control Reporting Post or AWACS airspace and contact that controlling agency; 11) approaching the contact point (CP), the controlling agency (Airborne Warning and Control System (AWACS), Control Reporting Point (CRP), or Forward Air Control Party (FACP)) tells the fighters to contact the Airborne Forward Air Controller (FAC-A) or 12) Tactical Air Control-Airborne (TAC-A) who give the fighters their initial briefing;

13) the fighters depart the initial point (IP) as coordinated or to meet attack time, normally requiring a call to the forward controller (ground, helo, or air FAC);  
14) the forward controller gives final clearance, corrections and or instructions for weapons delivery;  
and 15) weapons are expended on target. (See Figure 1.)

The survivability of a FAC-A in the forward battle area using a fixed wing aircraft is very questionable given the hostility of the environment and his relatively continuous exposure to it. A ground FAC may be more survivable but his ability to assist the fighters in target location and identification could be significantly reduced from that of an airborne FAC. When needed, forward control from a rotary wing aircraft would appear to provide the optimum advantages of survivability and battlefield perspective, given the requirement to operate in that environment.

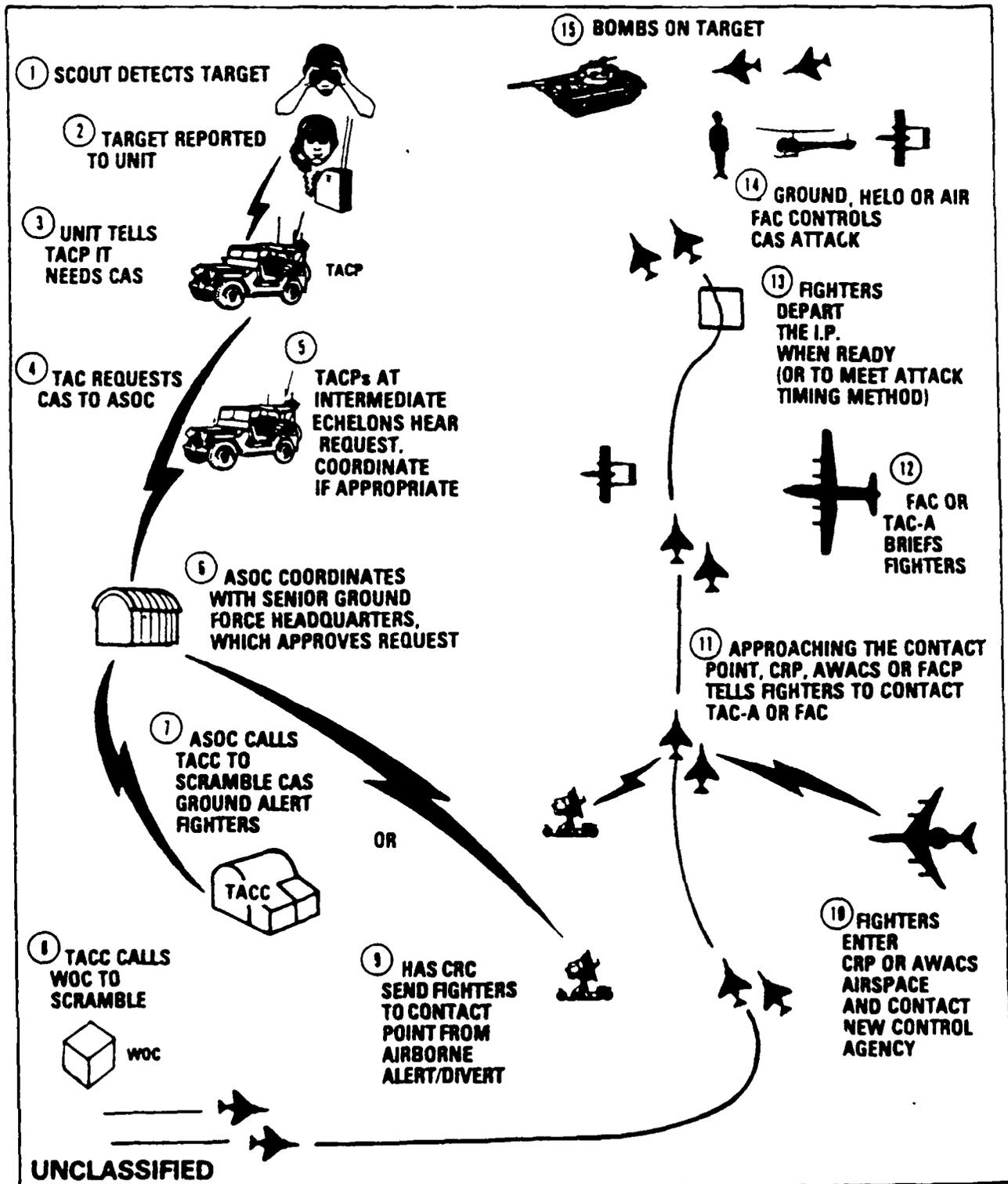
All communications require authentication procedures to be used in order to minimize enemy deception possibilities. Authentication is extremely important at the point when ordnance is to be expended. Communications jamming can severely complicate this process when compatible anti-jam radios are not used and the FAC and fighter are not in close proximity to each other at the time of attempted communication.

The widespread use of secure, jam resistant radios and digital burst relay of data will greatly help to reduce the voice communication procedures needed to

complete a CAS mission. That will require equipment that is widely available and is maintained in serviceable condition.

Figure 1

TACS Support of CAS Operations 5



In a nonlinear battle, with extensive use of maneuver and countermaneuver, even secure voice jam resistant communication nets may jam themselves with transmissions involving information on the battle situation, planning data, directive instructions and execution information. Less complex command, control and execution systems, used optimally, can be the quickest, most effective means to put bombs on target.

As the fighters approach the battle area, the commander must deconflict their efforts from those of his artillery by establishing artillery control areas (ACA) that will stop ground fire into that area while the fighters are completing their deliveries. He must further provide for deconfliction with friendly attack and support helicopters and coordinate with friendly air defense batteries.

Once into the forward area of battle the fighters need to be directed to the correct target(s) or target area. The commander must have reasonable assurance that the targets he has designated for attack are in fact the targets that will be hit and not nonpriority targets or worse, friendly force components. The target identification task is complicated by the changing nature of a maneuver battle. It can be expected that tactical deception will be used to the greatest extent possible, further complicating target location and identification. Col. Hans-Ulrich Rudel, a successful German Stuka pilot on the Eastern Front in World War II, was credited with 519 Soviet tank kills. He found that the biggest problem was acquiring the tank

and that speed was "poison for finding tanks".<sup>6</sup> In a fluid battle where German and Russian tanks were intermixed, he would have to make five or six passes to determine which tanks were Russian. He supposedly said that during the war he was shot down 36 times and that often his aircraft was hit 30 to 40 times on a single mission.<sup>7</sup> The capabilities of both attacker and defender have changed but the final stage of attack still requires target location and identification. Time delays between detection of a target and execution of the attack can also cause identification problems due to maneuver and concealment.

Target marking greatly enhances first pass weapons delivery accuracy. Marking of targets, however, is time sensitive since the mark must be visible to the attacking fighters at the time of attack and must not have moved from the desired target prior to that time due to wind or target movement. Laser type designators are not affected by wind and can generally handle target movement, but may put the designating position at risk if used too long. The longer the time of marking the more warning to the target. The shorter the marking time, the more coordination required for effective attack. Target identification without the use of some form of marking device requires the use of target grid numbers, time and distance run-ins from a known initial point, and/or verbal descriptions of the target and the salient features in its area. At the forward edge of battle we can expect

that the enemy force will be more dispersed and more mobile than in rear areas. The task of target identification by the attacker is critical to effective weapons delivery. Timely and often extensive coordination is required when conducting close operations.

The flexibility of fighter response is dependent upon the mode of operation. If fighters are on alert at an airfield located a reasonable distance from the target, the time from the request for air support until attack may be as little as thirty to fifty minutes. The increased range of Soviet fighters and the introduction of cruise missiles may put forward bases at high risk and further increase the response time to the battle area. If the fighters are holding airborne in the forward area the response time may be only a few minutes. Since close air support can be likened to waiting for a rabbit to run across a road, each mode of operation has its advantages and its risks. The use of holding provides firepower on short notice. It requires the use of rotating flights of aircraft, consumption of larger amounts of fuel, and the availability of holding airspace with all of the corresponding coordination that is required to control and deconflict that airspace. There is an increased element of risk to aircraft holding in the forward area from enemy attack and from attack by friendly forces in the flux of battle. Ground alert is less risky to the aircraft, requires a lesser commitment of air frames and consumes less fuel per period but is far less flexible to short term demands.

In summary, close air support must be flexible, must be an extension of the commander's fire support system, must be timely, must be accurate, and must be well coordinated and integrated into the commander's concept of operations. This must all be accomplished in a highly lethal, very fluid environment with players that are not collocated and must be coordinated and integrated using communication intensive systems. Close air support then must be an effective asset for the execution of fluid battle.

#### ENDNOTES

1. U.S. Department of the Air Force, MCM/IACM/AACM/PACAFM/USAFEM 3-1, Vol. III, 15 June 1987, p.1-1.
2. John A. Warden, The Air Campaign: Planning for Combat, p.101.
3. MCM 3-1, Vol.III, p.1-1.
4. Warden, p.103.
5. MCM 3-1, Vol.I, Fig.4-1.
6. Lt.Col. Price T. Bingham, U.S. Air Force, "Dedicated Fixed Wing, Close Air Support: A Bad Idea," Armed Forces Journal International, September 1987, p.60.
7. Bingham, p.60.

CHAPTER IV  
THE CLOSE AIR SUPPORT AIRCRAFT

The requirement for a close air support aircraft for operations in a high threat environment has been studied for years. These studies have led to a range of solutions involving various mixes of aircraft and weapons. Beginning in World War I, the use of aircraft changed the dimension of battle. This new technology began to render existing concepts of battle obsolete. New weapons and doctrine were needed to deal with the new battlefield dimension. World War II fostered the continuation of this development at an ever increasing pace. Technological improvements were made in the abilities of aircraft to wage war and in the lethality of the defensive weapons needed to prevent their use. The Korean war, and more so, the war in Vietnam demonstrated the potential for the use of air power as an extension of firepower for the ground commander albeit in a relatively benign surface to air threat environment. During these wars, the fighters used in close air support were generally high performance aircraft originally designed for air superiority missions. As a result of that experience, requirements were developed for a more effective close air support aircraft. The new aircraft would be very maneuverable at slow air speeds, be capable of extended time on station in the battle area, be able to carry large combat weapons loads, and be able to survive hits from ground fire. The AX design

competition was initiated in order to provide the solution to those requirements. The winner of that competition is the current Air Force dedicated close air support aircraft, the A-10. By incorporating a large straight wing design, the airplane is capable of carrying large numbers of external weapons and of maneuvering at relatively low airspeeds. The use of the internal GAU-8 30 MM cannon, and the capability to employ the Maverick anti-armor missile, allow the A-10 to stand off from the enemy and employ a lethal blow at his armor. The addition of a hardened cockpit area, redundant aircraft systems and twin engines, along with the use of foam in the fuel cells, gave the A-10 increased survivability to ground fire over its predecessors.

The general characteristics required of a follow on close air support aircraft are responsiveness, flexibility, effectiveness and survivability. Responsiveness is the ability to be available when needed, to be ready when the "rabbit crosses the road". Included in this area are the concepts of serviceability and reliability to produce high sortie rates, and the endurance to allow for a reasonable on station time. Flexibility allows the aircraft to carry a variety of weapons, deliver them where needed and in a range of environments. Effectiveness involves making maximum use of the firepower available through high weapons system accuracy. It also involves the tasks of area navigation, target location and identification and the engagement of those targets. Survivability refers to the ability to sustain

damage to the aircraft and return to base, the ability to negate threat systems, and the capability to minimize the exposure time in the threat environment.

While the capabilities of aircraft to attack ground forces have improved, surface-to-air weapons have also been improved in firepower, detection capabilities, and guidance methods and accuracy. The areas of effective engagement have expanded dramatically due to technological advances, individual weapons envelopes and the large increases in numbers of systems fielded. These systems are highly mobile and range from hand held small arms and missiles to vehicle mounted, integrated, multi-mode, multi-target capable anti-aircraft gun and missile systems. Survivability by absorbing enemy hits takes on new meaning when we move from small arms fire or some 23 MM rounds to multiple 30 MM rounds and multiple highly maneuverable surface to air missiles, some with 50-lb-class expanding rod type warheads. The emphasis rapidly shifts to threat avoidance and efforts to negate the threat. The ways to accomplish these tasks are to increase stand-off ranges for weapons employment, fly at very low altitudes and at increased speed, maneuver aggressively, use terrain as a shield, use electronic threat countermeasures equipment to increase miss distance and even include a stealthy airframe to assist in deceiving the threat's acquisition and tracking capability.

The fixed wing aircraft that can use these methods to avoid or negate threats will have to have several characteristics. It will need to be stable enough to allow extended operations

at very low altitudes and high air speeds. Airspeeds of over 500 knots have been addressed. At a speed of 550 knots the aircraft is moving at roughly 930 feet per second or one mile every six-and-one half seconds. At these speeds and altitudes ground avoidance is a major pilot task. One of the most effective methods of threat avoidance is to use terrain to mask the aircraft. This requires the use of available land features and aggressive flying of the aircraft. The design must be unstable enough to allow for rapid maneuvering in order to follow terrain features, to engage targets and to react to threats. Technological advances in airframe design, composite materials for increased strength and reduced weight, improved engine thrust and reduced fuel consumption, and the use of computer assisted flight controls will contribute to achieving these aircraft characteristics.

Advances in the electronic countermeasures capabilities may assist in making the aircraft less visible to the enemy. Decoy systems will also contribute to reducing the effectiveness of weapons fired at the machine. These systems, however, will have no effect on optically fired ballistic weapons. In addition, the systems will require varying amounts of pilot attention to operate. Again, technology can help to reduce the work load by tying the threat reaction systems to the threat detection devices on the aircraft and/or by the use of timed programs. This is not foolproof, however, since not all threats are detectable. Also, automated or timed programs are not always flexible and

may at times actually highlight the aircraft if improperly used. For this reason the pilot will have to be directly involved in the operation of these systems.

Stealth technology may be effective in reducing the signature of the aircraft to threat weapon systems; however, in a CAS environment, the repeated operations required in the forward battle area will make detection more likely, if only in the visual or infrared spectrums. The relationship of stealth design and aircraft maneuverability is another area that will need to be addressed. In addition, a stealthy aircraft will most likely lose much of that capability if conventional type weapons are hung on external mounts. Internal carriage of weapons affects the size, design and employment method to be used. As above, technologies are available but they may not do the entire job and are certain to come at a high cost.

The use of stand-off weapons to avoid entering the effective range of the threat is a concept of operations intended for use by the A-10. The range of defensive weapons, the numbers of systems and the tracking methods have improved to a point where it is highly likely that a fighter attacking deployed tanks in the forward areas will enter and be engaged by multiple enemy systems. Use of magnified optics and other magnified imaging systems are limited in the amount of assistance they can provide to the pilot. A tank sized target of a nominal size of twelve feet wide, eight feet tall and twenty-four feet long, viewed at a distance of three nautical miles,

(Approx. 18,000 feet) would represent an unmagnified target of one and one third mils (a mil is the size of a one foot object viewed at one thousand feet) side on, two thirds of a mil head on and something in between at other aspects. Magnification of three to five times still leaves a small image to engage in an attack that is minimally preplanned and will most likely require positive target identification prior to employment of weapons. If we assume visual contact with the target area at three miles and weapons employment at two miles (12,000 feet), then we have about seven seconds to detect the target, decide to engage it, track the target, insure that we are cleared to fire (direct close control) and fire the weapon. Each mile of variation one way or the other adds or subtracts about seven seconds. This is for the attack of one target on one pass. The aircraft must now maneuver to evade the threat and return to the IP (initial point) for additional attacks. We have not addressed multiple ship employment. Suffice it to say that multiple ship operations complicate the work of enemy threat systems and contribute visual mutual support but also increase the in-flight coordination and visual look-out duties involved.

These tasks are being performed at the delivery end of the sequence of events listed in an earlier section. The ground commander must have reasonable assurance that his own forces will not be attacked by friendly fighters and both he and the attacking pilots have a minimum of time to coordinate this. Maintaining situational awareness

is extremely demanding for all participants. Target acquisition is difficult even with extensive assists by technological means. The situation is complicated by the fluid nonlinear nature of the battle we have defined. Threat avoidance is complicated by the probability of having threats in multiple quadrants simultaneously.

The above situation is busy and confused enough, but the added factor of poor weather and/or darkness cause demands on all participants to multiply. As before, technologies such as LANTIRN 1 and advanced navigation systems can be incorporated to assist in navigating to an area and in general area orientation. These systems, though very capable, do not contribute greatly to the type of target identification needed for close support of ground forces, particularly at the ranges desired for stand-off survivability and within the short exposure time available. Navigation and defensive maneuvering systems optimized for interdiction mission support may very well burden a CAS mission that is more fluid and less amenable to the detailed area planning. It is reasonable to expect that, because of the difficulties of defending at night and in poor weather, the enemy will try to make use of these periods to advance. This spectrum of battle is not one that can be taken lightly. We must be able to respond flexibly and effectively in this environment.

Our development to this point has not considered opposing aircraft in the forward area of battle. There is a respectable capability on the other side both in

numbers of aircraft and in "look down shoot down" systems. Local area air superiority on both sides in this forward arena, however, is assumed to lie primarily with surface to air defense systems with some assistance from rotary wing aircraft. The lethality of the air environment in the forward battle area does not permit the use of fixed wing aircraft in a counter air role without great cost in losses from ground systems. The engagement of helicopters by fixed wing aircraft is problematic, particularly when the helicopter may be armed and when it is operating in a dense surface-to-air threat area. The helicopter can stop, move backward, forward and from side to side. The fixed wing aircraft must commit to an avenue of attack due to its speed and flight characteristics. The helicopter can achieve "nose position" very quickly which normally forces the fixed wing aircraft into a vertical mode. A vertical maneuver is very likely to present a solution to an air defense system or another helicopter before a successful attack can be completed. Is the gain worth the cost? Probably not. Helicopters can engage and defend against each other, depending <sup>on</sup> pilot skill and weapons capability.

The specific design type are all subject to debate for given operational environments. Fixed wing aircraft will have to be employed in the most effective manner possible in order to maximize the effect of this limited asset. Multiple targets will need to be engaged and destroyed on a single pass or exposure in order to prevent trading aircraft for tanks. The forward edge of the battlefield of the 1930's is not a place where fixed wing air can be

effectively employed doing close support missions on a regular basis and expect to survive. Because the mission is difficult does not mean that we can ignore the need for it. We can, however, look to other ways of accomplishing its basic requirements that provide for the optimum use of assets available to fight the battle.

There is a design type that will fit into the battlefield of the 1990's with a minimum of difficulty in firepower integration. This design is not new but is very adaptable to the requirements of close-in CAS. I am referring to the rotary wing aircraft design type.

It was stated earlier that CAS required an aircraft that was responsive to the needs of the ground commander. Helicopters can provide excellent response for several reasons. First, the helicopter can be located close to the forward battle area by virtue of its ability to operate from nearly any small cleared area or areas. This allows it to be there when it is needed and yet not require holding airspace that would be required to keep fixed wing aircraft available in the forward area. Also, because a helicopter can remain on the ground at idle power and out of direct view, it consumes less fuel and is less exposed to attack per period covered than a fixed wing aircraft. General Russ, Commander, Tactical Air Command, stated: "Whatever airframe we choose for the follow-on close air support aircraft, responsiveness is vital".<sup>2</sup> General Saint, in an article on close operations, emphasized the importance of responsiveness and integration

of air support (helicopters) in the successful battle scheme.<sup>3</sup> Included in the concept of responsiveness is the ability to provide support in virtually all weather conditions and on a twenty-four hour per day basis. The fixed wing aircraft has been modified and adapted through the application of technologies in navigation, target identification, threat detection and response, as well as in the employment of smarter weapons. These improvements come at considerable cost and are best used for larger target types and with detailed preflight planning. The helicopter, on the other hand, due to its ability to view from hover and choose its speed of movement as well as its ability to change direction quickly, can more effectively deal with darkness, poor weather and a fluid battle environment dealing with specific targets.

Flexibility is an aspect of close air support that relates closely with responsiveness. It deals with the ability to provide a variety of missions, including various weapons types when needed. The mobility of firepower as well as high weapons accuracy and effectiveness are included here. General Russ, in describing CAS aircraft weapons delivery, stated: "It will need to deliver... weapons with surgical accuracy, because it will operate often near friendly troops".<sup>4</sup> The helicopter can also provide the commander with reconnaissance capability and close attack firepower as well as some capability to do limited battlefield air interdiction in certain conditions. With the exception of some free fall, high explosive weapons deliv-

eries, the helicopter can provide forward firing ord-  
nance deliveries and the capability to lay down mines in  
specific areas. The helicopter has the added flexibility  
of being able to provide survivable forward air control  
for fighters when needed, while requiring none for itself.

Mission effectiveness is an additional requirement  
for close air support. This characteristic relates to  
the first two listed. Effectiveness will also require an  
understanding of the commander's scheme of battle. This will  
allow air to anticipate needs and employ force to achieve  
maximum impact with a minimum amount of communication.  
The helicopter unit commander has the opportunity to  
regularly meet directly with the ground commander that  
he is supporting. This allows him to be aware of near  
term and longer term objectives as well as allowing an  
exchange of information contributing to a better situa-  
tional awareness of all players. Due to the relatively  
close geographic location of the air and ground components,  
radio communications have a better chance of being useable  
than for fixed wing air moving in and out from greater  
distances. Weapons accuracy improves with improved target  
acquisition. Target acquisition improves with the number  
of cues in the target area and with the amount of time  
available to acquire the target. A helicopter pilot has  
a very good understanding of his local operating area.  
We have said that he is in a position to have a current  
accurate situational assessment and by the use of low  
hover he can more accurately identify targets even in

poor weather and at night than can a pilot of a fixed wing aircraft moving at over nine hundred feet per second trying to stay clear of the ground and evade a large threat array that can generally "see" him.

Survivability is the fourth required characteristic for a close air support aircraft. Survivability can be taken to mean the ability to "absorb" hits from enemy weapons. As discussed in previous paragraphs, the ability of an aircraft to "get home" with some combat damage is an excellent design requirement. The concept of hardening an aircraft to operate in a threat zone in the 1990's is not sound. The most effective way to survive an enemy threat is to avoid it, the most effective way to avoid it is to stay out of it's envelope. This can be accomplished by preplanned routing, by remaining below the threat's low altitude capability, by out-maneuvering its weapons when fired or by using terrain to "mask" the activity of the aircraft until it intends to employ its own weapons. Helicopters have an advantage in using terrain and low altitude to avoid threats. The use of low hover, terrain masking, masked movement to new observation or firing positions, and use of such technologies as mast mounted sensors to allow target observation and identification from positions out of enemy systems field of view, give helicopters a unique ability to operate in the forward battle area. Their ability to operate from dispersed locations in both the forward and rear areas, allows them to present a significant targeting problem to the enemy

and give them a reasonably survivable basing mode. The ability to go to where the logistic support is, within reason, and the commonality of such weapons as TOW/Hellfire and fuel types, give the helicopter a flexibility to match the fluid battle environment.

#### ENDNOTES

1. LANTIRN stands for low altitude, night, target identification, recognition and navigation system.

2. General Robert D. Russ, U.S. Air Force, "The Air Force, The Army and the Battlefield of the 1990's", Defense 88, July/August 1988. p.13.

3. Lt.Gen. Crosbie E. Saint and Col. Walter H. Yates, U.S. Army, "Close Operations: Attack Helicopter Operations in the Airland Battle", Military Review, June 1988.

4. Russ, p.14.

CHAPTER V  
CONCLUSION

The force composition in the forward battle area has undergone extensive change as has the effectiveness of the weapons employed there. The fixed wing aircraft provided a significant advantage to the execution of land battle in the forward area. Because of its capability to influence the outcome of battles, technologies have been and continue to be developed to prevent its use in that area.

Counter technologies are being applied to aircraft, avionics and weapons in order to maintain effective mission capability. Such advances as global positioning systems, digital burst transmission of data, brilliant weapons capable of some target discrimination, advanced aerodynamic designs capable of high speed maneuverability and electronic countermeasures, to cite a few, will enhance the capability of future aircraft and will also significantly increase their cost. The basic problem of locating, identifying and attacking mobile targets will remain primarily a pilot task. Those tasks must be completed in an ever shorter time frame.

The advantages of fixed wing aircraft speed and extended range are not optimized in this environment. At the same time, advances in rotary wing technology have produced the capability to provide mobile firepower to the forward commander with a high degree of control and effectiveness. The Army has extensive experience in operating rotary wing

aircraft. In fact, many of the helicopter missions flown are directly involved in the forward battle. This paper does not create a role for helicopters that does not exist already. The point is one of degree of use and emphasis in the airland battle scheme. Equipment modernization programs need to continue in both the Army and the Air Force. The objective of that modernization must fit into an integrated realistic concept of operations that maximizes the effect of the joint force.

Targets with known locations, within range and reasonable probability of kill of artillery should be attacked by artillery. Targets whose exact locations are not known or whose range exceeds the effective use of artillery become candidates for fixed wing aircraft. Targets that are more dispersed, mobile and require high levels of coordination and control should be candidates for helicopters. This is not to say that fixed wing aircraft will never be involved in the forward battle. They can be used for high priority areas in concert with helicopters on precoordinated strikes. These strikes require additional force packaging such as threat suppression and electronic countermeasures forces to enhance survivability and mission effectiveness.

What constitutes close air support in the sense of supporting the ground commander is a gray area. A variety of targets and missions have a direct impact upon the outcome of the individual battle. A wider number affect the outcome of the campaign. The objective must be to place the emphasis on combinations of assets and missions

so as to optimize their use and maximize their operational effect.

We have looked at the high threat complex scenario in order to "worst case" the CAS mission. Significant portions of this environment will likely exist in lower intensity conflicts as well. Lower threat environments will undoubtedly exist. In those situations, coordination, identification, firepower needs and survivability may make fixed wing aircraft the most effective option. In those cases, the forward control and coordination would best be accomplished by the CAS Army helicopter.

The mix of assets that can operate in the high threat arena can operate in a lower threat scenario. The mix optimized for the lower threat arena will, most likely, not survive in the high threat scenario. The helicopter has the operational flexibility to be effective across the spectrum of conflict.

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