REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
14-02-2005	FINAL	

4. TITLE AND SUBTITLE

Joint Close Air Support Transformed

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Richard K. Bohn Jr., Major, USAF

Paper Advisor (if Any): Prof Douglas Hime

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Joint Military Operations Department
Naval War College
686 Cushing Road
Newport, RI 02841-1207

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Distribution Statement A: Approved for public release; Distribution is unlimited.

13. SUPPLEMENTARY NOTES A paper submitted to the faculty of the NWC in partial satisfaction of the requirements of the JMO Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.

14. ABSTRACT

Operations Enduring Freedom and Iraqi Freedom have begun to demonstrate the rapid evolution of Joint Close Air Support (JCAS). The integration and synchronization of air and ground fires in support of JCAS is being influenced by a number of factors including: technology of military weapon systems, transformation of the armed forces structure, the rapid maneuver capability of ground forces, and the changing nature of the war against terrorism. Sound training and the capability to execute TTPs in a variety of conditions will be required of many airmen, sailors, soldiers and marines. Not only will the operators be required to exhibit great flexibility to conduct the mission, but the weapon systems themselves must be capable of increased levels of joint interoperability and utility.

This paper investigates how the military can most effectively integrate air power and ground forces to optimize the shaping of the battle space and then seamlessly shift to an effective and safe environment for JCAS operations. To realize the full potential of JCAS operations, it is argued that leadership must address the limitations and lack of quality JCAS training, joint doctrine, targeting methods and the absence of interoperability across the spectrum of DOD weapon systems.

15. SUBJECT TERMS

Joint Close Air Support, Air Interdiction, Transformation, Joint Doctrine

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			Chairman, JMO Dept
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED		27	**19b. TELEPHONE NUMBER** *(include area code)* 401-841-3556

Standard Form 298 (Rev. 8-98)

NAVAL WAR COLLEGE
Newport, RI

Joint Close Air Support Transformed

By

Richard K. Bohn Jr.
Major, United States Air Force

A paper submitted to the faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: _____

14 February 2005

_____
Professor Douglas Hime
JMO Department

Table of Contents

GLOSSARY

BDA. Battle damage assessment is the timely and accurate estimate of damage resulting from the application of military force. It is composed of physical damage assessment, functional damage assessment, and target system assessment. (JP 2-0)

FSCL. Fire support coordination line is a coordinating measure that is established and adjusted by appropriate land or amphibious force commanders within their boundaries in consultation with superior, subordinate, supporting, and affected commanders. Fire support coordination lines facilitate the expeditious attack of surface targets of opportunity beyond the coordinating measure. (JP 3-0)

JDAM. Joint Direct Attack Munition uses an integrated inertial navigation system (INS) and Global Positioning System (GPS) tail-kit to adjust the tail fins and steer the bomb to preplanned coordinates.

JOINT FIRES. Fires produced during the employment of forces from two or more components in coordinated action toward a common objective. (JP 3-09)

PGM. Precision-guided munitions are weapons that use either INS or GPS to steer themselves to the desired point of impact (DPI) (such as JDAMs), or are laser-guided bombs (LGBs) that use external sources (reflected laser energy) for target location and the bomb's seeker-head controls the fins that steer it to that DPI.

TST. Time-sensitive targets are those targets requiring immediate response because they pose (or will soon pose) a danger to friendly forces or are highly lucrative, fleeting targets of opportunity. (JP 3-60)

ABSTRACT

Operations Enduring Freedom and Iraqi Freedom have begun to demonstrate the rapid evolution of Joint Close Air Support (JCAS). The integration and synchronization of air and ground fires in support of JCAS are being influenced by a number of factors to include: technology of military weapon systems; transformation of the armed forces structure; the rapid maneuver capability of ground forces; and the changing nature of the war against terrorism. Sound training and the capability to execute TTPs in a variety of conditions will be required of many airmen, sailors, soldiers and marines. Not only will the operators be required to exhibit great flexibility to conduct the mission, but the weapon systems themselves must be capable of increased levels of joint interoperability and utility.

This paper investigates how the military can most effectively integrate air power and ground forces to optimize the shaping of the battle space and then seamlessly shift to an effective and safe environment for JCAS operations. To realize the full potential of JCAS operations, this paper argues that leadership must address the limitations and lack of quality JCAS training, joint doctrine, targeting methods and the absence of interoperability across the spectrum of DOD weapon systems.

INTRODUCTION

In the short period spanning Operation DESERT STORM, Operation ENDURING FREEDOM (OEF) and Operation IRAQI FREEDOM (OIF), the U.S. military has had to significantly change the way it integrates and sequences joint air and ground fires. Joint Close Air Support (JCAS) is one such fire that has evolved rapidly to integrate fire support from multiple weapon systems in the air-land battle space faster than joint doctrine and training can be developed and implemented. Just as significantly, technology and advances in precision-guided munitions (PGMs) are outpacing doctrine and the methods of accurately targeting those weapons regarding JCAS operations. Further, in the transformed military of the twenty-first century, JCAS operations must be conducted using many of the same weapon systems employed during other phases of operations. This paper investigates how the military can most effectively integrate air power and ground forces to optimize the shaping of the battle space and then seamlessly shift to an effective and safe environment for JCAS operations. In order to realize the full potential of JCAS operations, it will be argued that leadership must address the limitations and lack of quality JCAS training, joint doctrine, and targeting methods as well as the absence of interoperability across the spectrum of DOD weapon systems.

Close air support is defined by joint doctrine as "air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces."[1] Air Interdiction (AI) operations are defined as "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."[2]

The U.S. Air Force merges AI and CAS operations under the mission known as "counterland operations." Specifically, the Air Force defines counterland as "operations conducted to attain and maintain a desired degree of superiority over surface operations by the destruction, disrupting, delaying, diverting or other neutralization of enemy forces. The main objectives of counterland operations are to dominate the surface environment and prevent the opponent from doing the same."[3] OIF demonstrated the combined power of air and ground forces and the potential effect of joint synchronization on the enemy's ability to resist. I believe that if joint training, doctrine and inter-service operability are increased in counterland and JCAS operations, the combatant commander's objectives will be more rapidly and efficiently met.

The tactics, techniques, and procedures (TTPs), doctrine, training and purpose of CAS have long been contentious issues among U.S. military experts because CAS has been perceived as being an ancillary mission. Early proponents of strategic air power, in general, very consciously tried to avoid assignment of this mission to their fledgling service as the rationale for justifying the existence of the Air Force as a separate entity. Immediately following World War II, for instance, most Air Staff officers, including Generals Carl Spaatz, Hoyt Vandenberg and Curtis LeMay did not want to provide secondary support to the Army in the form of air artillery, and chose to primarily develop airmen for strategic attack missions.[4] The Korean and Vietnam Wars presented the U.S. military with adversaries and terrain features that caused ground forces to rely heavily on CAS. It was during these conflicts that many airmen in Tactical Air Command and Strategic Air Command became

familiar with and proficient in CAS operations.[5] Even these experiences, however, failed to produce the impetus among the military's leadership to increase and formalize the required level of joint training and proficiency among the air and ground forces tasked with executing this critical mission. The Cold War and, in particular, the threat of a Soviet invasion across Europe motivated the military's development of the AirLand Battle doctrine.[6] This doctrine integrated air and land operations to halt or slow the Soviet advance, in which CAS and AI were essential elements to engage enemy forces. The end of the Cold War and break up of the Soviet Union resulted in a drastic draw down of U.S. forces and a diminished likelihood of having to execute the AirLand Battle doctrine. In recent history, Operation DESERT STORM was marked by an extensive air operation highlighted by strategic attack, air interdiction and close air support. The thirty eight-day air war was followed by only four days of ground operations. CAS sorties were resultantly limited and received very little attention from either the Air Force or Army. Furthering the trend, Operation ALLIED FORCE, the 1999 air war over Serbia, was conducted without deployment of friendly ground forces. The absence of executing CAS lowered it even more on the priority list of Air Force missions and deemphasized the necessity to conduct extensive joint air and ground training. OEF and the Global War on Terrorism (GWOT) saw the reemergence of air power being directly controlled by ground forces to direct tactical fires against the enemy's supplies and forces. Finally, OIF has relied heavily on the synchronization of air and ground power to engage and overwhelm the enemy's ground forces.[7] In contrast to Operations DESERT STORM and ALLIED FORCE (OAF), OIF's air operations did not culminate with a ground invasion, but were executed simultaneously requiring detailed joint command, control and coordination of countless tactical and operational fires.

This paper recognizes the efforts currently in progress by the Joint National Training Capability (JNTC), led by the U.S. Joint Forces Command, to transform all aspects of joint military training.[8] In fact, the cornerstone demonstration for defining JNTC initial operating capability was the JCAS training event in January 2004. All aspects of JCAS were assessed, including planning, execution, command and control between all levels, synergistic effects of fires, battle damage assessment (BDA) and prevention of fratricide.[9] Additionally, the U.S. military services, including U.S. Special Operations Command, signed a "joint close-air support memorandum of agreement" in September of 2004 that should pave the way for a single document and supporting joint doctrine to standardize the TTPs of JCAS.[10]

TRANSFORMATION AND TECHNOLOGY

The DOD must continue its transformation to meet both twenty-first century peer competitor threats as well as those less-resource-demanding challenges that are likely to be more asymmetrically taxing than have been conflicts of the past. Successfully countering such threats will require the military to be lean, agile and capable of quickly deploying with just enough forces to accomplish the mission. General Richard Myers, Chairman of the Joint Chiefs of Staff, noted that while technology plays a role in transformation, the more difficult challenge is "in thinking how we're going to act and interact with each other."[11] OEF and OIF have highlighted a few key issues of how the "transformed" U.S. military can plan and execute JCAS missions. Among these issues are: fire support measures and geographical coordination of rapidly moving forces; technology and the accuracy of PGMs; and airspace deconfliction, considering the multitude of weapon systems being employed. Moreover, the challenges of executing JCAS missions by today's lean and flexible armed forces must be

balanced with the ability to execute a host of many other missions our military and government are tasked to complete.

Since the end of the Cold War, one key aspect similar among all surviving weapon systems is that they must be flexible instruments capable of performing multiple missions. Current DOD transformation efforts make this implied requirement an essential characteristic for the survival of any military weapon system. For example, unmanned aerial vehicles (UAVs) have quickly evolved from reconnaissance-only platforms to real-time targeting platforms and BDA assets, and have already been employed as weapon delivery systems against time sensitive targets (TSTs), as demonstrated in OEF. The army's Crusader howitzer program, on the other hand, illustrates what a transforming military cannot acquire because of its redundancy with other systems and its lack of deployability. Further, as a result of its cancellation, the U.S. Army was asked to accelerate other indirect fires research and development programs consisting of precision munitions and rockets.[12] In response to a military member's question during a recently-staged media event, the Secretary of Defense, Donald Rumsfeld, commented, "You go to war with the Army you have . . . not the Army you might want or wish to have." This statement typifies the challenges the military faces with a decreasing number of weapon systems available, coupled with the increasing types of missions it is being asked to perform. Nowhere is the need for flexible weapon systems more prevalent than in the missions of JCAS and AI. The pilot's capability to flex to a completely new mission while airborne is becoming more expected, regardless of service, and a significant enabler of or obstacle to expected agility can be the flexibility of the hardware and software being operated.

The integration of precision-guided weapons with a host of weapon systems has been instrumental to the quickly evolving JCAS and AI missions. Two types of weapons, the Joint Direct Attack Munition (JDAM), which is GPS guided, and the laser-guided bomb have been critical to increasing the interoperability of more weapon systems with respect to JCAS. The accuracy of these weapons and emerging methods to update the final point of impact while the weapon is in ballistic flight greatly increase weapon effectiveness and safety when used in close proximity to friendly forces. Additionally, GPS-guided weapons are not hampered by night or weather, and the geographic coordinates programmed in the weapon's tail kit, which steers the weapon, can be rapidly updated or changed via voice or data link. The inability of the JDAM to strike a moving ground or sea target has been a key deficiency and limitation while executing JCAS; however, those limitations are currently being eliminated. Until very recently, a JDAM would receive a set of geographic coordinates from air strike planners or the executing aircrew, and GPS satellites would guide the weapon to within feet of that programmed location. In recent tests, a B-52H bomber successfully employed nine JDAMs against a moving sea target. The guided weapons were released from the aircraft, and during the JDAMs' approximately sixty-second time-of-fall, the subsequently successful bombs received continuous updates of the ship's location from an E-8C Joint Stars aircraft.[13] Additionally, bombers (such as the Air Force's B-2s, B-1s and B-52s) are capable of long loiter times in the target area without refueling and can carry up to 80 precision-guided weapons in a single aircraft. Whether such a fire is being delivered from the sea, land or air, the technological advancement of being able to place a high explosive in an area defined by a few feet means more weapon systems are capable of performing the JCAS or interdiction missions in direct coordination with friendly ground forces.

TRAINING AND DOCTRINE

The joint force commander is tasked by joint doctrine to synchronize and integrate the actions of air, land, sea, space, and special operations forces to achieve strategic and operational objectives through integrated joint campaigns and major operations.[14] The task of integrating JCAS operations presents significant coordination challenges that are complicated by the necessity of establishing and moving the fire support coordination line (FSCL). The FSCL is a fire support coordinating measure that facilitates the expeditious attack of surface targets of opportunity beyond the coordinating line by ensuring that such fires will not have an adverse effect on supporting elements in the vicinity of the attack or behind the FSCL. It applies to all fires provided by air, land and sea-based weapon systems and does not define a boundary between close and deep operations.[15] The establishment of a FSCL is considered a permissive measure aimed to facilitate freedom to attack ground targets beyond this line. However, the FSCL is relatively static and, according to doctrine, "should follow well-defined terrain features."[16] Some problems associated with using a geographically defined FSCL include: 1) inaccurate descriptions of the terrain based on ground or air perspective; 2) difficulty in identifying the FSCL in weather and at night; and 3) excessive time required to change, coordinate and implement a new FSCL.[17] One method of facilitating expeditious attacks of surface targets has been the development of latitude-longitude defined grid boxes. A driving force behind the use of grid boxes has been USCENTCOM's "Concept of Operations for Joint Fires."[18] CENTCOM's employment of this concept during OEF and OIF to facilitate air attacks on the friendly side of the FSCL, without the arduous task of moving it, resulted in increased flexibility and responsiveness of

air power and allowed ground forces to request fires from weapon systems not capable of visually identifying the intended target.

In addition to doctrine lagging behind new methods of coordination measures, joint doctrine does not adequately address the use of precision-guided weapons. The current version of JP 3-09.3, Joint Tactics, Techniques and Procedures for CAS, mentions the use of and discusses some limitations of laser-guided and GPS-guided weapons.[19] However, it addresses neither the types of weapon systems that employ precision-guided weapons nor does it address or standardize how various weapon systems can update, refine and change target coordinates within minutes prior to their attack runs. This lack of detail in JP 3-09.3, which was recently updated, demonstrates the speed with which technology is outpacing updates of doctrine and TTPs.

In addition to joint doctrine, joint air and ground crew training for JCAS operations remains in its infancy compared to the more established joint missions of the armed forces. One explanation is that JCAS in the past has been a specialty mission performed by a very limited number of airmen, marines and army ground forces, for which training was minimal. In a U.S. Air Force panel study done in the late 1980s, the final report recommended to the departments of the Air Force and Army that, "The CAS mission has unique requirements that are important enough to our military posture to deserve a dedicated aircraft."[20] Findings and recommendations such as this enforced the belief that weapon systems should be designed and operated for specific missions, but failed to stress the need for interoperability and joint applications throughout the DOD. Additionally, a more recent effort to conduct large-scale JCAS training occurred during the JNTC Combined Arms Exercise (CAX) 4-04. Navy, Air Force, Marine and Army units all participated; however, of all the JCAS-capable weapon

systems in the DOD, only Air Force F-16s and Marine attack aircraft were used. Such narrow platform participation seems to indicate a presumption at the JNTC-level that JCAS involves very limited types of aircraft and weapon systems. Lessons learned from CAX 4-04 also seemed to be very fundamental and included comments such as, "cultural and philosophical differences between Marines and Air Force with regard to CAS resulted in crews from both services expressing dissatisfaction with the amount of time spent doing target descriptions for CAS targets."[21] In essence, Air Force crews were dissatisfied with incomplete target descriptions and the absence of 9-line briefs, while Marine forward air controllers complained of excessive time to get bombs on target.

In an attempt to compensate for a lack of doctrine and joint TTPs, some individual units throughout the U.S. military have established informal agreements for CAS training. These units have created training opportunities as a result of unofficial lessons learned in OEF and have exercised on a small scale in preparation for OIF. Although these training opportunities are creative and sometimes effective methods to perform JCAS missions at a tactical level, the procedures used and developed are often non-standardized and weapon system specific. Consequently, this lack of uniformity increases confusion amongst air and ground forces when faced with operations consisting of multiple weapon systems and dynamic combat situations.

ANALYSIS

JCAS is a rapidly evolving mission as demonstrated in OEF and OIF. Once regarded as a specialty mission to be conducted by a limited number of aircraft, it is now a critical capability that more weapon systems are required to execute. The application of JCAS is being influenced by a number of factors to include: technological advances in precision

weapons, the changing structure of armed forces due to military transformation efforts, the growing ability of ground forces to maneuver over large distances quickly, and the changing character of the war against terrorism.

Technology and the precision with which munitions can be delivered without visually identifying the target are key factors propelling the evolution of JCAS. Integration of technology into all aspects of JCAS operations is critical regardless of whether forces are executing fires from the air or from the ground. A perfect example is the OIF battle for Fallujah during 2004. The JCAS portion of the operation was conducted using aircraft from all services, and nearly every weapon expended was precision-guided, launched or dropped from altitudes preventing visual identification of the targets. The effectiveness of the operation was marked by employment of standardized procedures, expenditure of precision weapons, and execution of a clear airspace deconfliction plan.[22] An additional benefit that technology has had on JCAS is the increasing accuracy with which PGMs strike their targets. Precise accuracy enables the use of smaller weapons to achieve the same desired effects as greater numbers of less-precise weaponry, which translates to more weapons per aircraft available to service more targets, less collateral damage, and decreased chances for fratricide.

Although there have been significant advances in PGMs, air power has had difficulty successfully engaging moving targets on the battlefield. This results in a significant limitation during JCAS operations and unacceptable risk to friendly ground forces. Technology is helping to alleviate this challenge, and recent flight tests have demonstrated how high altitude bombers or fighters can be used to successfully engage and destroy a moving target in support of JCAS. One test consisted of an E-8C Joint Stars aircraft, linked with a B-52H carrying multiple GPS-guided weapons, the latter of which successfully

engaged a moving ship.[23] This test demonstrated that any JDAM-class weapon could be used in the JCAS or AI role against moving ground targets, and the delivery procedures could be nearly transparent to the pilots of all weapon systems carrying JDAMs. Integration and location of the Joint Stars aircraft, however, would require the development of additional procedures and planning considerations—certainly, a reasonably-easy task.

The Joint Stand-Off Weapon (JSOW) and the Joint Air-to-Surface Stand-Off Missile (JASSM) can also be effective weapons in a JCAS role, particularly if the air defense threat is high and the target can be struck in near real-time (5 to 20 minutes from release). The JSOW is a GPS-guided weapon and has a range of approximately 30 nautical miles (nm), while the JASSM is GPS and optically guided with over a 200 nm range. Recent flight tests have demonstrated that the desired point of impact of GPS-guided weapons, with respect to a moving target, can be updated while enroute to the target. During these tests a Tactical Air Control Party (TAC-P) used a laser range finder (LRF) in conjunction with an operational software suite to generate digital, geographic coordinates. The updates were then provided from the TAC-P to the weapon via a Link-16 network.[24] Tests such as these by the Air Force demonstrate the need for common (or at least compatible) hardware and software throughout DOD and standardized training and qualifications for JCAS ground controllers, to include special forces and related CIA operatives. Technology will not be able to eliminate what Clausewitz called the "friction" and "fog of war," but its ability to attenuate these effects has outpaced joint training and doctrine.

Transformation of the U.S. military can be described as the process of changing the structure of its military forces to include the nature of its culture and the doctrine supporting its forces. Moreover, transformation will streamline our warfighting functions to more

effectively meet the complexity of emerging threats in the new millennium.[25] Thus, transformation is another catalyst for the evolution of JCAS, and its effects must be analyzed and actively adopted in all aspects of training, doctrine and interoperability of hardware and software systems. The 2002 Unified Command Plan directs USJFCOM to be the lead command for developing the ways and means to increase joint interoperability and synergy in military training programs. Many initiatives have been started by USJFCOM that address deficiencies in joint interoperability. The Command seems to be on the right track toward better joint training and rehearsal exercises, more realistic evaluation of command and control, more thorough TTPs and planning phases, and has established lead agency responsibility for the interoperability of data interfaces (i.e., can my system talk to your system?). Unfortunately, many of these initiatives will take years to become effectively implemented. Procurement, testing and integration of hardware and software systems that enables all joint tactical air controllers (JTACs) to consistently communicate with aircrews, or directly with the weapons, is years away. Moreover, the simulated and actual military training ranges are currently inadequate to effectively conduct and evaluate JCAS operations with the multitude of weapons and weapon systems currently in DOD's inventory.[26]

The ability of our Marine and Army ground forces to maneuver quickly in the battle space is a capability that has also outpaced the TTP's and doctrine of JCAS and AI. Fire support coordination measures (FSCMs) are doctrinally inadequate to synchronize many JCAS and AI fires required by the joint force commander's tactical and operational plans. In support of OEF and OIF, CENTCOM was successful in developing alternate procedures for inadequate doctrine. The grid box system, for instance, has been unofficially used since

NATO's Operation ALLIED FORCE in Kosovo and became procedural for air and ground forces by inclusion in CENTCOM's OIF special instructions.

U.S. forces also enjoy substantial advantages when operating in darkness and bad weather. The requirement to conduct JCAS missions during these conditions also exemplifies the inadequacy of our current FSCMs when coupled with the fluidity of today's battle space and the speed of ground maneuver.

The global war on terrorism has also had significant effects on the role and execution of JCAS. The war on terror rapidly shifts from special forces operations to major combat operations and back to counter-insurgent or special forces operations. The nature of this conflict is such that our military forces must be extremely adaptable to evolving enemy tactics and strategy at all times. Therefore, all aspects of our military power must be able to perform a variety of missions with little or no warning. This flexibility is especially true of special forces soldiers who are now more frequently the consumers of JCAS. During Operation DESERT STORM, for instance, there were thirty operational detachment teams of special forces operating independent of conventional forces. In OIF, however, there were over 100 special forces teams who worked closely with the conventional forces in the air and on the ground.[27] As the need for air support continues to increase for special forces, the requirement for qualified TAC-Ps is becoming much higher than the Air Force can supply.[28] Even if the Air Force could supply enough TAC-Ps, however, these airmen have not been trained to operate in the conditions or methods of special forces personnel. TAC-Ps are not the only units with limited or no training experience with special forces. The military's current large force exercises conducted with joint U.S. forces have very little or no integration with special forces on a large, deliberate scale. This lack of training appears to be

largely a result of specialized weapon systems performing specialized missions. A further complication of providing air support to special forces is that such requests are generally unplanned events in reaction to superior enemy maneuvers. Therefore, providing focused, precise JCAS to special forces exacerbates many of the current shortfalls and requires an even more extensive analysis of the joint training, doctrine and interoperability challenges facing the DOD.

CONCLUSION AND RECOMMENDATIONS

Our highly responsive and most agile battlefield weapons systems of the future are likely to be lighter, stronger, more deployable and, most importantly, more flexible. As a result, the ability to synchronize air and ground power relies, in part, on the skills and training of operators to quickly transition from one type of mission to the next at a moment's notice. Nowhere is this more true than during JCAS operations. Sound training and the capability to execute standardized TTPs in a variety of conditions will be required of many airmen, sailors, soldiers and marines. Not only will the operator be required to exhibit great flexibility to conduct the mission, but the weapons systems themselves must be capable of increased levels of joint interoperability and utility. USJFCOM has been tasked with the conduct of joint training and is responsible to the Joint Chiefs of Staff and the combatant commanders worldwide. The JNTC is the centerpiece for joint training and is currently conducting simulated and live joint force exercises in an attempt to establish this system's initial operating capability. The ability to emulate combat operations at a joint operational level is a daunting task, and while the JNTC is attempting to do just that, its model is still developing, and many exercises will be executed at the rudimentary or intermediate levels for the next few years.

The capabilities demonstrated during OEF and OIF are a fraction of what is possible for JCAS and AI operations of the future. Many of the necessary JCAS skills and lessons learned in the preparation and conduct of those operations are perishable and must be captured at the joint tactical and operational levels for inclusion in joint doctrine. Additionally, special forces are becoming a more frequent consumer of JCAS, and counterland missions are being conducted more often using special forces for target identification. As a result, counterland procedures executed with the help of special forces are beginning to be indistinguishable from the TTPs used for JCAS.

To realize the full impact technology can have on the JCAS missions, the Services must continue to integrate the hardware and software into common, interoperable systems. Procuring weapons that can be used on multiple aircraft, such as the GBU-38 (500-lb JDAM), is a positive indicator that the Services are on the right track. Basic common JCAS tools such as secure satellite communications, data link networks and laser range finders must be fielded to all units conducting JCAS and AI. These systems must be joint procurement ventures, and when the weapons systems and data transfer interfaces become truly interoperable, the development and execution of joint doctrine and TTPs will also become more standardized and easier to accomplish. In addition to demanding joint interoperability of military hardware and software as it relates to JCAS and AI, military forces conducting joint training and large force exercises must plan and execute JCAS and AI from an operational level. If adequately planned and orchestrated by operational-level commanders and staffs, the requirement for all military forces to be represented, including Special Operations Command, will be apparent. Further, each service must consciously equip and train all units that will perform the mission of JCAS. If properly developed and

documented in unit training plans at the tactical level, service weapon systems and operators will also find themselves during larger joint force exercises conducting operational planning and execution of the JCAS and AI missions in support of ground forces. Finally, the military is being transformed and a significant aspect is streamlining our warfighting functions. The development of joint doctrine has to include technological advances and such efforts must recognize the growing capabilities of many weapon systems to perform missions not thought possible only a few years ago.

NOTES

[1]U.S. Joint Chiefs of Staff, Joint Tactics, Techniques and Procedures for Close Air Support, Joint Pub 3-09.3, Washington DC: 3 September 2003, I-1.

[2]U.S. Joint Chiefs of Staff, Doctrine for Joint Interdiction Operations, Joint Pub 3-03, Washington DC: 10 April 1997, II-4.

[3]Department of the Air Force, Counterland Operations, Air Force Doctrine Document 2-1.3, 27 August 1999, 92.

[4]Air Chiefs of Staff, Generals Carl Spaatz and Hoyt Vandenburg encouraged the service to focus on developing an atomic strike force of intercontinental bombers. The Strategic Air Command would be critical to winning the next war, which was thought to be a nuclear war against the Soviet Union as noted in John D. Sherwood, Officers in Flight Suits: The Story of American Air Force Fighter Pilots in the Korean War (New York: New York University Press, 1996) 169.

[5]Walter J. Boyne, Beyond the Wild Blue, A History of the U.S. Air Force (New York: St. Martin's Press, 1997) 56-59, 154.

[6]Phil M. Haun, "Direct Attack: A Counterland Mission," Air and Space Power Journal 17, No. 2 (Summer 2003): 13.

[7]Scott Jasper, Michael Binney, "Joint Close Air Support Training Transformation," Marine Corps Gazette 88, No. 5 (May 2004): 71-73.

[8]The JNTC creates joint warfighting conditions through a networked collection of interoperable training sites and nodes that combine personnel, doctrine and technology to achieve combatant commander and service training requirements. It will use live, virtual and constructive (L-V-C) training environments, and the network will focus on joint training, experimentation, testing, education and mission rehearsal, by linking command and control, training facilities, ranges and simulation centers throughout the world as described by Gordon C. Nash, "Statements Before the House Armed Services Subcommittees on Capabilities of the Joint National Training Capability." 1-24. http://www.jfcom.mil/newslink/storyarchive/2004/sp031804.htm. Accessed: December 16, 2004.

[9]Ibid, 6.

[10]Sandra Erwin, "Services Sign Off on Common Procedures for Close-Air Support," National Defense 89, No. 612 (November 2004): 33.

[11]Jim Garamone, "Myers Stresses Transformation in War on Terror," *American Forces Press Service* (February 19, 2004) http://www.af.mil/news/story_print.asp?storyID=123007018 Accessed: January 30, 2005, 1.

[12]Joe Burlas, "DOD Wants to Accelerate Indirect Fires Technology," *Army News Service* May 16, 2002. http://www4.army.mil/ocpa/print.php?story_id_key=888 Accessed: January 30, 2005, 1.

[13]Tonya Keebaugh, "Resultant Fury Successful Thanks to 'Test' Airmen," *53rd Wing Public Affairs* December 14, 2004. http://www.af.mil/news/story_print.asp?storyID=123009411 Accessed: January 30, 2005, 1.

[14]U.S. Joint Chiefs of Staff, Doctrine for Joint Operations, Joint Pub 3.0, Washington DC: 10 September 2001, X.

[15]Joint Pub 3-09.3, GL-9.

[16]Joint Pub 3-09.3, GL-10.

[17]Mick Quintrall, "A Change-Challenge: The Fire-Support Coordination Box," Air and Space Power Journal 16, No. 3 (Fall 2002): 8.

[18]Ibid, 12.

[19]Joint Pub 3-09.3, V-53.

[20]"USAF Panel Urges Separate CAS, Interdiction Aircraft," Aviation Week and Space Technology (July 27, 1987): http://web.lexis-nexis.com/universe/document Accessed: 10 December, 2004, 22.

[21]P.C. Schreck, "Quick Look Outbrief for the JNTC Horizontal Training Exercise Conducted During Combined Arms Exercise (CAX) 4-04," 30 January 2004. https://jcas.eglin.af.mil/docs/040130_JNTCCAX_Outbrief.pdf Accessed: January 30, 2005, 5.

[22]Christopher E. Tucker, "CVW-17 Supports Coalition Ground Forces in Fallujah," *USS John F. Kennedy Public Affairs* November 22, 2004 http://www.news.navy.mil/search/display.asp?story_id=16032 Accessed: February 1, 2005, 1.

[23]Tonya Keebaugh, 1.

[24]Kyle Swope, "Link-16/Seeker Flight Demonstration," https://jcas.eglin.af.mil/Protected/reportsbriefs/0412FlightTestWhitepaper.pdf Accessed: January 30, 2005, 1.

[25]U.S. Joint Forces Command, "What is Transformation?" http://www.jfcom.mil/about/transform.html Accessed: December 16, 2004, 1.

[26]Scott Jasper, 74-77.

[27]Admiral E.P. Giambastiani, "Remarks for Industry Symposium 2004," http://www.jfcom.mil/newslink/storyarchive/2004/sp031704.htm Accessed: December 16, 2004.

[28]Christian M. Karsner, "The Integration of Special Forces into U.S. Air Force Counterland Operation," Special Warfare 16, No. 1 (April 2003): 3.

SELECTED BIBLIOGRAPHY

"USAF Panel Urges Separate CAS, Interdiction Aircraft," Aviation Week and Space Technology July 27, 1987. 22. http://web.lexis-nexis.com/universe/document Accessed: 10 December, 2004.

Anthony, Charles. "Guard F-16's Provide Marines Close-Air Support in Fallujah." National Guard (May 2004): 34.

Barrie, Douglas. "Close Call Close Air Support Is Back on the British Agenda Following the Air Campaign Against Iraq." Aviation Week & Space Technology 159, No. 1 (July 7, 2003): 49.

Bentley, Christopher, F. "Joint and Coalition Fire Support in Operation Anaconda." Field Artillery (Sep-Oct 2002): 10-14.

Boyne, Walter J. Beyond the Wild Blue, A History of the U.S. Air Force. New York: St. Martin's Press, 1997.

Burlas, Joe. "DOD Wants to Accelerate Indirect Fires Technology." *Army News Service* May 16, 2002. http://www4.army.mil/ocpa/print.php?story_id_key=888 Accessed: January 30, 2005.

Campbell, Bryan E. "Joint Close Air Support (JCAS) Joint Test and Evaluation (JT&E)." The Air Land Sea Bulletin 2001-2-3 (December 2001): 4-9.

Department of the Air Force. Counterland Operations. Air Force Doctrine Document 2-1.3, 27 August 1999.

Erwin, Sandra, I. "Revised Rules for Close Air Support." National Defense (July 2004): 19.

Garamone, Jim. "Myers Stresses Transformation in War on Terror." *American Forces Press Service* February 19, 2004. http://www.af.mil/news/story_print.asp?storyID=123007018 Accessed: January 30, 2005.

Hawkins, Donald, S. "Close Air Support in the U.S. Marine Corps: A FAC's Perspective." Marine Corps Gazette (September 2003): 48-52.

Hura, Myron and McLeod, Gary. Enhancing Dynamic Command and Control of Air Operations Against Time Critical Targets. Santa Monica, CA: RAND, 2002.

Haun, Phil M. "Direct Attack-A Counterland Mission." Air and Space Power Journal 17, 2 (Summer 2003): 9-16.

Jasper, Scott and Binney, Michael. "Joint Close Air Support Training Transformation." Marine Corps Gazette 88, No. 5 (May 2004): 71-73.

Karsner, Christian, M. "The Integration of Special Forces into U.S. Air Force Counterland Operation." Special Warfare 16, No. 1 (April 2003): 3.

Keebaugh, Tonya. "Resultant Fury Successful Thanks to 'Test' Airmen." *53rd Wing Public Affairs* (December 14, 2004) http://www.af.mil/news/story_print.asp?storyID=123009411 Accessed: January 30, 2005.

Kennedy, Harold. "Military Steps Up Training for Joint Close-Air Support." National Defense 89, No. 613 (December 2004): 44-46.

Nash, Maj Gen Gordon C., "Statements Before the House Armed Services Subcommittees On Capabilities Of The Joint National training Capability." http://www.jfcom.mil/newslink/storyarchive/2004/sp031804.htm. Accessed: December 16, 2004, 1-24.

Quintrall, Mick. "A Change-Challenge: The Fire-Support Coordination Box." Air and Space Power Journal 16, No. 3 (Fall 2002): 7-16.

Sherwood, John D. Officers in Flight Suits: The Story of American Air Force Fighter Pilots in the Korean War. New York: New York University Press, 1996.

Swope, Kyle. "Link-16/Seeker Flight Demonstration." https://jcas.eglin.af.mil/Protected/reportsbriefs/0412FlightTestWhitepaper.pdf Accessed: January 30, 2005, 1.

Tucker, Christopher E. "CVW-17 Supports Coalition Ground Forces in Fallujah." *USS John F. Kennedy Public Affairs* (November 22, 2004) http://www.news.navy.mil/search/display.asp?story_id=16032 Accessed: February 1, 2005, 1.

U.S. Joint Chiefs of Staff, Doctrine for Joint Interdiction Operations. Joint Pub 3-03. Washington DC: 10 April 1997.

U.S. Joint Chiefs of Staff. Joint Tactics, Techniques, and Procedures for Close Air Support. Joint Pub 3-09.3. Washington, DC: 3 September 2003.

USJFCOM, "What is Transformation?" http://www.jfcom.mil/about/transform.html. Accessed: February 1, 2005, 1.

Wall, Robert. “Fight Control in Iraq: A Rarely Used Command-and-Control Aircraft Helped Direct the Marine Corps’ Close Air Support.” Aviation Week & Space Technology 158, No. 24 (June 16, 2003): 164.

Wall, Robert. “War Expansion May Require New Operational Techniques.” Aviation Week & Space Technology 156, No. 17 (April 29, 2002): 55.