Joint Pub 3-09.3

Joint Tactics, Techniques, and Procedures for Close Air Support (CAS)

1 December 1995

PREFACE

1. Scope

This publication provides tactics, techniques, and procedures for use by supported and supporting commanders, terminal controllers, air control agencies, and aircrews in fixed- and rotary-wing aircraft to attack targets in close proximity to friendly forces. It presents options the joint force commander can employ in the planning and execution of close air support in joint operations.

2. Purpose

This publication has been prepared under the direction of the Chairman of the Joint Chiefs of Staff. It sets forth doctrine and selected joint tactics, techniques, and procedures to govern the joint activities and performance of the Armed Forces of the United States in joint operations and provides the doctrinal basis for US military involvement in multinational and interagency operations. It provides military guidance for the exercise of authority by combatant commanders and other joint force commanders and prescribes doctrine for joint operations and training. It provides military guidance for use by the Armed Forces in preparing their appropriate plans. It is not the intent of this publication to restrict the authority of the joint force commander (JFC) from organizing the force and executing the mission in a manner the JFC deems most appropriate to ensure unity of effort in the accomplishment of the overall mission.

3. Application

a. Doctrine and selected tactics, techniques, and procedures and guidance established in this publication apply to the commanders of combatant commands, subunified commands, joint task forces, and subordinate components of these commands. These principles and guidance also may apply when significant forces of one Service are attached to forces of another Service or when significant forces of one Service support forces of another Service.

b. The guidance in this publication is authoritative; as such, this doctrine (or JTTP) will be followed except when, in the judgment of the commander, exceptional circumstances dictate otherwise. If conflicts arise between the contents of this publication and the contents of Service publications, this publication will take precedence for the activities of joint forces unless the Chairman of the Joint Chiefs of Staff, normally in coordination with the other members of the Joint Chiefs of Staff, has provided more current and specific guidance. Commanders of forces operating as part of a multinational (alliance or coalition) military command should follow multinational doctrine and procedures ratified by the United States. For doctrine and procedures not ratified by the United States, commanders should evaluate and follow the multinational command's doctrine and procedures, where applicable.

For the Chairman of the Joint Chiefs of Staff:

WALTER KROSS
Lieutenant General, USAF
Director, Joint Staff

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- **Explains the Process of Aircraft Requesting and Tasking for Preplanned and Immediate CAS**
- **Outlines Considerations for CAS Employment Planning**
- **Provides Standardized and Situation-Specific Procedures Applicable to CAS Execution**

General

Close air support (CAS) supports military objectives assigned to tactical units or task forces.

Close air support (CAS) provides firepower in offensive and defensive operations to destroy, disrupt, suppress, fix, or delay enemy forces in close proximity to friendly forces. **Each component has the capability to perform CAS** and all forces/capabilities participating in the joint CAS mission must be integrated during joint operations. CAS assets should be employed in a manner that takes advantage of Service-unique capabilities and minimizes limitations. CAS requires **detailed planning, coordination, and training** for effective and safe execution.

Maneuver force commanders request CAS to augment organic supporting fires. **CAS is integrated with other fire support assets** to support maneuver forces. Supporting air commanders optimize support to requesting units. **Employment considerations differ for fixed- and rotary-wing aircraft.** In a joint force, the integration of CAS-capable aircraft can take advantage of different, but complementary, capabilities of each platform.

The conditions for effective CAS are: air superiority, suppression of enemy air defenses, target marking, favorable weather, prompt response, aircrew and terminal controller skill, appropriate ordnance, communications, and command and control.

Command, Control, and Communications

CAS requires an integrated, flexible, and responsive command and control structure.

Joint and component airspace control agencies rely on dependable, secure communications systems. Joint force connectivity, critical to CAS success, must exist between the Air Force theater air control system, Army air-ground system, Navy tactical air control system, Marine air command and control system, and special operations command and control. Aircrews performing CAS in joint operations utilize the communications nets and architecture of the requesting component. **Communications must be flexible and responsive** to ensure that links between aircraft and ground units are maintained.

Requests for CAS

CAS is requested for situations where CAS can be employed to enhance mission accomplishment.

The employment of both preplanned and immediate CAS follows **a process of requesting and tasking**. CAS begins with a request from a maneuver commander for CAS to augment organic supporting fires. The CAS requirements foreseeable early enough to be included in the joint air tasking order or mission order are forwarded as **preplanned requests**. Alert aircraft requirements are also pre-identified and used to support immediate requests. **Immediate requests** arise from situations that develop once the battle is joined and are those that cannot be identified early enough to allow detailed coordination and planning.

General Planning Considerations

When planning CAS missions, consideration is given to mission, enemy, terrain and weather, troops and support available, and time available.

CAS is employed in each of the following phases: prehostilities; lodgment; decisive combat and stabilization; follow-through; and posthostilities and redeployment. Commanders can employ CAS in close proximity to friendly forces throughout the depth of the battlefield — in offense and defense, and in deep, close and rear operations. **Support** received from CAS can be **general or direct. Navigation planning is critical** and everyone in the joint CAS process must use a common datum. **Control procedures** must be established to deconflict air operations and special techniques which are employed to integrate CAS with other supporting arms. **Logistics efforts** must ensure CAS is timely and responsive to adequately support the ground forces. **A specific and timely CAS request** will allow for proper preplanned logistic support and will increase the probability that the allocated aircraft will be appropriately armed for the mission.

General Considerations for Execution

Standardized procedures need to be followed for CAS execution.

Security procedures, synchronized timing coordination, and aircraft check-in procedures are applicable to all CAS operations. **Target marking** aids aircrews in locating the precise target and reduces the possibility of fratricide. Marking can be accomplished by the use of lasers, infrared devices, direct or indirect fire, aircraft, and the radar beacon forward air controller. The **terminal controller** has the authority to clear aircraft to release weapons only after specific or general release from the maneuver force commander. CAS execution can be assisted by **laser-guided systems** which provide the joint force with the ability to locate and engage targets with an increased probability of a first round hit.

Night/Adverse Weather

Night/adverse weather CAS is one of the most difficult missions on the battlefield.

CAS must sometimes be provided at night, during periods of limited visibility, or under adverse weather conditions. These situations accentuate the CAS requirements for rigorous training, detailed mission planning, and solid communications and procedural discipline. There can be **advantages** to night/adverse weather conditions such as the limitations it imposes on enemy optically directed equipment. A major **disadvantage** is that CAS aircrews and ground forces may have difficulty in pinpointing targets and accurately locating both enemy and friendly positions. For night/adverse weather conditions, **CAS planners should select munitions and aircraft offering the greatest accuracy, firepower, and flexibility**. Night CAS employs a mixture of modern night vision devices, infrared pointers, laser systems, battlefield illumination, and standard procedures.

Fixed-Wing CAS

Fixed-wing aircraft positioning and logistics play a part in CAS planning and execution.

Fixed-wing CAS aircraft can be based on main operating bases on land and naval ships afloat, well behind the battle area. These locations offer the widest range of support, such as available ordnance, mission equipment, and logistics. **The aircraft can be deployed to forward operating bases,** which decreases transit time and increases time on station but may limit flexibility of munitions available.

Rotary-Wing CAS

When attack helicopters perform CAS, it is normally as a unit and as part of a component's organic assets.

Attack helicopters are employed in a variety of roles. Normally, attack helicopters are employed by components as organic assets. **Army armed and attack helicopters are usually employed as a maneuver unit** capable of all normal maneuver force missions. In most circumstances, the Army does not consider attack helicopters a CAS system, although they can perform the CAS function when operating in support of another component. **Marine Corps attack helicopters are also employed in a variety of roles, including CAS.** Generally, attack helicopters are not included in air apportionment decisions, nor are they normally tasked via the Air Tasking Order (ATO). In some military operations other than war situations, however, attack helicopter missions will be on the ATO for deconfliction purposes. When cross-component attack helicopter missions are required, attack helicopters can be performing a CAS or maneuver unit function.

Attack helicopters basing, logistics, and other planning factors affect the effectiveness of the rotary-wing CAS execution.

Attack helicopters operate in the forward areas of the battlefield. They have main operating bases, yet these bases are fairly close to the battle area. **Forward arming and refueling points** are located in the forward area for aircraft support.

The **maneuver commander** plans to employ attack helicopters using the factors of mission, enemy, terrain and weather, troops and support available, and time available. The aviation commander employs his attack helicopters in the way that best supports the maneuver commander. The commander may employ attack helicopters to conduct either dedicated CAS alone, as part of a joint aviation task force, or as an augmenting force.

CONCLUSION

JTTP for CAS provide guidance for aircraft involved in the attack of targets in close proximity to friendly forces. Joint procedures and terminology enable ground personnel and pilots in fixed- and rotary-wing aircraft to plan and execute effective CAS operations. Effective communications, requesting, tasking, planning, and execution are critical to the success of CAS missions.

CHAPTER I
INTRODUCTION, ORGANIZATION, AND FUNDAMENTALS

"Among military men it is a commonplace that interallied and interservice operations inescapably pose grave difficulties in execution. Differences in equipment, in doctrine, in attitude and outlook stemming from contrasting past experience all inhibit and complicate harmonious interaction. Past successes, however, have shown that these difficulties can be overcome where determination is present and effective procedures have been applied by properly trained troops. Experience also shows that armed forces . . . have been slow to hammer out the necessary procedures. Often corrective steps have been achieved only after many failures in battle. In no area of interservice operations has this phenomenon been more pronounced than in the matter of close air support."

Professor I. B. Holley, Jr.,
Case Studies in the Development of Close Air Support

1. Introduction

This publication focuses on the joint tactics, techniques, and procedures (JTTP) for the execution of close air support (CAS) in a joint environment. Although simple in concept, **CAS requires detailed planning, coordination, and training** for effective and safe execution. The charter of this publication is to establish the doctrinal foundation for **standardized joint procedures and terminology** for use by ground personnel and by pilots in fixed- and rotary-wing aircraft for ordnance delivery by aircraft in close proximity to friendly forces.

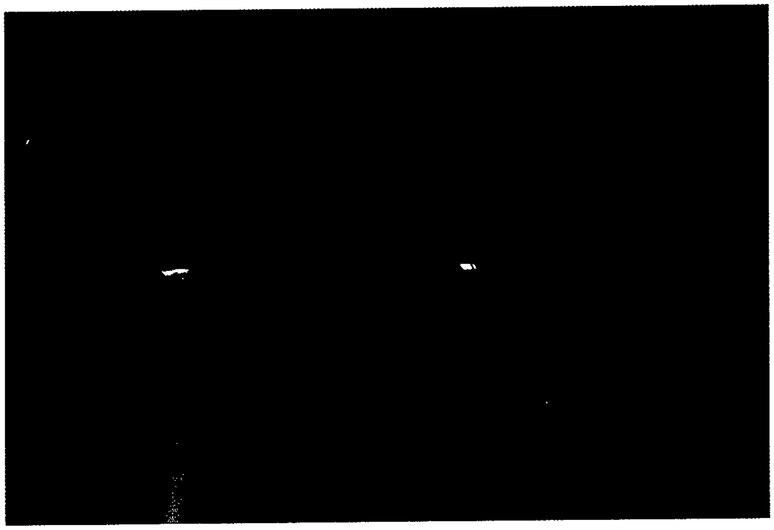
2. Purpose

This chapter **defines CAS** in a joint environment to facilitate universal understanding; **addresses fratricide avoidance**; discusses the **use and integration** of CAS; describes **fixed-** and **rotary-wing** CAS employment; describes the **conditions** for effective CAS; and delineates the joint force command **responsibilities** for the conduct of CAS across the range of military operations.

3. Close Air Support Defined

a. Joint Pub 1-02, "DOD Dictionary of Military and Associated Terms," defines CAS as **"air action by fixed- and rotary-wing aircraft against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces." Joint CAS is CAS conducted through joint air operations** (as described in Joint Pub 3-56.1, "Command and Control for Joint Air Operations") or in the case of rotary-wing aircraft, through the establishment of a command relationship between components (see Chapter III, "Requesting and Tasking," paragraph 9).

b. **CAS is a tactical level operation. CAS is planned and executed to accomplish military objectives assigned to tactical units or task forces.** CAS planning focuses on the **ordered arrangement** and **maneuver of combat elements** in relation to each other and/or to the enemy to achieve combat objectives. Although CAS is a tactical operation, it is linked to the operational art through the air apportionment process.



CAS is provided to ground commanders when the situation requires detailed integration of firepower against enemy forces.

c. **CAS can be conducted at any place and time friendly combat forces are in close proximity to enemy forces.** The word "close" does not imply a specific distance; rather, it is situational. **The requirement for detailed integration** because of proximity, fires, or movement **is the determining factor**. CAS provides firepower in offensive and defensive operations to destroy, disrupt, suppress, fix, or delay enemy forces.

d. At times, **CAS is the best force available to mass lethal capability rapidly** in order to exploit tactical opportunities or to save friendly lives. **Each Service performs CAS** within its organic capabilities, organization, and training. As a result, **a variety of aircraft are capable of performing CAS**. Some, however, are better designed and suited for the CAS mission than others. Regardless of Service, **all aircraft capable of performing CAS must be fully integrated into joint operations** to give the joint force commander (JFC) flexibility in force employment.

e. The **Service and special operations perspectives** on CAS operations can be found in Appendix A, "Service and Special Operations Perspectives on CAS."

4. Fratricide

a. **General.** Fratricide, or casualties to friendly forces caused by friendly fire, is an unwanted, undesirable, and avoidable side effect of warfare. **All the JTTP outlined throughout this publication are intended to avoid fratricide.**

b. **Causes.** Though occasionally the result of malfunctioning weapons, **fratricide has often been the result of confusion on the battlefield**. Causes include misidentification of targets, target location errors, target locations incorrectly transmitted or received, and loss of situational awareness by either terminal controllers, CAS aircrews, or requestors. The bottom line is that **it is critical for all participants in the CAS process to realize that they can contribute to unintentional or inadvertent friendly fire incidents.**

c. **Responsibility. All participants in the CAS employment process** — maneuver commanders, fire support coordinators, targeteers, terminal controllers, and aircrews — **are responsible for the effective and safe execution of CAS.** Each participant must make every effort possible to ensure friendly units and enemy forces are correctly identified prior to the release of ordnance.

d. **Training. JFCs, components, and units must habitually emphasize joint training that routinely exercises these JTTP** to create a knowledge and understanding of the battlefield in situations in which CAS may be employed.

5. Use of CAS

Maneuver force commanders request CAS to augment organic supporting fires. They can use CAS to attack the enemy in a majority of weather conditions, day or night. Improvements in tactics, techniques, procedures, and equipment have improved the ability of aircraft to provide support. **The speed, range, and maneuverability of aircraft allow them to attack targets other supporting arms cannot effectively engage** because of limiting factors, such as target type, range, terrain, or the ground scheme of maneuver.

a. **Battlefield Utility. CAS provides commanders with uniquely flexible and responsive fire support.** Properly employed, commanders focus the firepower of CAS at decisive places and times to achieve their tactical objectives. **Using CAS, commanders can take full advantage of battlefield opportunities. The three-dimensional mobility and speed of aircraft** provides commanders with a means to strike the enemy swiftly and unexpectedly.

b. **Usage Criteria. The maneuver force commander considers the following criteria in planning for CAS:**

- **Mission** and **concept of operations.**
- **Enemy air defenses** and the joint force's ability to counter them.
- **Integration** with other supporting arms.
- **Types of CAS assets** available.

6. CAS Integration

CAS is integrated with other fire support measures to support maneuver forces. Whether conducting offensive or defensive operations, **commanders focus CAS at key points** throughout the depth of the battlefield. **Priority for the assignment of CAS is to support the commander's intent and concept of operation.** Commensurate with other JFC mission requirements, supporting air commanders posture their assets to optimize support to requesting units.

7. Fixed- and Rotary-Wing CAS Employment

The organizational structure, missions, and the characteristics of CAS-capable aircraft determine how CAS is employed. In a joint force, the integration of CAS-capable aircraft allows maneuver force commanders to take advantage of the distinctly **different**, but **complementary, capabilities** of each platform to support the fire and maneuver of their units. **Although fixed- and rotary-wing aircraft can both provide CAS, employment considerations differ**. Traditional planning and employment methods for fixed-wing CAS may not be best for rotary-wing aircraft.

a. While attack helicopters and fixed-wing aircraft capabilities are complementary, **neither type can fully replace the air support provided by the other**. The range, speed, and ordnance load of fixed-wing

Close air support operations provide flexible and responsive fire support at decisive places to assist commanders in achieving their tactical objectives.

aircraft and the helicopter's excellent responsiveness and ability to operate in diverse conditions are distinct advantages peculiar to each.

b. **Fixed-wing aircraft are typically tasked and employed in terms of aircraft sorties.** A sortie is defined as an operational flight by one aircraft performing a single mission. **Fixed-wing CAS sorties are usually flown in groups of two to four aircraft.** In the Air Force, these small groups are called flights; in the Navy and Marines, sections (two aircraft) or divisions (four). Special operations AC-130 gunships typically operate single-ship sorties during hours of darkness.

c. **Army aviation units** are organic to corps and divisions and **perform missions as part of a combined arms team**. Army helicopters are normally tasked through mission-type orders passed to a battalion or cavalry squadron, which executes the mission as an integral unit/maneuver element. **Special situations may arise that dictate employment of attack helicopters in smaller units.** Although they can perform CAS missions in smaller groups, **the preferred employment of Army attack helicopters is as an integral unit**, operating under the control of a maneuver commander with mission-type orders.

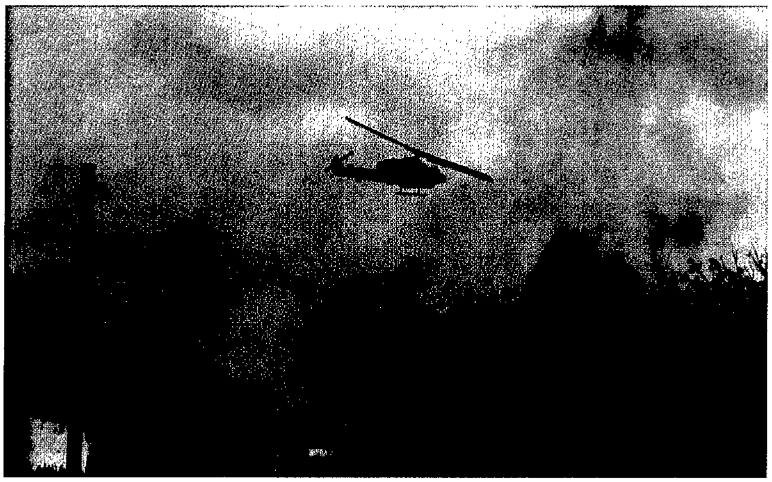
d. **Marine Corps attack helicopters** are organized in squadrons and **typically operate in sections and divisions**. These units are assigned to and are integral to the Marine air-ground task force (MAGTF).

e. The Joint Force Special Operations Component Commander (JFSOCC) maintains a small fleet of special operations helicopters. These are normally armed for defensive protection but can perform emergency CAS. However, on occasion, specially equipped special operations forces (SOF) helicopters can provide organic CAS for SOF ground forces.

8. Conditions for Effective CAS

See Figure I-1.

a. **Air Superiority. Air superiority permits CAS to function more effectively and denies that same advantage to the enemy.** It may range from local or temporary air superiority to control of the air over the



Attack helicopters provide capabilities complementary to fixed-wing aircraft and are preferably employed as organic/integral units under the control of a maneuver commander or MAGTF.

CONDITIONS FOR EFFECTIVE CLOSE AIR SUPPORT

AIR SUPERIORITY

SUPPRESSION OF ENEMY AIR DEFENSES

TARGET MARKING

FAVORABLE WEATHER

PROMPT RESPONSE

AIRCREWS AND TERMINAL CONTROLLER SKILL

APPROPRIATE ORDNANCE

COMMUNICATIONS

COMMAND AND CONTROL

Figure I-1. Conditions for Effective Close Air Support

entire area of responsibility/joint operating area. See Joint Pub 3-01, "Joint Doctrine for Countering Air and Missile Threats."

b. **Suppression of Enemy Air Defenses (SEAD). SEAD may be required for CAS aircraft to operate within areas defended by enemy air defense systems.** Available means to suppress enemy air defense threats include **destructive** and **disruptive means.** See Joint Pub 3-01.4, "JTTP for Joint Suppression of Enemy Air Defenses (J-SEAD)" for more information.

c. **Target Marking. The requesting commander can improve CAS effectiveness by providing timely and accurate target marks.** Target marking aids CAS aircrews in building situational awareness, locating, and attacking the proper target. See Chapter V, "Execution," for further details.

d. **Favorable Weather. Favorable visibility improves aircrew effectiveness** regardless of aircraft type. **Adverse weather CAS** is available through **specially-equipped aircraft** and **radar beacons**; however, radars or radar beacons may not work well in conditions of heavy precipitation. **Before CAS missions are executed, minimum weather conditions will be met.** The air unit commander determines the minimum weather required for CAS missions.

e. **Prompt Response.** To be effective, **CAS must provide a timely response to the request**. Streamlined request and control procedures improve responsiveness. Prompt response allows a commander to exploit fleeting battlefield opportunities. **Techniques for improving response time include:**

- The use of **forward operating bases (FOBs)** to decrease the distance to the area of operations.

- Placing aircrews on **ground** or **airborne alert status.**

- **Delegating launch** and **divert authority** to subordinate units.

f. **Aircrew and Terminal Controller Skill.** CAS execution is complex. **Aircrew and terminal controller skills influence mission success.** Maintaining a high degree of skill requires that aircrews and terminal controllers **practice frequently**. Frequent training is essential to maintain the skill and currency required to successfully accomplish the CAS mission in a joint environment. In addition, training with all maneuver elements is essential.

g. **Appropriate Ordnance.** To achieve the desired level of destruction, neutralization, or suppression of enemy CAS targets, **it is necessary to tailor the weapons load and arming and fuzing settings for the required results**. For example, cluster and general purpose munitions would be effective against troops and vehicles in the open, whereas hardened, mobile, or pinpoint targets may require specialized weapons such as laser guided, electro-optical, infrared munitions, or aircraft with special equipment or capabilities. In all cases, **the requesting commander needs to know the type of ordnance to be expended** (especially cluster munitions).

h. **Communications. CAS requires dependable and interoperable communications** between aircrews, air control agencies, terminal controllers, requesting commanders, and fire support agencies.

i. **Command and Control. CAS requires an integrated, flexible command and control (C2) structure** to process CAS requirements, assign assets, communicate taskings, deconflict fires and routing, coordinate support, establish airspace control measures, and update or warn of threats to CAS assets.

9. Responsibilities

a. **The Joint Force Commander. The JFC establishes the guidance and priorities for CAS** in the concept of operations, operation or campaign plans, air apportionment decision, and by making capabilities and forces available to the components. For CAS, as in other mission areas, the JFC should allow Service tactical and operational groupings to function generally as they were designed (see Appendix A, "Service and Special Operations Perspectives on CAS"). However, **it is the JFC that is ultimately responsible for accomplishing the joint force mission** and accordingly has the authority to do this as the JFC sees fit.

b. **The Joint Force Air Component Commander (JFACC).** JFCs will normally designate a JFACC. **The JFACC draws authority and responsibilities from the JFC** to accomplish the tasks and missions assigned. In the case of joint CAS, **these responsibilities normally include planning, coordinating, recommending air apportionment** (after consulting with other component commanders), **allocating capabilities/forces made available, and tasking joint CAS operations**. The allocation for joint CAS sorties is made by aircraft type and unit and is depicted in the joint air tasking order (ATO). Attack helicopters are generally not included in the air apportionment recommendation or decision, but can be made available (normally as units as opposed to sorties) as directed by the JFC. **The JFACC should ensure close integration in planning and execution** with the most senior tactical level surface commanders.

c. **Component Commanders. Component commanders are responsible for ensuring that their assets are properly organized, trained, and equipped to conduct CAS missions** in support of their own requirements, in addition to supporting other requesting components when directed.

CLOSE AIR SUPPORT IN WORLD WAR I

Despite the losses inflicted on attacking aircraft, aerial attack of front-line troops appeared, on the whole, to be quite effective. On November 23, 1917, for example, RFC D.H. 5 fighters (a type used almost exclusively for ground-attack duties) cooperated with advancing British tanks, attacking artillery positions at Bourlon Woods as the tanks advanced. Subsequent analysis concluded that "the aeroplane pilots often made advance possible when the attacking troops would otherwise have been pinned to the ground." The critical problem affecting the quality of air support in the First World War was, interestingly, one that has appeared continuously since that time as well: communication between the air forces and the land forces. During these early operations, communication was virtually one-way. Infantry would fire flares or smoke signals indicating their position, or lay out panel messages to liaison aircraft requesting artillery support or reporting advances or delays. For their part, pilots and observers would scribble messages and send them overboard (on larger aircraft, crews carried messenger pigeons for the same purpose). Though by 1918 radio communication was beginning to make an appearance in front-line air operations — as evidenced by its employment on German ground-attack aircraft such as the Junker J1 and on Col. William Mitchell's Spad XVI command airplane — it was still of such an uncertain nature that, by and large, once an airplane had taken off it was out of communication with the ground until it had landed. Thus attack flights — both Allied and German — tended to operate on what would now be termed a "prebriefed" basis: striking targets along the front of the basis of intelligence information available to the pilots before the commencement of the mission. The "on-call" and "divert" CAS operations associated with the Second World War and subsequent conflicts were not a feature of First World War air command and control, though attack flights often loitered over the front watching for suitable targets of opportunity, as would their successors in the Second World War.

SOURCE: Richard P. Hallion, Strike From The Sky, The History of Battlefield Air Attack 1911-1945, Smithsonian Institute Press, ©1989

CHAPTER II
COMMAND, CONTROL, AND COMMUNICATIONS

"The measure of command and control effectiveness is simple: either our command and control works faster than the enemy's decision and execution cycle or the enemy will own our command and control."

Fleet Marine Force Manual 3

1. Purpose

CAS requires an integrated, flexible, and responsive command and control structure to process CAS requirements **and a dependable, interoperable, and secure communications architecture** to exercise control. This chapter outlines the joint and component airspace control agencies involved and joint force connectivity required for integrated CAS operations.

2. General

The JFC normally exercises operational control (OPCON) through component commanders. CAS in joint operations is controlled via **the joint air operations center (JAOC)**, using host component organic C2 architecture. Figure II-1 graphically illustrates joint force CAS connectivity. **The JFACC/JFC staff requires reliable, secure communications** to exchange information with component commanders. In joint operations, **components provide and operate the C2 systems**, which have similar functions at each level of command. If a JFACC is designated, **the JFACC tasks capabilities/forces made available for joint tasking through these Service component C2 systems**. Figure II-2 depicts functional equivalents among the US Air Force (USAF) theater air control system (TACS), Army air-ground system (AAGS), Navy tactical air control system (NTACS), Marine air command and control system (MACCS), and special operations command and control, as well as liaison elements.

3. CAS Support for Joint Force Operations

During joint force operations, **a command relationship between land components** (e.g., tactical control [TACON], OPCON, support) **may or may not exist.**

a. **If a command relationship is established between components, the supporting component uses the CAS C2 system of the supported component.** For example, if an Army brigade is OPCON to a Marine MAGTF, the Army brigade directs CAS requests through the brigade fire support element (FSE) to the Marine fire support coordination center (FSCC) in the MACCS. The CAS request is handled the same as any other CAS request in the MACCS system.

b. **If a command relationship is not established between components, each component forwards CAS requests utilizing its respective CAS process to the JAOC for consideration/fill.** For example, a MAGTF and an Army division are operating as adjacent units under the JFC. Each component would direct CAS requests through their respective CAS process to the JAOC for consideration/fill.

c. Figures II-3 (Air Force/Army TACS/AAGS nets) and II-4 (Navy/Marine amphibious tactical air control system [ATACS] nets) depict **component air C2 agencies** and **communications nets**. This information is provided for supporting components to determine **control agencies** and **frequency band connectivity** for CAS.

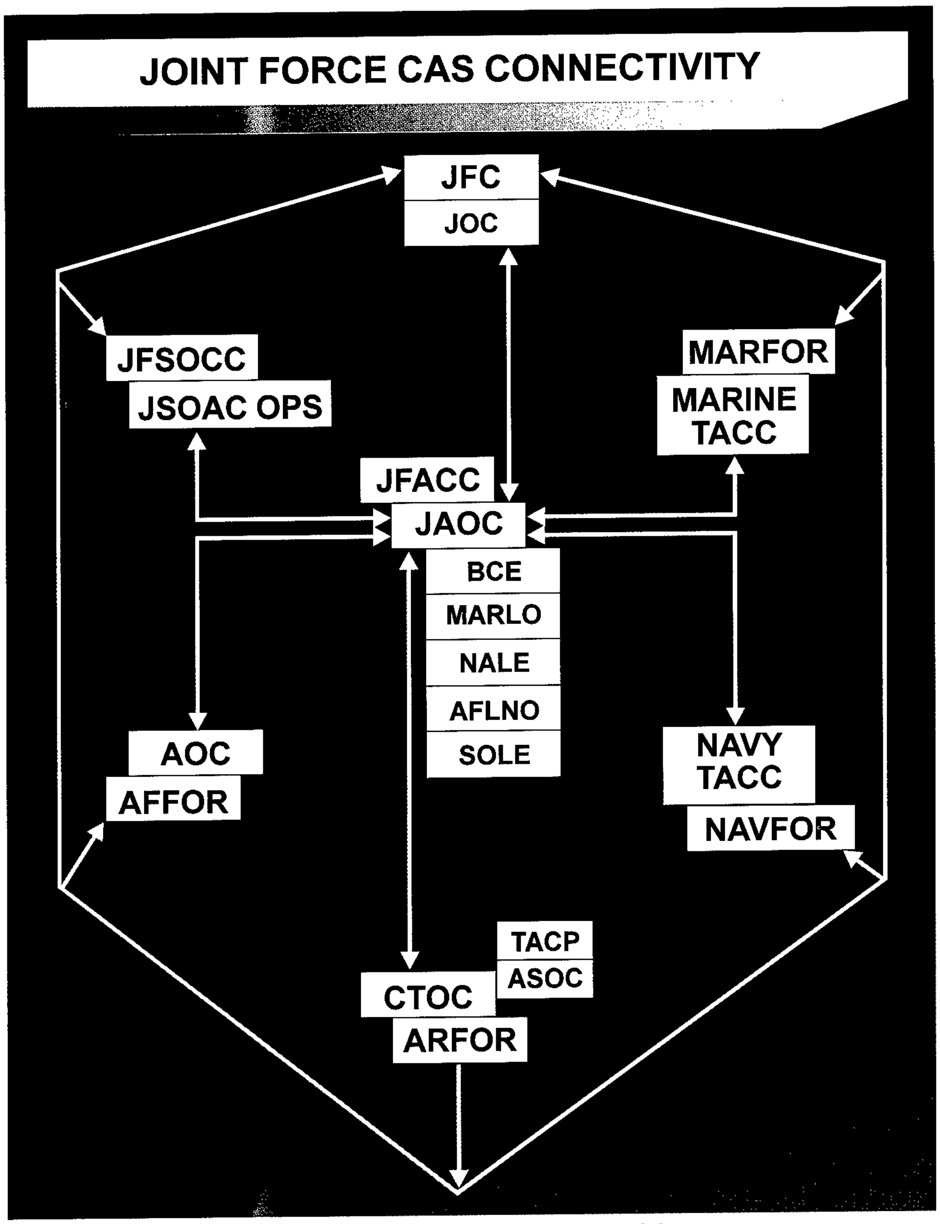


Figure II-1. Joint Force CAS Connectivity

Component Air Command and Control Agencies for CAS				
USAF TACS	**USA AAGS**	**USN NTACS**	**USMC MACCS**	**SOF C2**
AOC	---	TACC/TADC	TACC/TADC	JSOAC (OPS)
---	BCE	NALE	MARLO	SOLE
CRC	---	AAWC	TAOC	---
ASOC	---	TACC	DASC	SOCCE
---	FSE/AC2	SACC	FSCC	---
TACP	---	---	TACP	SOLE
FAC(A)	----	FAC(A)	FAC(A)	---
TAC(A)	----	TAC(A)	TAC(A)	---
FAC	---	---	FAC	SOTAC

Figure II-2. Component Air Command and Control Agencies for CAS

USAF/USA Communications Nets										
NET	**FREQ**	**AOC**	**ASOC**	**CRC**	**WOC**	**FACP**	**TACP**	**CAS A/C**	**ABCCC**	**AWAC**
Command & Control Net	HF SATCOM	X	X	X	X				X	X
AFARN	HF		X				X		X	
Air Control Net	UHF VHF-AM			X		X		#		X
Tactical Air Direction Net	UHF		X				X	X	X	
Inflight Report Net	UHF VHF-AM	#	X	X	#	X		#	X	X
Guard	UHF VHF	X	X	X	X	X	X	X	X	X
TACP Admin Net	HF VHF-FM		X				X			
X Indicates normal participation in the specified net. # Indicated participation when directed, or as required.										

Figure II-3. USAF/USA Communications Nets

ATACS Communications Systems									
NET	FREQ	TACC USN	TACC USMC	TADC	TAOC	DASC	MAG	TACP	A/C
Direct Air Support Net	HF VHF		X	#		X			
Group Common	UHF						X		#
Guard	UHF VHF	X	X	X	X	X			X
Squadron Common	UHF VHF								#
Tactical Air Command	HF UHF	X X	X X	# X	X	X	X		
TACP Local	VHF					X		X	#
Tactical Air Direction	UHF VHF	X	X	#	#	X		#	#
Tactical Air Request	HF VHF	N	N	#	#	X		X	
Tactical Air Traffic Control	UHF VHF	X #	X #	#	X	X			

X Indicates normal participation in the specified net.
# Indicates participation when directed, or as required.
N Indicates participation by NTACS agencies.

Figure II-4. ATACS Communications System

4. Air Force/Army Command and Control

The Air Force Component Commander (AFCC, also known as Commander, Air Force Forces [COMAFFOR]) **exercises C2 over assigned forces through the TACS**. Closely related to, and interconnected with the TACS is the Army AAGS. Together, these systems are known as "TACS/AAGS."

a. **Theater Air Control System.** (See Figure II-5.) **The TACS provides the AFCC or the JFACC (if the AFCC is the JFACC) the capability to plan and conduct joint air operations.** The AFCC's focal point for tasking and exercising operational control over Air Force forces is the **air operations center (AOC)**, which is the **senior element of the TACS**. Subordinate TACS agencies performing the tasks of planning, coordinating, monitoring, surveillance, control, reporting, and execution of CAS are shown in Figure II-6.

- **Air Operations Center. The AOC is the COMAFFOR's means of turning the JFC's guidance into a component air operations plan**. It allocates resources and tasks forces through **ATOs**. In joint operations, the JAOC is collocated with the AOC if the AFCC is the JFACC. For a description of the organization and functions of the AOC/JAOC, see Joint Pub 3-56.1, "Command and Control for Joint Air Operations."

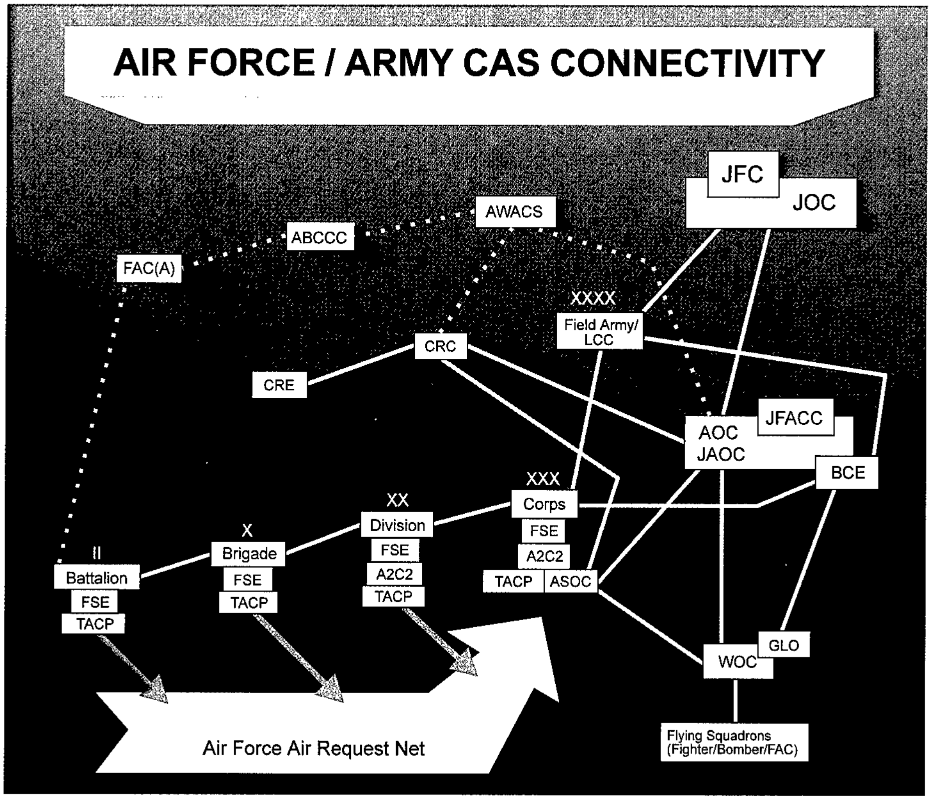


Figure II-5. Air Force/Army CAS Connectivity

- **Airborne C2 Elements.** Airborne C2 platforms supporting CAS include the E-3 Sentry airborne warning and control system (AWACS), and the EC-130E airborne battlefield command and control center (ABCCC).

•• **Airborne Warning and Control System.** AWACS provides **safe passage** and **radar control and surveillance** for CAS aircraft transiting from bases/ships to the target area and back.

•• **Airborne Battlefield Command and Control Center.** The ABCCC provides **threat, intelligence,** and **target updates** to CAS aircrews and **radio relay** to ground and air control elements. ABCCC **manages the flow of aircraft** into and out of the battle area. ABCCC acts as a backup to the air support operations center (ASOC) and AOC and can temporarily assume their functions.

- **Control and Reporting Center (CRC).** CRCs are **ground-based airspace control/air defense facilities** that provide safe passage and radar control and surveillance for CAS aircraft transiting to and from target areas.

- **Control Reporting Element (CRE).** CREs are **mobile radar units normally deployed into forward areas** to extend the radar coverage of the CRCs by providing early warning guidance and acting as a gap filler. They are subordinate to and can assume limited functions of the CRC, if required.

SUBORDINATE THEATER AIR CONTROL SYSTEM AGENCIES

- Airborne Warning and Control System
- Control and Reporting Center
- Control and Reporting Element
- Airborne Battlefield Command and Control Center
- Air Support Operations Center
- Tactical Air Control Party
- Combat Controllers
- Forward Air Controller
- Wing Operations Center

Figure II-6. Subordinate Theater Air Control System Agencies

• **Air Support Operations Center**

•• **Location and Mission. The ASOC is the primary control agency component of the TACS** for the execution of CAS. Collocated with the senior Army echelon's FSE, normally the Corps FSE, **the ASOC coordinates and directs CAS in support of Army operations**. In a multi-corps environment, there will normally be one ASOC with each corps, reporting individually to the AOC. An ASOC may be provided to a Field Army or to a division engaged in independent operations. The AOC may grant the ASOC control (launch or divert authority) of missions designated to it on the ATO.

•• **Function. The ASOC processes Army requests for immediate CAS** which are submitted by ground maneuver forces over the Air Force Air Request Net (AFARN) directly to the ASOC. Once the Army approves these immediate requests, **the ASOC tasks on-call missions or diverts scheduled missions** (with Army approval) to satisfy those approved immediate requests. The ASOC may be granted control of all or some of these missions. If the ASOC has not been given control of on-call or scheduled missions, they must contact the AOC/JAOC to launch or divert CAS missions.

b. **Army Air-Ground System.** The AAGS (Figure II-5) begins at the field army

CLOSE AIR SUPPORT IN WORLD WAR II

In the late afternoon of March 26, the Western Desert Air Force began to attack enemy lines before El Hamma. The British and New Zealand forward elements were marked by yellow smoke, while British artillery fired smoke shells into important enemy positions. Behind the Allied front line "a large land-mark [was] cut into the ground against which red and blue smoke was burned . . . Lorries were also arranged in the form of letters to act as ground strips at selected pinpoints." At 1530 hours, fifty-four bombers — Bostons and Mitchells of the AAF and the South African Air Force — conducted "pattern bombing" on targets near El Hamma. On the heels of the bombers came the first group of fighter-bombers — P-40s, Spitfires, and Hurricanes — which machine-gunned and bombed enemy positions from the lowest possible height at fifteen-minute intervals. The pilots, including some in the AAF, were ordered to attack preset targets and shoot-up enemy gun crews to knock out enemy artillery and antitank guns. Twenty-six fighter-bomber squadrons provided effective close air support, strafing and bombing the enemy for two-and-a-half hours, while a squadron of Spitfires flew top cover for the fighter bombers.

At 1600, half an hour after the fighter-bomber attacks had begun, British and New Zealand forces attacked behind an artillery barrage. The offensive moved at a rate of one hundred yards every three minutes, thus automatically defining the bomb-line. Allied fighter-bombers continued to work in front of the barrage. This combined air-artillery fire proved too much for the Axis defenders, and by the time the moon rose, British armor and New Zealand infantry broke through the enemy line. Within two days, the New Zealanders took Gabes, and the British Eighth Army marched north through the gap between the sea and Chott El Fedjadj.

The Allied use of aircraft during the Mareth Line battles provided a classic example of great flexibility. While the XII Air Support Command and 242 Group pinned down the enemy air force by attacking airfields, the Western Desert Air Force worked with ground artillery to blast a path through the defenses at El Hamma for the ground troops. Broadhurst thought that the battle fought on March 26 at El Hamma was "an example of the proper use of air power in accordance with the principle of concentration." The Allied breakthrough at El Hamma and the capture of Gabes forced the retreat of Axis forces from southern Tunisia.

SOURCE: Case Studies in the Development of Close Air Support, Edited by Benjamin Franklin Cooling, 1990, Office of Air Force History

level, and extends down through all echelons to the maneuver battalion. **AAGS coordinates and integrates both Army component aviation support and CAS with Army ground maneuver.**

- **Battlefield Coordination Element (BCE).** The Army component commander establishes a BCE to **interface and provide liaison with the JFACC or COMAFFOR**. It is the senior Army airspace command and control (A2C2) element. The BCE is collocated with the JAOC or AOC. Preplanned requests for CAS are forwarded through Army command channels to the BCE.

- **Corps Tactical Operations Center (CTOC).** The CTOC **synchronizes the entire corps battle**, including all planning and authorization for CAS. It is **the final approving authority** for CAS within the Corps.

- **Corps Tactical Command Post.** The tactical command post primarily concentrates on the **conduct of the corps' current operations**. The Corps Tactical Command Post is usually the **approving authority for immediate CAS requests** or **diversions of preplanned missions** within the Corps.

- **Corps FSE/ASOC Interface. The corps FSE provides interface and effects coordination between the corps and the ASOC.** The FSE **controls all fires**, including CAS, within the corps **and coordinates the use of airspace** with the corps' A2C2 element collocated with the FSE. The FSE and ASOC **synchronize CAS** for the corps. CAS is coordinated through the corps air liaison officer (ALO), ASOC, and the corps tactical air control party (TACP) in conjunction with the G-3 Air. If Navy or Marine Corps CAS is available, the air/naval gunfire liaison company (ANGLICO) provides the division, brigade, and battalion FSEs with supporting arms liaison.

c. **TACS/AAGS Terminal Control Agencies. Terminal control of CAS assets** is the final step in the TACS for CAS execution and is **a key element in the CAS process for preventing fratricide**. There are both ground and air elements of the TACS to accomplish this mission.

- **Tactical Air Control Party.** TACPs are located with Army maneuver units from battalion to corps. When deployed TACPs report to the ASOC Director, who is normally the corps ALO. While **corps through brigade TACPs** function primarily as liaisons, **battalion TACPs** have the primary responsibility of terminal control. **The TACP mission is to advise and assist the ground commander in planning, requesting, and coordinating CAS.**

  •• **Air Liaison Officer.** The ALO is the officer member of the TACP. **The ALO advises the commander on CAS employment and assists with planning and coordination.** The ALO may also perform terminal control.

  •• **Forward Air Controller (FAC). The FAC is an aviator who**, from a forward ground or airborne position, **controls aircraft in close air support of ground troops.** The FAC can operate on foot, from ground vehicles, or from fixed- or rotary-wing aircraft. The FAC/ALO must: (1) Know the enemy situation, selected targets, and location of friendly units. (2) Know the supported unit's plans, position, and needs. (3) Validate targets of opportunity. (4) Advise the maneuver force commander on proper employment of air assets. (5) Submit immediate requests for CAS. (6) Control CAS with maneuver commander's approval. (7) Perform battle damage assessment (BDA).

  •• **Enlisted Terminal Attack Controllers (ETAC).** ETACs, members of the TACP, provide flexibility for the ALO by also being qualified to **perform terminal control** and **assisting in liaison functions**.

- **Forward Air Controller (Airborne) (FAC(A)).** Operating from suitable aircraft, **the FAC(A) coordinates airstrikes between the TACP and the CAS aircraft**. The FAC(A) provides support by providing terminal control, relaying CAS briefings, providing immediate target and threat reconnaissance, and marking targets. If required, the FAC(A) can also function autonomously in the absence of a TACP.

- **Tactical Air Coordinator (Airborne) (TAC[A]).** Normally performed by a FAC(A) or ABCCC, **the TAC(A) provides communications relay** between the ground terminal controller and attack aircraft as well as other agencies of the TACS. It also expedites CAS aircraft-to-FAC hand-off during "heavy traffic" CAS operations.

- **Fire Support Team (FIST). Fire support synchronization at the maneuver company level is accomplished by the FIST and the FAC/ETAC.** The FIST is supervised by the company fire support officer (FSO). The company FSO usually coordinates CAS through the battalion FSO. In the absence of a TACP or airborne FAC, **the FIST can also provide emergency control of CAS**. When supported by a Marine ANGLICO, the FIST coordinates the employment of Navy and Marine Corps CAS through the ANGLICO firepower control team (FCT). The FCT is subordinate to the ANGLICO supporting arms liaison team which supports battalion level organizations.

- **Army Aviation Unit Commander. Army attack aviation commanders establish liaison with supported headquarters** when tasked by mission. The liaison element **integrates aviation maneuver and fires into the ground tactical plan**. During execution, the liaison element **monitors the mission** while the unit commander executes in accordance with orders generated by the supported unit. **The aviation unit commander controls aviation maneuver and fires and provides reports to the command group.** Qualified attack helicopter commanders may direct the terminal control of CAS in coordination with the TACP.

- **Air Force Combat Controllers.** Combat control team members **are assigned to Air Force units** and are **trained and certified to perform terminal control** in drop zones or landing zones.

"Information is a commodity, but it is not a consumable; its value increases with the number of people who have access to it."

Vice Admiral
Arthur K. Cebrowski
The Joint Staff, J-6
May 1995

5. Navy/Marine Corps Command and Control

The ATACS is organized and equipped to plan, direct, and control all air operations within an assigned area. ATACS can also coordinate air operations with other components of the joint force. **The subordinate systems of the ATACS are the NTACS and the MACCS.** Through the control agencies and facilities of the NTACS and MACCS, the commander, amphibious task force exercises centralized command and decentralized control. Figure II-7 is a graphical illustration of the ATACS. See NWP 22-2/FMFM 1-7, "Supporting Arms in Amphibious Operations," for a detailed discussion of the NTACS. See FMFM 5-60, "Control of Aircraft and Missiles," for a detailed discussion of the MACCS. See Joint Pub 3-02, "Joint Doctrine for Amphibious Operations," Joint Pub 3-02.1, "Joint Doctrine for Landing Force Operations," and Joint Pub 3-52, "Doctrine for Joint Airspace Control in the Combat Zone," for discussions of the transition of control ashore.

a. **Navy Tactical Air Control System.** (See Figure II-7.) **NTACS is the principal air control system afloat. The senior Navy air control agency is the Navy tactical air control center (Navy TACC).** When required, a subordinate air control agency, the tactical air direction center (TADC), may be established.

- **Navy Tactical Air Control Center/ Tactical Air Direction Center**. During amphibious operations and before control is passed ashore, the Navy TACC **controls all air operations within the amphibious objective area (AOA).** Like the AOC, the TACC/TADC is responsible for planning and conducting CAS. Typically, the Navy TACC is onboard the amphibious task force flagship. Should the JFC designate a sea-based JFACC, the Navy TACC may serve as the JFACC's C2 system. In such a case, the Navy TACC supports the operations of the JAOC.

•• **If two or more ATACS agencies are operating within an AOA, while control is afloat, one functions as the Navy TACC and the others function as Navy and/or Marine TADCs.** TADCs are under OPCON of the Navy TACC and exercise only those functions delegated to them by the Navy TACC. The passage of control ashore requires a Marine TADC ashore which is capable of assuming the role of tactical air command center (Marine TACC). When control is passed to the Marine TADC ashore, it is redesignated the Marine TACC and the Navy TACC is redesignated a TADC. The Navy TADC may be directed to function in a standby

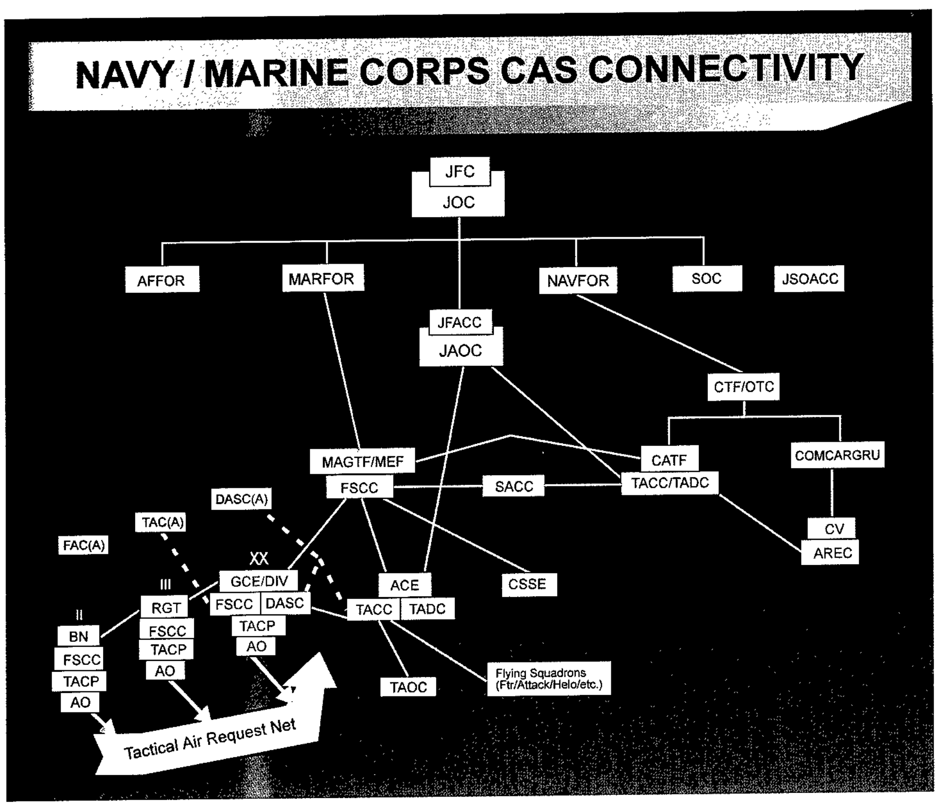


Figure II-7. Navy/Marine Corps CAS Connectivity

status, prepared to assume the TACC role should passage of control become necessary.

•• **The Navy TACC has two sections that control and integrate CAS: the air traffic control section (ATCS) and the air support control section (ASCS). (1) Air Traffic Control Section.** The ATCS provides initial safe passage, radar control and surveillance for CAS aircraft in the AOA. The ATCS can also provide early detection, identification, and warning of enemy aircraft. **(2) Air Support Control Section.** The ASCS is the section of the TACC designed to coordinate and control all CAS operations. The primary task of the ASCS is to provide fast reaction to CAS requests from the landing force. The ASCS: (a) Coordinates with the supporting arms coordination center (SACC) to integrate CAS and other supporting arms; (b) Provides tactical air direction of assigned aircraft; (c) Provides aircrews with current and complete friendly intelligence, enemy intelligence, and target briefings; (d) Controls CAS and passes control to the terminal controller; and (e) Executes the CAS portion of the joint ATO. The ASCS functions as the action agency for immediate CAS requests.

•• Should the JFC designate a sea-based JFACC in an operation that does not involve an amphibious operation, the JFACC operates from a command and control ship or an aircraft carrier. A JAOC is formed using a NTACS that provides the capability to plan and conduct joint air operations.

- **Supporting Arms Coordination Center.** Although not part of the ATACS, the SACC is an integral part of an amphibious assault. The SACC **processes joint tactical air strike requests (JTARs)** and determines **which supporting arm is best suited to engage targets**. The SACC **maintains radio contact** on tactical air request nets with TACPs to **coordinate transition of CAS aircraft**.

- The **special operations liaison element (SOLE)** is also available to the JFACC for integration of special operations.

b. **Marine Air Command and Control System.** (See Figure II-7.) **The function of the MACCS is to control air operations and to integrate all Marine aviation functions within the MAGTF and with joint/combined forces.** The principal agencies of the MACCS concerned with CAS are the Marine TACC/TADC, tactical air operations center (TAOC), and direct air support center (DASC).

- **Marine Tactical Air Command Center/Tactical Air Direction Center. The Marine TACC is the senior MACCS agency and is the focal point for MAGTF aviation command and control.** The Marine TACC is the operational command post for the aviation combat element (ACE) commander. The Marine TACC will serve as the JAOC when the Marine component provides the JFACC. The Marine TADC is the senior MACCS agency until the MAGTF assumes control of all air operations. Once the MAGTF assumes control, the Marine TADC is designated the Marine TACC.

- **Tactical Air Operations Center.** The TAOC is subordinate to the Marine TACC. The TAOC provides **safe passage, radar control**, and **surveillance** for CAS aircraft en route to and from target areas.

- **Direct Air Support Center.** Typically, the DASC is the **first major MACCS agency established in an area of**

operations and is subordinate to the Marine TACC. The DASC controls CAS and is normally collocated with the ground combat element's (GCE) senior FSCC. The DASC can operate from specially-configured Marine KC-130 aircraft, and is then called a DASC(A).

•• **Tasks.** The DASC processes immediate CAS requests and coordinates the execution of preplanned and immediate CAS. It also coordinates with the GCE senior FSCC to integrate CAS with supporting arms.

•• **Supporting Arms Integration.** The link between the DASC and the senior FSCC is critical for the coordination and integration of CAS missions with supporting arms. The DASC receives ground and air intelligence information from aircrews. Aircrews can pass visual reconnaissance reports essential to timely battlefield targeting directly to the DASC, which passes this information to the Marine TACC/TADC and senior FSCC. The FSCC integrates visual reconnaissance reports into supporting arms operations.

c. **MACCS Terminal Control Agencies. MACCS terminal control agencies control final delivery of ordnance.** Terminal control agencies perform specialized tasks not performed by other air controllers. Some terminal control agencies, such as TACPs, are not organic to the ACE. The MACCS integrates terminal controllers into the command and control system through communications and procedures.

- **Tactical Air Control Party.** The TACP plays an integral role in the MACCS, but **is responsible to and reports to the supported commander for employment and coordination of CAS.** The air officer (AO) is a FAC who heads the TACP. The TACP is organic to Marine divisions and subordinate units down to the battalions.

•• **Organization.** The battalion TACP has two FAC parties that typically accompany front-line companies. Regiment and division TACPs do not have FACs.

•• **Tasks.** The TACP participates in fire support coordination. The AO advises the ground unit commander on CAS employment.

- **Forward Air Controller. The FAC controls CAS aircraft** and maintains radio communications with assigned CAS aircraft from a forward ground position. This control aids target identification and greatly reduces the potential for fratricide. **Primary duties of the FAC are to:**

•• Know the enemy situation, selected targets, and location of friendly units.

•• Know the supported unit's plans, position, and needs.

•• Locate targets of opportunity.

•• Advise the supported company commander on proper air employment.

•• Request CAS.

•• Control CAS.

•• Perform BDA.

- **Airborne Controllers.** The two airborne MACCS agencies that provide airborne control for CAS missions are the TAC(A) and the FAC(A).

•• **Tactical Air Coordinator (Airborne). The TAC(A) is an officer operating from an aircraft who coordinates CAS and other supporting arms with ground combat operations and provides airspace coordination.**

The TAC(A) is an airborne extension of the DASC or Marine TACC/TADC. The DASC or Marine TACC/TADC identifies specific TAC(A) authority. The TAC(A) coordinates with the TACPs, FSCCs, subordinate FAC(A)s, artillery units and naval surface fire support (NSFS) units. **TAC(A) duties include:** (1) Coordinating CAS attack briefs and timing; (2) Providing CAS aircraft hand-off to terminal controllers; (3) Relaying threat updates and BDA; (4) Coordinating and deconflicting CAS with supporting arms; and (5) Coordinating fixed-wing and rotary-wing operations.

•• **Forward Air Controller (Airborne).** The FAC(A) is an airborne extension of the TACP. The FAC(A) can serve as another FAC for the TACP or augment and extend the acquisition range of a FAC party. The FAC(A)'s mission is different from that of a TAC(A). **The FAC(A) controls CAS**, while a TAC(A) aids in the coordination of supporting arms. A FAC(A) cannot perform TAC(A) and FAC(A) missions simultaneously. **FAC(A) duties include:** (1) The detection and destruction of enemy targets; (2) Conduct/coordinate target marking; (3) Provide terminal control of CAS missions; (4) Conduct air reconnaissance; (5) Provide artillery and NSFS air spotting; (6) Provide radio relay for the TACP and FAC; and (7) Perform BDA.

- **Air/Naval Gunfire Liaison Company. ANGLICO is an organization composed of Marine and Navy personnel specially qualified for shore control of NSFS and CAS.** The ANGLICO is attached to a US Army or multinational division-size force for operations when fire support is provided by NSFS and/or naval air assets.

6. Special Operations Command and Control

Theater special operations are normally under the control of the JFSOCC. Tactical control of special operations forces (SOF) air is normally exercised by the Air Force Special Operations Component (AFSOC) Commander, the Army Special Operations Aviation Commander, or the Joint Special Operations Air Component Commander (JSOACC), when designated. The JFSOCC normally designates the SOF component commander with the preponderance of aviation assets and the means to control those assets as the JSOACC. Principal functions which support coordinations of CAS in the SOF command system are the SOLE, the special operations command and control element (SOCCE), and special operations terminal attack controller (SOTAC). (See Figure II-8.)

a. **Special Operations Liaison Element.** The function of the SOLE is to **coordinate, deconflict, and integrate SOF air and surface activities with the JFACC**. Additionally, it is responsible for including all SOF air activity on the joint ATO.

b. **Special Operations Command and Control Element.** The function of the SOCCE is to **advise the corps/MAGTF of all SOF air and surface activity.**

c. **Special Operations Terminal Attack Controller. Special operations combat controllers** assigned to special tactics teams **are trained and certified to perform the terminal control responsibilities.** SOTAC CAS training emphasizes night infrared, laser, and beacon equipment. Additionally, SOF surface teams can perform the terminal guidance function.

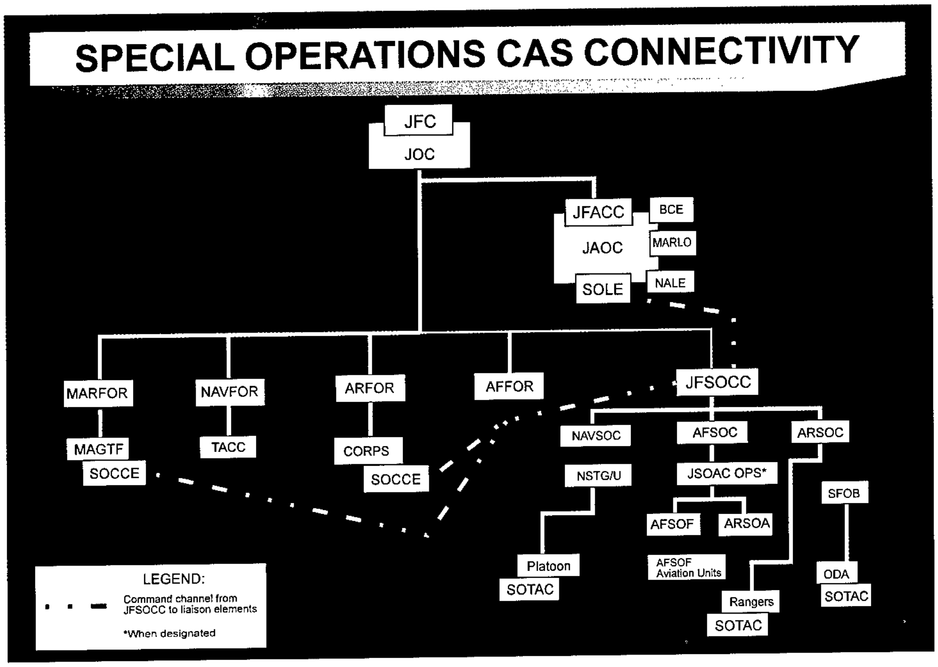


Figure II-8. Special Operations CAS Connectivity

7. Communications

a. **Control and Flexibility.** CAS missions require a high degree of control exercised through effective communication. **Communications must be flexible and responsive** (mission-tailored and robust) **to ensure that links between aircraft and ground units are maintained,** reducing the chance of fratricide and enhancing mission effectiveness. Flexibility and responsiveness of joint force CAS communications is made possible using a variety of techniques including countermeasures and emission control (EMCON), and through the interoperable communications nets of the components.

b. **Secure Voice/Frequency Agile Communications. The standard mode for all CAS communications should be secure voice, frequency-agile** (e.g., Have Quick, Single-Channel Ground-Air Radio System) **and/or data link whenever available**. However, do not allow the non-availability of these methods to hinder the application of CAS, especially in emergency situations or in the case of fleeting targets.

c. **Countermeasures. Enemy communications jamming, monitoring, and imitative deception interfere with the air command and control system and jeopardize the use of CAS.** Proper radio procedures are critical. **There are a number of techniques to counter jamming and deception.** They include natural terrain masking, burn through, brevity, chattermark, frequency-agile radios, secure communications, authentication, and visual signals. No single technique is completely effective by itself. The tactical environment, available communications equipment, and mission determine the proper technique.

d. **Emission Control.** Emphasize EMCON throughout the planning and training cycles. **As the enemy increases the use of electronic warfare (EW), traditional air support communications may become impossible.**

This may reduce an aircrew's ability to conduct immediate missions. **A preplanned mission, however, can be accomplished with minimum communication between the terminal controller and the aircrew.** The DASC/ASOC/TACC or TAC(A) transmits the CAS brief to the aircrew as early as possible and prior to initial contact with the terminal controller. The aircrew contacts the terminal controller, transmits the abort code, and receives the time to target (TTT) or time on target (TOT).

e. **Joint Communications Requirements**

- **Aircrews performing CAS in joint operations will utilize the communications nets and architecture of the requesting component.** This section describes the communications nets of each component and how they support CAS.

- When CAS is executed in joint operations, **everyone involved must have the appropriate signal operating instruction/communications-electronics operating instruction (SOI/CEOI) data** to communicate effectively and successfully support requesting units. The JFACC/JFC staff identifies the communications requirements associated with CAS, the J-6 satisfies these requirements (e.g., providing frequencies, call signs, cryptographic key information) and produces the SOI/CEOI. It is the responsibility of the JFACC/JFC staff to ensure that required communications data for CAS is published on the joint ATO.

- Specifically, **CAS-capable units and aircrews will need radio frequencies and call signs for airspace control agencies and terminal controllers** they will need to contact during the course of their missions. **They will also need identification, friend or foe codes and authentication materials.** The component communications manager should establish direct liaison with the joint force J-6 to provide the necessary CAS communications data to all elements in the CAS process.

f. **Component Communications Nets. This section describes the communications nets used by air control agencies and tactical aircraft in the conduct of CAS.** In addition to these nets, there are numerous other nets within the command and control systems that could be used in extreme situations. These nets are designed to provide communications redundancy. See Figures II-3 and II-4 for a listing of the communications nets associated with CAS.

- **Air Force/Army Communications Nets**

  •• **Army Interface.** The ASOC and TACPs are key liaison points between Air Force and Army elements. They have hardwire telephone facilities and organic very high frequency-frequency modulation (VHF-FM) voice communications equipment for entry into Army command and tactical communications nets.

  •• **Command and Control Net.** Interfaces with other TACS units (AOC, CRC, AWACS, ABCCC and wing operations center [WOC]) are accomplished via both high-frequency/single sideband (HF/SSB), tropo-microwave links, and satellite communications systems. All of these systems should normally be encrypted. These communications nets are used for command communications traffic, including operations and scramble orders, coordination, intelligence, and air defense warning. Whenever possible, reliability and survivability are enhanced by using multiple systems and redundant switches.

•• **Air Force Air Request Net.** The AFARN is the link between the ASOC and subordinate TACPs for request and coordination of immediate air support. The ASOC is the net control station. An AFARN will normally be provided for each division. The ASOC will activate and operate as many nets as necessary, contingent with needs, equipment available, and frequencies allocated. The preferred mode for the AFARN is secure HF/SSB; however, the ASOC must be capable of operating the AFARN (secure) on other radios when the tactical situation requires.

•• **Air Control Net.** The purpose of this net is to coordinate mission direction of airborne aircraft under control of the CRC or CRE. The ASOC interfaces with the tactical air control net through the command and control net.

•• **Tactical Air Direction (TAD) Net.** The TACPs/FACs use their ultra-high frequency-amplitude modulation (UHF-AM) net for the direction and control of aircraft engaged in close air support. The TACP is the prime user of this net and is allocated specific frequencies to conduct tactical operations. The ASOC is also authorized to enter this net to pass time sensitive information. The TAD net should be reserved for time-critical terminal control information only.

•• **Inflight Report Net.** This UHF-AM net is for the airborne transmission of inflight reports to the elements of the TACS. Reports are normally passed to the CRC, AWACS, ABCCC, or CRE and relayed to the AOC and/or ASOC. The ASOC and AOC monitor this net when in range.

•• **Guard Net.** Provides an emergency distress net for aircraft. Guard further serves as a means for air control agencies to advise aircraft of emergency conditions or serious hazards to flight safety. All aircraft continuously monitor Guard.

•• **TACP Admin Net.** This net is used to pass urgent administrative, logistic, and command information between the ASOC and TACP elements.

•• **Squadron Common Net.** Provides a means of communication between squadron aircraft and/or with the squadron headquarters. Each aircraft squadron has its own common net.

• **Navy/Marine Corps Communications Nets**

•• **Direct Air Support Net.** Provides a means for the DASC to request direct air support aircraft from the TACC/TADC. Information pertaining to aircraft status and progress of direct air support missions may also be passed over this net.

•• **Group Common Net.** Provides a means of communication between in-flight group aircraft and/or with the aircraft group headquarters. Each aircraft group has its own common net.

•• **Guard Net.** Provides an emergency distress net for aircraft. Guard further serves as a means for air control agencies to advise aircraft of emergency conditions or serious hazards to flight safety. All aircraft continuously monitor Guard.

•• **Helicopter Direction Net.** Provides positive control of inbound and outbound helicopters in the AOA. It is a backup net available to coordinate rotary-wing CAS.

•• **Squadron Common Net.** Provides a means of communication between squadron aircraft and/or with the squadron headquarters. Each aircraft squadron has its own common net.

•• **Tactical Air Command Net.** Provides the primary means for the TACC/TADC to pass operational and/or administrative traffic to various agencies providing tactical air support. Once the DASC is established, requests for CAS beyond the capability of the DASC are referred to the TACC/TADC over this net. During a large operation an additional tactical air command net may be reserved for purely operational purposes.

•• **Tactical Air Control Party Local Net.** Provides a means for coordination between the AO and the FACs. Coordination with TAC(A)s and FAC(A)s may also be conducted over this net.

•• **Tactical Air Direction Net.** Provides a means for the control of aircraft conducting CAS and for the TACC/TADC/DASC to brief CAS aircraft on target information or assignment to the FAC or FAC(A). Multiple TAD nets are required and are utilized by various air control agencies. This net is primarily UHF, with a secondary VHF capability available in some cases. The TAD net should be reserved for time-critical terminal control information only.

•• **Tactical Air Request Net.** Provides a means for ground maneuver units to request immediate air support from the DASC or TACC/SACC. The SACC/FSCCs monitor this net and may modify or disapprove a specific request. The DASC uses the net to brief the requesting unit on the status of the mission. Additionally, BDA may be passed over the net. Multiple tactical air request nets may be required depending on the scope of CAS operations. A secondary VHF capability may be available.

•• **Tactical Air Traffic Control Net.** Provides a means for the TACC/TADC, TAOC, and DASC to exercise control of all tactical and itinerant aircraft in the AOA or AO. Types of information passed over the tactical air traffic control (TATC) net include aircraft reports of launches by mission number, clearance of aircraft to their assigned control agencies, diverting aircraft as necessary, and relay of inflight reports and BDA. Multiple TATC nets are often required.

• **Special Operations Communications Nets.** SOF communications nets provide a means for both SOF air assets to provide preplanned/immediate CAS and SOF surface teams to request immediate CAS. The majority of SOF surface unit requests will be immediate.

•• **SOF Air.** Communications between the aircraft and the JSOACC will be used to coordinate preplanned/immediate CAS requests. For preplanned CAS missions where TACON of SOF air has been given to another component, SOF air will access the established requesting component network. For immediate CAS (after JFSOCC approval), SOF air will access the requesting service communications net to provide the requested CAS support.

•• **SOF Surface Units.** SOF surface units have a variety of communications capabilities that can be used for CAS. For CAS requests not supported via organic SOF assets, the JFSOCC will forward the request to the JFACC via established communication links (through the SOLE). Once the asset has been assigned, that information is passed to the requester via the JFSOCC. The requesting unit will communicate with the CAS aircraft via the established providing component net (including UHF/VHF Guard).

g. **Alternate Nets.** When communications are lost on the primary nets, CAS can still be conducted through alternate modes of communication. Communications may be restored using alternate air support nets or non-air support communications nets.

h. **Communications Equipment.** See Appendix D, "Communications Equipment," for a listing of radios found on CAS-capable aircraft and ground units. The Figures in Appendix D, "Communications Equipment," describe the frequency ranges and capabilities

CHAPTER III
REQUESTING AND TASKING

"It is firepower, and firepower that arrives at the right time and place, that counts in modern war."

B. H. Liddell Hart, Thoughts on War, 1944

1. Purpose

This chapter describes the close air support process in joint operations. First, it gives a basic description of the planning and decision process leading to the employment of preplanned CAS and immediate CAS. Then, the processes for preplanned and immediate CAS are described, following the sequence from request to tasking. Formats and mission data flow are identified. The chapter concludes with a description of the aircraft tasking process with particular emphasis on how attack helicopters are tasked for CAS in joint operations.

2. JFC Guidance

a. **The JFC provides guidance on intent and vision with respect to the use of air assets to support the campaign plan.** As the phases of an operation or campaign unfold, the emphasis of different air missions changes along with the direction of the campaign. CAS will likely receive heavy emphasis when ground forces engage the enemy.

b. **The amount of air support that will be dedicated to joint CAS is decided by the JFC in the air apportionment decision.** As part of the air apportionment decision, **the JFC may identify CAS priorities by geographic area or by percentage to components**. Following the JFC air apportionment decision, the JFACC/JFC staff translates that decision into total number of CAS sorties available. If one component requires attack helicopter support from another component, such support is normally provided by establishing a command relationship, per paragraph 9 of this chapter.

3. CAS Requests

CAS begins with a request for CAS from a maneuver commander. As the **requesting commander** plans and conducts combat operations, the commander **identifies situations where CAS can be employed to enhance mission accomplishment**. The requesting commander submits either **preplanned** or **immediate** CAS requests.

4. Preplanned Requests

a. **Rationale.** Maneuver force commanders request CAS to augment organic supporting fires. **Those CAS requirements foreseeable early enough to be included in the joint ATO or mission order are forwarded as preplanned requests.** These preplanned requests normally do not include detailed target information, and may not include detailed timing information because of the lead time involved. Information such as potential targets, desired effects, timing, and priority are needed to prepare the joint ATO. ALO/AOs and G3/S3s at all echelons must ensure that such information is forwarded through the FSE/FSCC as soon as it is foreseen by their respective echelon's planners and commanders. **The important thing in preplanned CAS is for requesting forces to forward their requests early on**—as soon as they anticipate the need for CAS—**and then regularly update and refine their requests as the time approaches.**

b. **Channels**

See Figure III-1.

- **Requests for preplanned CAS missions are submitted to the fire support coordination element** at each echelon of command. **The commanders,** ALO/AO, FSCC/FSE, and G3/S3 at each echelon **evaluate requests, coordinate requirements** (such as airspace, fires, and intelligence), **consolidate them** and, if they approve the request, **assign it a priority and precedence.** The G3/S3 **then forwards approved requests** through component communications nets to the next higher echelon. If a request is disapproved at some level, the request is returned to the originator with an explanation, or a substituted fire support asset. **The FSE/FSCC of the highest maneuver echelon in the force** (such as the CTOC) **approves requests and prioritizes them.** After approval, these consolidated requests become the component commander's request for CAS. These requirements are then passed to the JAOC for planning and execution in the joint ATO. If CAS requests exceed the component's organic capability, the requests for additional CAS are forwarded to the JAOC via the air support request (AIRSUPREQ) message. See Appendix B, "Close Air Support Request (CASREQ)," for further details and completion instructions for the AIRSUPREQ.

- At the JAOC, **the JFACC/JFC staff reviews the requests, matches them in priority order against the JFC's air apportionment decision, and fills those requests** with the sorties available from the air apportionment guidance. Requesting units are then notified of approval/disapproval/revisions via the SORTIEALOT message or other means, such as contingency theater automated planning system or through component liaisons. (See Joint Pub 3-56.1, "Command and Control for Joint Air Operations," for an expanded discussion.)

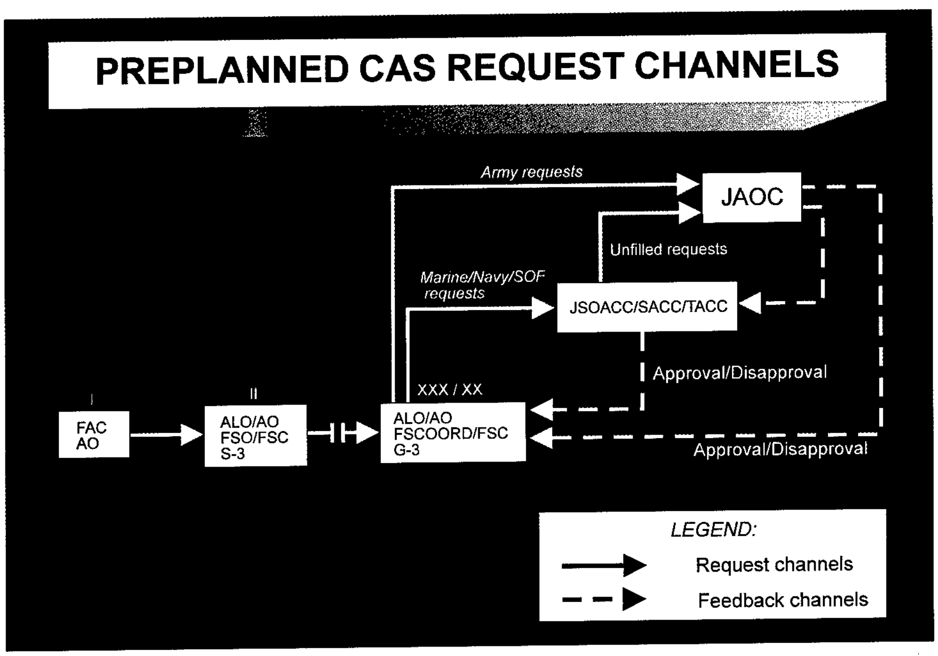


Figure III-1. Preplanned CAS Request Channels

- **If CAS requests exceed the air apportionment,** the JFACC/JFC staff must ask the JFC to **modify the air apportionment decision, request components to allocate more joint CAS sorties,** or **deny the requests** exceeding the air apportionment for CAS.

- **Preplanned CAS requests for SOF are normally handled within the SOF component** by the JSOACC using organic capability.

c. **Categories.** Preplanned requests are categorized as either **scheduled** or **on-call.**

- **Scheduled Requests.** Scheduled requests require the requesting maneuver unit to **identify the target and the desired TOT well in advance.** Scheduled requests **offer greater opportunity for effective coordination** and provide a higher likelihood that the aircraft will have the proper weapons load for the assigned targets. Scheduled air support requires the requesting commander to identify a specific target and time for the attack well in advance, so that after launch minimum communications are necessary for final coordination. However, this is often impossible on a fluid battlefield.

- **On-Call Requests.** On-call requests **identify an anticipated requirement** for CAS to be available during a period of time, **with the exact time and place to be coordinated as the battle develops.** On-call CAS allows the requesting commander to indicate a time frame, probable target type, and place where the need for CAS is most likely. On-call aircraft are configured with the proper ordnance for anticipated targets (e.g., anti-armor) and maintain an alert status for a specified period of time. On-call requests can specify either ground or airborne alert.

"I am persuaded that unless troops are properly supported in action, they will be defeated."

Maurice de Saxe
Mes Reveries, 1732

5. Immediate Requests

See Figure III-2.

a. **Rationale and Methodology. Immediate requests arise from situations that develop once the battle is joined.** Requesting commanders use immediate CAS to exploit opportunities or protect the force. Because immediate requests respond to developments on a dynamic battlefield, **they cannot be identified early enough to allow detailed coordination and planning,** which may preclude tailored ordnance loads. If on-call CAS is unavailable, the Corps ALO advises the Corps G3/G3 Air to divert corps preplanned CAS missions or forward the request to the JAOC. During the execution phase of the joint ATO, **the JFACC/JFC staff may need to redirect joint air missions to cover immediate requests for high priority CAS.** The JFACC may also seek additional support from another component to cover the immediate request. However, diverting aircraft from preplanned scheduled CAS missions is a zero-sum game: preplanned requestors lose the same amount of firepower gained by the immediate requestor. See Joint Pub 3-56.1, "Command and Control for Joint Air Operations," for additional discussion of changes during the force execution phase of joint air operations.

b. **Channels.** (See Figure III-3.) **Immediate requests are forwarded to the appropriate command post by the most rapid means available.** Requests are broadcast directly from the TACP to the ASOC/DASC using the applicable component communications nets. The TACP at each intermediate headquarters monitors the

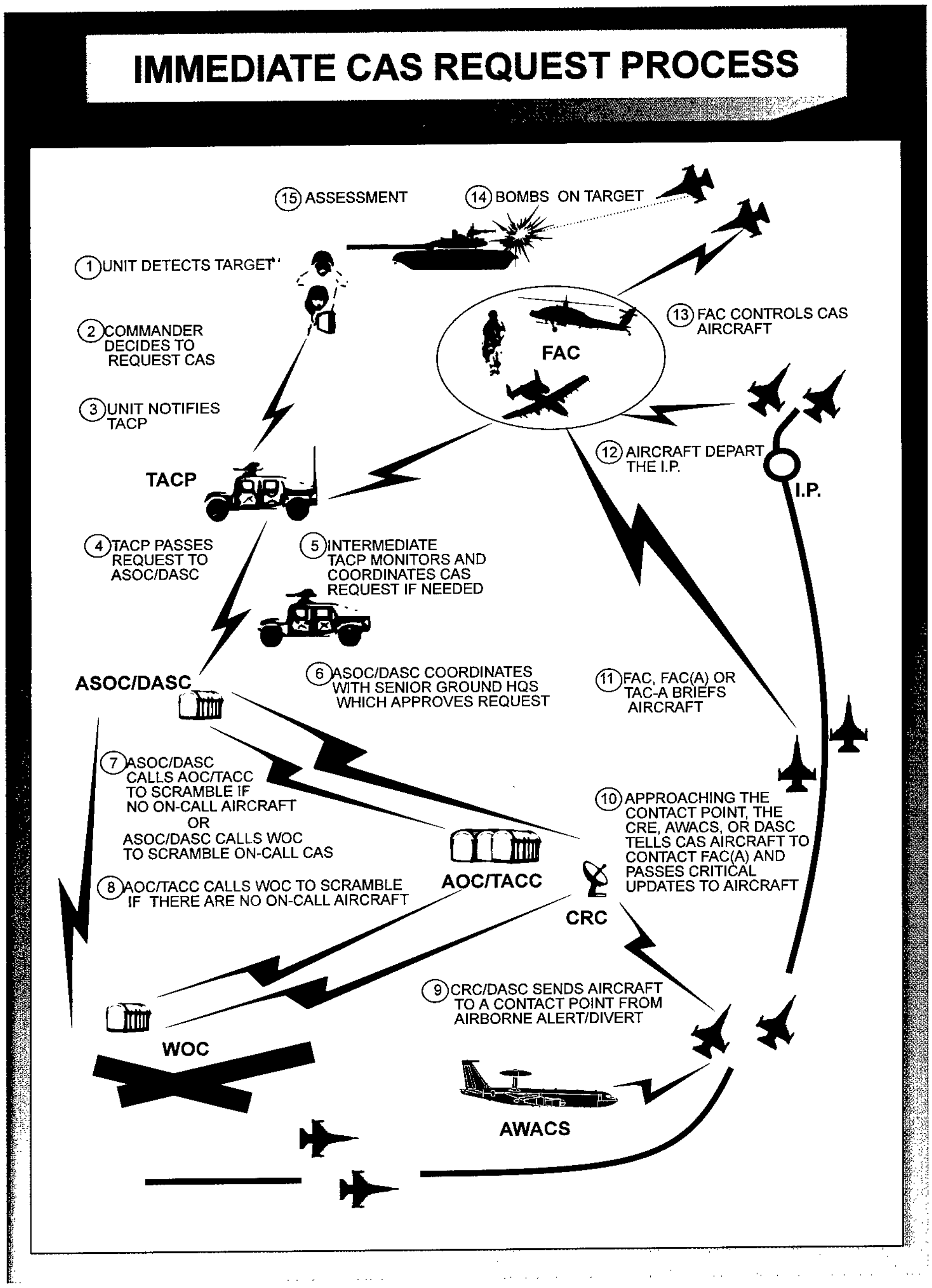


Figure III-2. Immediate CAS Request Process

request and informs the **G3/S3 Air, ALO/AO, and fire support coordinator (FSCOORD/FSC)**. Based on the commander's intent, and after considering whether organic assets are available, appropriate, or sufficient to fulfill the request, **they approve or deny the request**. Silence by intermediate headquarters indicates approval.

c. **SOF Request Channels.** Due to the small size of SOF surface units and the nature of the mission, there is always a danger that a

SOF surface unit may be confronted with a combat situation posing immediate danger to the unit's very existence. **SOF communication capabilities are usually adequate to link directly to component communications nets** (described in Chapter II, "Command, Control, and Communications"), **who can divert or scramble CAS aircraft as required.**

6. Request Formats

a. **US Message Text Format (USMTF).** The USMTF program establishes the standards and prescribes the rules and conventions governing message text formats. **The proposed standard message text for requesting Joint CAS is the CASREQ.** See Appendix B, "Close Air Support Request (CASREQ)," for a description of and completion instructions for the CASREQ.

b. **Voice Backup. Units that do not have the capability to transmit record copy messages, or when time constraints require, will use the joint tactical air strike request** (JTAR, DD Form 1972) **voice format.** See Appendix C, "Joint Tactical Air Strike Request Form (JTAR)," for an illustration of and completion instructions for the JTAR.

7. Mission Data

a. **For preplanned requests, information is passed down through maneuver force channels.** Data may be included in the ATO, mission order, or fire support plan. **For approved immediate requests, mission data is passed down the same air request net used by the requesting unit to pass the request.** Mission data is passed using the JTAR Section 3 format to the requesting unit.

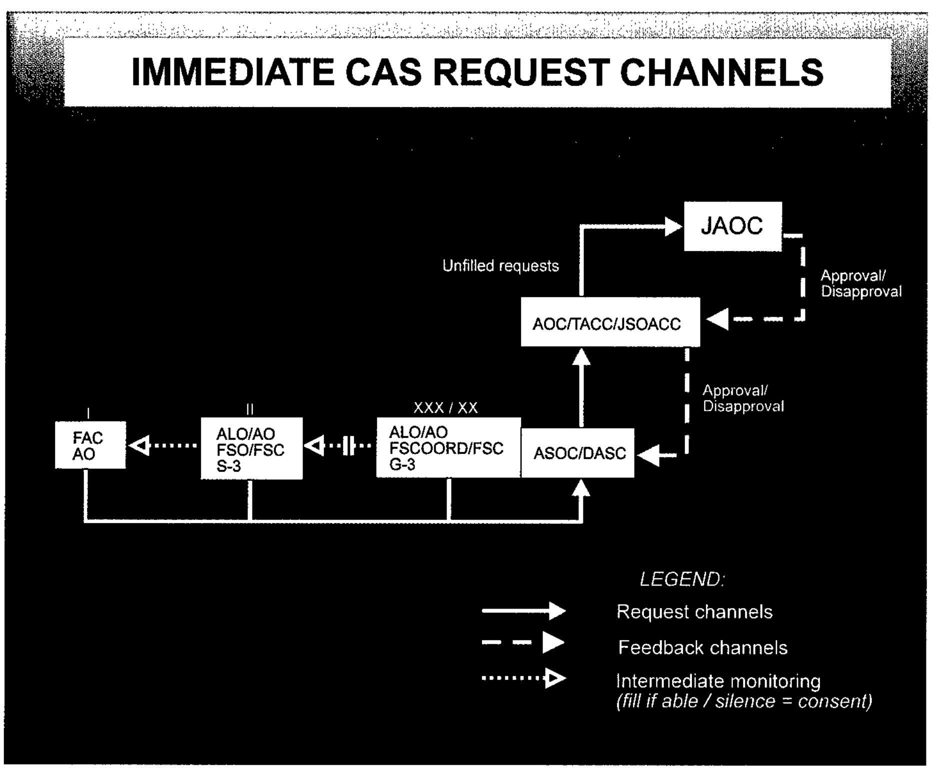


Figure III-3. Immediate CAS Request Channels

b. **As a minimum, mission data will include:**

- Mission Number
- Call Sign
- Number and Type of Aircraft
- Ordnance
- Estimated Time on Target/on Station
- Contact Point
- Initial Contact (who the aircrew contacts first)
- Call Sign and Frequency of Final Control Agency

8. Tasking Fixed-Wing Aircraft

Tasking fixed-wing aircraft for preplanned CAS in joint operations is **accomplished via the air apportionment process**, and is **scheduled through the joint ATO**.

9. Tasking Rotary-Wing Aircraft

a. **General. Attack helicopters are normally tasked differently than fixed-wing aircraft.** Army attack helicopters are tasked and employed as integral units, rather than by sorties and flights as fixed-wing aircraft are. Marine attack helicopters can be tasked by sortie or as a unit. **There are significant considerations, such as logistics, involved with tasking attack helicopters** to conduct CAS in joint operations.

b. **Command Relationships.** The JFC tasks attack helicopters to conduct CAS in support of another component in two ways. In the first way, the JFC tasks a component to provide direct support to another, establishing a command relationship between the two components for CAS. In the second way, the JFC uses the air apportionment and joint ATO process to make the attack helicopters available for joint CAS as part of the joint air operations. This is the less likely case, as attack helicopters are not normally part of the air apportionment process. **The following are**

CLOSE AIR SUPPORT IN SOUTHEAST ASIA

Early on October 20, 1965, the enemy launched an attack at Plei Me. A flareship arrived within 25 minutes and strike planes hit their targets at the requested times. Throughout the 7-day communist attack, tactical aircraft hovered continuously over the beleaguered outpost, delivering more than 830 tons of ordnance in 588 strike sorties; 22 flareship missions dropped more than 3,700 flares. In the end, 326 enemy troops were killed, and captured documents later showed that about 250 of these perished as a result of air power. After the battle, an Army officer working with the Vietnamese defenders affirmed the effectiveness of USAF close air support. He declared:

"If it hadn't been for air, we would have lost this place. The air chopped them up at the wire. My men had about 30 rounds of ammo left per man when the attackers were driven off, never having broken the perimeter. They (USAF strike aircraft) came right down our perimeter with cannon, antipersonnel mines, and then when the enemy began pulling back, they hit them with high explosive stuff."

Case Studies in the Development of Close Air Support, Edited by Benjamin Franklin Cooling, 1990, Office of Air Force History

two examples where joint CAS is provided through direct support using either TACON or support command relationships.

- **TACON.** II Marine expeditionary force (MEF) is defending critical territory against a large enemy force. The enemy has, for the moment, relaxed its effort in the I Corps sector. The JFC appoints II MEF as the main effort, so II MEF receives the preponderance of CAS sorties. Additionally, the JFC instructs the Commander, Army Forces(COMARFOR), in this example the Commander, I Corps, that II MEF will have TACON of two of his attack helicopter battalions for the next 48 hours. The I Corps Commander informs the Aviation Brigade Commander, who in turn selects two units based fairly close to II MEF's area of operations.

- **Support.** Army forces (ARFOR) might be designated to support a Marine expeditionary operation with attack helicopters. While ARFOR maintains control over these helicopters, he coordinates with the MAGTF to position the attack helicopters and their required logistics. Once positioned, the attack helicopters respond to mission-type orders from the MAGTF.

c. **Considerations. JFCs and component commanders must consider communications requirements, the significant logistical impact, and combat range when employing attack helicopter units in joint operations.** Components must ensure **communications interoperability** between the attack helicopters and component forces. Relocation may entail **moving significant logistical support,** including maintenance, munitions, and petroleum, oils, and lubricants. The attack helicopters may be able to obtain logistical support from other components; however, they may not be compatible in every respect. In addition to logistical concerns, **attack helicopters have a limited combat range** when compared to fixed-wing CAS aircraft. The most efficient method is to perform the mission from already-established operating bases, if the objective area is within range.

Once positioned, forces under ARFOR control may be tasked to respond to mission type orders from another command.

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CHAPTER IV
PLANNING

"In forming the plan of a campaign, it is requisite to foresee everything the enemy may do, and be prepared with the necessary means to counteract it."

Napoleon, Maxims of War, 1831

1. Purpose

This chapter outlines considerations associated with CAS employment planning in the joint environment. CAS planning is explored in relation to the conduct of joint operations and campaign phasing and the general combat circumstances surrounding CAS employment, such as offensive or defensive operations, with CAS provided in general or direct support. Next, the chapter describes procedures and structures used to facilitate CAS employment and integration with other fire support means, and detailed planning considerations for employing CAS at night or in adverse weather. Finally, this chapter provides detailed planning considerations unique to employment of fixed- and rotary-wing aircraft in CAS missions.

SECTION A. BASIC CONSIDERATIONS

2. Operation/Campaign Phasing

a. **Joint operations and campaigns are typically arranged into phases.** Joint Pub 3-0, "Doctrine for Joint Operations," defines a phase as "a period during which a large portion of the forces are involved in similar or mutually supporting activities." It further states: "Phasing assists commanders to think through the entire operation and to define requirements in terms of forces, resources, and time. **The primary benefit of phasing is that it assists commanders in achieving major objectives**, which cannot be attained all at once, by planning manageable subordinate operations to gain progressive advantages . . . achieving the major objectives as quickly and affordably as possible."

b. **Campaigns and operations often follow phases** similar to those outlined in Joint Pub 3-0, "Doctrine for Joint Operations": **prehostilities; lodgment; decisive combat and stabilization; follow-through; and posthostilities and redeployment.** The following paragraphs illustrate ways in which commanders can plan to employ CAS in each phase.

- **Prehostilities Phase.** Commanders aim to deter combat or "set the terms for battle and enhance friendly and limit enemy freedom of action" (Joint Pub 3-0, "Doctrine for Joint Operations"). If a potential enemy appears to be threatening offensive action, **JFCs can posture CAS-capable forces to demonstrate resolve to counter the threat**. JFCs may choose to request additional CAS-capable forces if there are none in place or if they are insufficient to meet the developing threat. It is possible that **a well-publicized request for and preparation to deploy a substantial CAS-capable force could help to deter enemy offensive action and contribute to resolution of a crisis short of resorting to war.**

- **Lodgment Phase.** Joint Pub 3-0, "Doctrine for Joint Operations," states that **"A lodgment phase allows the movement and buildup of a decisive combat force in the operational area** . . . (including) movements to host-nation air or sea ports. In operations conducted before and during combat, initial deployment may require forcible entry."

•• Since a forcible entry is "seizing and holding a military lodgment in the face of armed opposition," **JFCs may need to employ CAS to help defeat enemy forces and facilitate the seizure of the lodgment**.

•• If joint forces begin deployment to an operational area with an enemy offensive already under way, **CAS may also play an integral role in covering the arrival and buildup of joint forces as they prepare for combat**. CAS will likely play a key role alongside early-deploying ground forces in defending against a combined-arms attack.

- **Decisive Combat and Stabilization Phase.** In this phase, JFCs take "decisive action (that) focuses on winning, that is, achieving the objectives defined by the NCA and JFC" (Joint Pub 3-0, "Doctrine for Joint Operations"). In concert with maneuver forces, **commanders integrate CAS with other fire support to achieve overwhelming firepower** at decisive points and times, thus creating or exploiting opportunities at the tactical level which can lead to operational success.

- **Follow-Through and Posthostilities/ Redeployment Phases.** JFCs follow through to "ensure the political objectives are achieved and sustained. Part of this phase may be to ensure the threat . . . is not able to resurrect itself" (Joint Pub 3-0, "Doctrine for Joint Operations"). **CAS-capable forces can deter or counter further hostile actions after the completion of offensive campaign operations.** This may extend even to non-traditional uses of CAS, such as support of peacekeeping or peace enforcement operations in the wake of armed conflict.

3. Mission Planning

Consider mission, enemy, terrain and weather, troops and support available, and time available (METT-T) when planning CAS missions.

a. **Mission.** Planners study the mission to **understand their objective**, the **tasks to be performed in accomplishing the objective**, and the **supported commander's intent**. Intent is key, as it allows subordinate and supporting units to exploit opportunities. In planning CAS missions, the ALO, FAC, or AO must understand the ground commander's objective, scheme of maneuver, command and control requirements, and criteria for specific rules of engagement. Aircrews tasked to fly CAS missions should also understand these factors to the maximum extent possible. This understanding increases aircrew situational awareness but may not be possible due to geographic/communications separation.

b. **Enemy. Planners must determine the enemy's disposition, composition, order of battle, capabilities, and likely courses of action.** From this information, planners anticipate the enemy's ability to impact the mission and the enemy's influence on flight tactics and techniques. **A primary planning consideration is the enemy's capability to conduct command and control warfare.** Potential or confirmed presence of chemical or biological contamination must also be considered. As the threat level increases, **prebriefing of aircrews and detailed mission planning are critical**. If the threat situation changes during the course of the mission, **effective communications and close coordination between the aircrew, control agencies, and the supported ground force are crucial**. Inflight updates on enemy activity and disposition along the flight route and in the target area may require the aircrew to alter their plan and tactics for executing the mission. If the enemy disrupts effective communications between aircrews, control agencies, and terminal controllers, **backup plans must be ready** to allow mission accomplishment. Secure voice equipment and frequency agile radios can overcome some effects of enemy interference.

c. **Terrain and Weather**

- **Survey the terrain to determine the best routes to and from the target area.** Where terrain permits and when the threat dictates, **flight routes should maximize use of terrain masking** to increase survivability against air defense systems. When practical, select flight routes, holding areas, initial points, release points, and battle positions using terrain features easily recognizable in daytime or at night to facilitate low level navigation. **Broad area satellite imagery** and **air mission planning and rehearsal systems** can assist in selecting optimum flight parameters.

- **Weather can play a significant role in CAS operations by impacting enemy and friendly capabilities.** Weather may have a significant impact on the effectiveness of CAS aircraft, guided weapons, and night vision systems. **Planners at every level must understand the impact of weather on CAS missions and weapon systems.** Take advantage of near-real-time weather imagery, downlinked directly from weather satellites, to enhance mission effectiveness.

d. **Troops and Support Available. CAS operations must be fully integrated into the supported commander's scheme of maneuver and fire support plan.** All combat systems should be synchronized to maximize the effects of combat power. **Mission support requirements must be identified early in the planning process and requested with sufficient time to coordinate their role in the operation.** Mission support requirements must be determined, including escort, EW, SEAD, tankers, reconnaissance and C2 systems.

"Forbear waste of Time, precious Time."

Oliver Cromwell

e. **Time Available. Time is the critical element** in coordinating events and massing fires to achieve the combined arms effect of ground and air forces. There must be adequate time available to ensure mission success. **Planners must estimate the amount of time necessary to plan the mission, effect the coordination, and execute the mission to support the ground commander as required.** Inadequate planning time will result in reduced effectiveness and increased risk to aircrews and ground troops alike.

4. Planning for CAS Employment

a. **General.** Like other assets, **commanders can employ CAS throughout the depth of the battlefield**. Where the maneuver force commander chooses to use CAS depends on subordinate unit missions and their need for support. Normally, **the maneuver force commander will consider the requirements for CAS throughout the area of operation**. CAS requires terminal control to ensure that the correct target is attacked and to reduce the possibility of fratricide due to the close proximity of friendly forces.

- **Deep Operations.** The maneuver force commander may also employ CAS to support operations deep within the area of operation, which may include special operations forces or conventional forces with a deep operation mission. **CAS in**

support of forces conducting operations deep within the area of operation will normally be limited in scope and duration to support attacking maneuver forces or special operations activities. Deep operations involving CAS may require additional coordination to deconflict with other missions deep in the area of operation such as air interdiction (reference the joint ATO).

- **Close Operations.** A maneuver force commander generally assigns most of his available CAS to the unit he has designated as his main effort. **CAS aircraft and fire support assets mass to assist the main effort.** The speed, range and firepower of CAS also make it a valuable asset for exploiting success and attacking a retreating enemy.

- **Rear Operations.** CAS aircraft are effective for countering deep enemy attacks against support forces operating in the friendly rear area. **The responsiveness and firepower of CAS greatly augment the combat power of rear area forces.** The potential for fratricide is high in rear area operations because of the larger number of support personnel and activities located there. **CAS aircrews and terminal controllers must take special care to identify friendly forces** and ensure that they are not subject to direct attack or weapons effects from CAS ordnance delivered against enemy forces operating in friendly rear areas.

b. **Offense. CAS supports offensive operations**, with preplanned or immediate missions **to give the maneuver force commander freedom of movement, by delivering a wide range of ordnance and massed firepower at decisive points and by destroying or neutralizing enemy forces**. How CAS is employed depends on the type of offensive operation being conducted: movement to contact, attack, exploitation, or pursuit.

- **Movement to Contact.** CAS can be employed to support maneuver forces providing forward and flank security. Once contact is made, **employing CAS aircraft at the initial point of contact can overwhelm and force the enemy to prematurely deploy his forces**. The ground commander rapidly augments his organic combat power with CAS to secure time and space to maneuver forces, gain positional advantage, and seize the initiative.

- **Attack. Commanders use CAS to support an attack against enemy forces,** whether it is launched with minimum preparation in a hasty attack or it is a fully synchronized operation in a deliberate attack. **In a hasty attack, CAS can destroy or attrit critical enemy units or capabilities before the enemy is able to concentrate their forces or establish a defense.** Effective communications are essential due to the lack of time to plan and coordinate the employment of CAS. **In a deliberate attack, commanders use CAS to fix the enemy and support the maneuver and assault of ground forces.** CAS adds to the concentration of firepower, shock effect, and violence against the enemy. CAS can help to isolate enemy forces on the battlefield and force the enemy to defend in a direction from which they are unprepared to fight. CAS should be incorporated into the detailed planning and coordination involved in a deliberate attack.

- **Exploitation.** Exploitation is an offensive operation that usually follows a successful attack and is designed to disorganize the enemy in depth. This can be accomplished by severing escape routes, destroying command and control, and striking reserves, artillery, and support units. **The speed, range, and firepower of CAS makes it well-suited for supporting exploitation.** Employing CAS in an exploitation requires effective communication to coordinate the fluid battlefield situation.

- **Pursuit.** In the pursuit, the commander attempts to annihilate the fleeing enemy force as the enemy becomes demoralized and cohesion and control disintegrate. Since the objective of the pursuit is destruction of the enemy, **CAS can keep direct pressure on the enemy to prevent them from reorganizing or reconstituting**.

c. **Defense. In defensive operations, CAS can be employed to cause the enemy to deploy prematurely and may slow or stop the enemy's attack.** CAS can be assigned to support specific forces in the security, main battle, or rear areas depending on the type of defense (mobile or position). **Commanders may use CAS to:**

- **Support Maneuver.** Complement maneuver forces and integrate with surface delivered fires as part of a combined arms attack.

- **Support the Movement.** Support the movement of friendly forces between positions.

- **Attack Penetrations.** Engage enemy units that have bypassed main battle area forces or penetrated friendly positions.

d. **Reserve.** In offensive operations, **CAS can provide the maneuver commander with additional firepower** to reinforce or exploit success. In defensive operations, **CAS can provide a supported commander with highly mobile firepower** to counterattack or support counterattack forces.

5. Tactical Mission Assignments

As described in Chapter III, "Requesting and Tasking," **the JFC may assign aviation forces/sorties in direct support of another component's maneuver unit**. When assigned in direct support, aviation forces or groups of sorties support a single maneuver unit. This provides immediate response to a maneuver commander's request. The JFC can cancel a direct support tasking at any time and reassign aviation forces to general support. There are **five inherent responsibilities which aviation forces or sorties should address when assigned in direct support:**

- **Requests.** Aviation forces or sorties in direct support respond to supported unit requests for CAS. Direct support forces or sorties can deliver CAS on other targets if not required by the supported unit.

- **Liaison/Communications.** Aviation forces or sorties in direct support must establish liaison and communications with the supported unit.

- **Engagement Area.** The engagement area describes area coverage responsibilities. For direct support forces or sorties, it is within the supported unit's zone of action.

- **Planning.** Aviation forces or sorties in direct support plan CAS in support of the supported unit.

- **Positioning.** Aviation forces or sorties in direct support should be positioned to support the supported unit's scheme of maneuver. Positioning and displacement areas should be coordinated with the supported commander.

6. Navigation Planning

a. **Coordinate Systems.** Several coordinate systems are in use around the world and even within US forces. The use of multiple datums has led to various kinds of inaccuracies during combat operations. **Everyone in the joint CAS process must use a common datum as established by the JFC.** Should the JFC not designate a standardized datum, or if there is any doubt as to which datum is being used, requesters of CAS should specify the datum in the JTAR.

b. Currently there are 32 separate datums used in map production around the world, many of which have several different ellipsoids. Although the long-term US goal is to eventually refer to all geographic positions on the World Geodetic System or a compatible ellipsoid, **there are still 11 different ellipsoids used on US-produced maps:**

- Australian National or South American 1969
- Bessel 1841
- Clarke 1866
- Clarke 1880
- Everest
- Geodetic Reference System 1980
- International
- Modified Airy
- Modified Everest
- World Geodetic System 1972
- World Geodetic System 1984

c. **Aircraft Systems. The different aircraft involved in the CAS process do not all use the same coordinate reference system in their navigation systems.** There are variations in the ways different aircraft types use military grid reference system, universal transverse mercator (UTM), latitude/longitude, and radar offset data. Note that the Military Grid Reference System (MGRS) is not identical to UTM. Both are based on meters but each will give a different prefix/number that describes the same location. For example, Naval Air Station Oceana, Virginia, in MGRS is "18S VR 07791 75465," and in UTM is "18 407791 4075465." See Appendix E, "Aircraft and Helicopter Weapons and Capabilities Guide," Figure E-3, for specific aircraft navigation requirements.

d. Map Systems. **The standard for target location is MGRS/UTM (6 digit) grid coordinates**; however, latitude/longitude may be requested if aircraft systems require it. Many global positioning system (GPS) receivers can compute quick, accurate coordinate conversions, provided users are properly trained.

e. **Control Point Selection**

- **Use of Terrain Features.** Although the advanced navigational equipment available on many CAS-capable aircraft, such as GPS and inertial navigation system (INS), can make the navigation process rather simple, **CAS planners and users should still select control points on or near "significant" features on the ground.**
- **Techniques.** Aircrews need not fly directly over a reference point. However, **precise navigation and adherence to control points may be necessary to deconflict with other fires.** In the case of system failures, crews will have to use

alternative methods of navigation. Further, the "fog of war," stress, confusion and other factors common in war may complicate the tactical situation for CAS aircrews and terminal controllers, requiring them to revert to simpler means of communication and navigation. In short, **basic pilotage and navigation skills remain very important in CAS.**

7. Control and Coordinating Measures

JFCs employ various maneuver and movement control and fire support coordinating measures to facilitate joint operations. Relative to the discussion of CAS are fire support coordinating measures and airspace control measures.

a. **Fire Support Coordinating Measures. Within their areas of operation, land/amphibious commanders employ permissive and restrictive fire support coordinating measures which are positioned and adjusted in consultation with superior, subordinate, supporting, and affected commanders.** The supported maneuver commander establishes fire support coordinating measures based on the recommendations of the FSCOORD/FSC, who coordinates all fire support impacting in the area of operations of his supported maneuver commander. **Fire support coordinating measures are used to facilitate timely and safe use of fire support.** Figure IV-1 depicts common fire support coordinating measures, including:

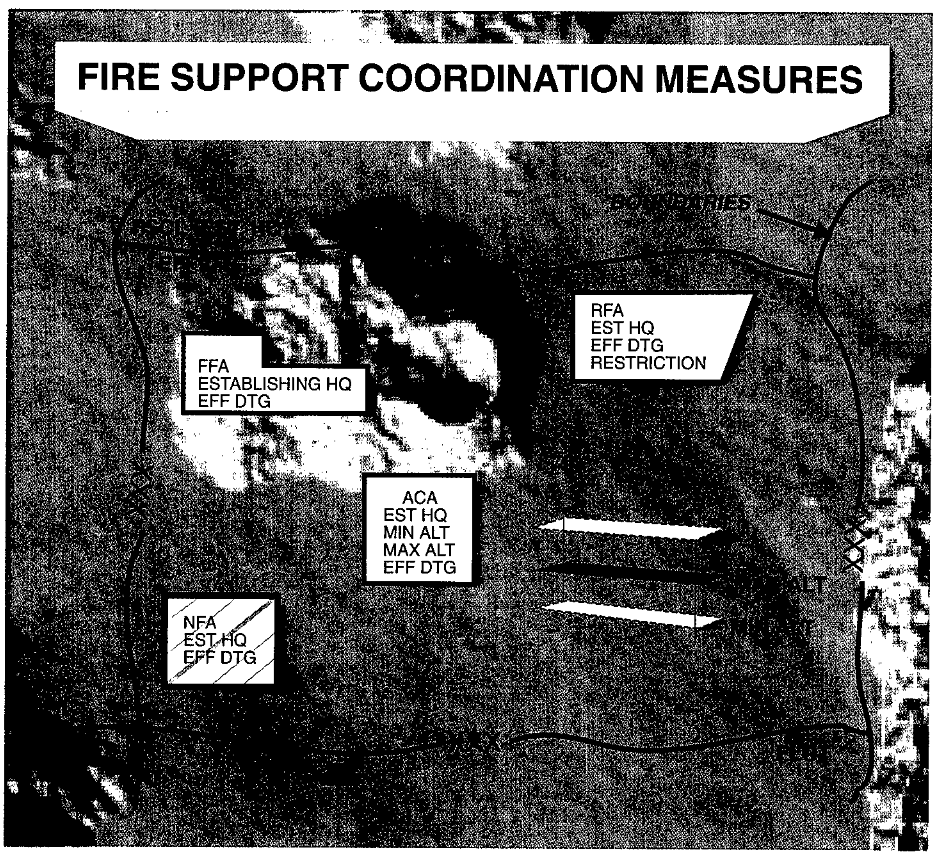


Figure IV-1. Fire Support Coordination Measures

- Fire Support Coordination Line (FSCL)
- Free-Fire Area (FFA)
- No-Fire Area (NFA)
- Restrictive Fire Area (RFA)
- Airspace Coordination Area (ACA)
- Coordinated Fire Line (CFL)
- Restrictive Fire Line (RFL)

b. **Airspace Control Measures.** (See Figure IV-2.) **The JFC uses the airspace control authority to establish airspace control measures. Each component within a joint force maintains an airspace control organization within the senior command facility linked to the airspace control authority.** The airspace control authority coordinates the airspace C2 system, assigns responsibilities, and develops procedures for planning, implementing, and executing airspace control using the airspace control plan and airspace control order. See Joint Pub 3-52, "Doctrine for Joint Airspace Control in the Combat Zone," for a detailed definition of **joint airspace control measures, which include:**

- Coordinating Altitude
- High Density Airspace Control Zone (HIDACZ)
- Restricted Operations Area/Zone (ROZ)
- Minimum Risk Routes (MRR)
- Standard Use Army Aircraft Flight Routes (SAAFR)

JOINT AIRSPACE CONTROL MEASURES

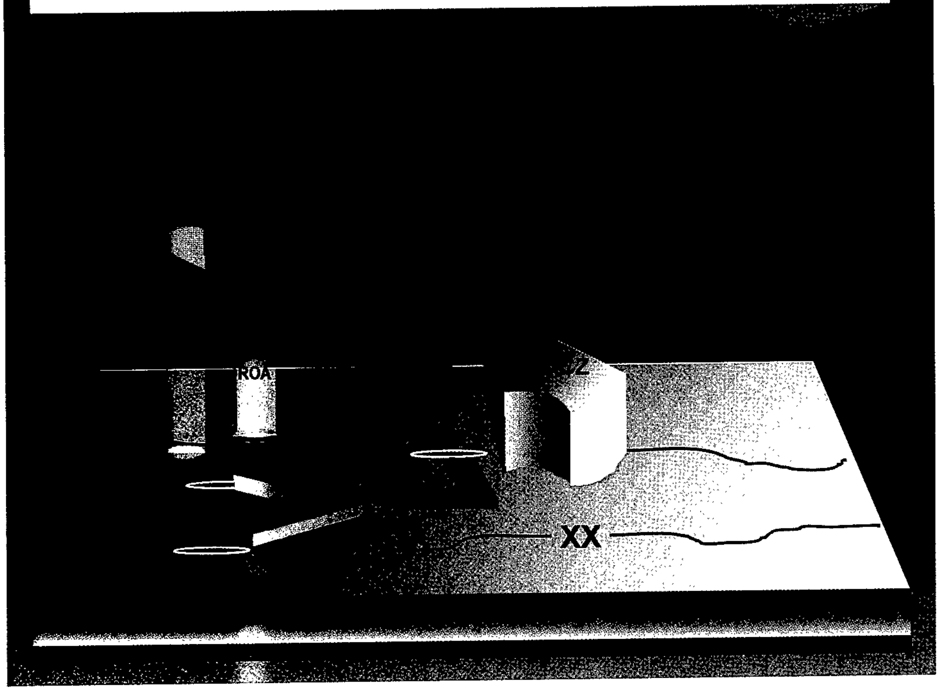


Figure IV-2. Joint Airspace Control Measures

8. Integrating CAS with Other Fires

This paragraph deals with techniques that can be used in situations requiring the integration of CAS with other supporting arms.

a. **Surface Fire Support**. One of the most difficult functions performed by a FSE/FSCC **is integrating CAS with surface fires.** The goal is to integrate air with the other supporting arms and with maneuver to achieve the desired effect without suspending the use of any of the supporting arms or unnecessarily delaying the scheme of maneuver. An additional goal is to offer a reasonable measure of protection to the aircraft from the unintended effects of friendly surface fire.

- **Inform Supporting Arms Units.** When CAS is requested, **the FSE/FSCC of the requesting unit** (battalion, regiment, brigade or division) **informs other concerned FSE/FSCC and all supporting arms units as quickly as possible of details of the mission.** The aircraft's time of arrival on station and TOT or TTT is passed. TOT/TTT is the CAS ordnance impact time. Aircraft may also be given a time block (for example, 1200-1230Z). CAS aircraft will employ within this time block to meet the TOT/TTT. TOT is normally used for preplanned scheduled CAS missions and is expressed in terms of a synchronized clock (e.g., 1505) or an established H-hour (e.g., H-2). TTT can be used for immediate and preplanned on-call CAS and is expressed as the number of minutes and seconds to elapse from a time hack until first ordnance impacts.

- **Surface Fires Supporting CAS Missions.** There are two primary forms of support: **SEAD** and **marking rounds**. They are often used in combination.

b. **Target Marking. A mark should be provided for aircraft providing CAS whenever possible.** Plan to mark the target in sufficient time prior to weapons employment to ensure target acquisition. **When one of the following marking methods is not possible, the CAS target may be identified by narrative description provided by the terminal controller.** This narrative may be aided by the terminal controller marking his position with devices such as strobe lights, mirrors, or air panels. **The mark can be provided by:**

- Indirect fire weapons (mortars, artillery, NSFS)
- Direct fire weapons (tank main gun or machine guns)
- LASER designators
- Radar Beacon
- FAC(A) aircraft (e.g., LASER, infrared [IR], rockets)
- IR pointers

See Chapter V, "Execution," for detailed information on marking techniques.

c. **Suppression of Enemy Air Defenses. SEAD missions do not guarantee aircraft immunity from enemy air defenses. They can divert lethal and nonlethal systems from other tasks and may expose those systems to enemy counterfire.** Terminal controllers should first evaluate the option to route the aircraft away from known or suspected antiair threats. If aircraft cannot be routed away from enemy air defenses, aircraft vulnerability must be balanced against the risk of exposing SEAD delivery systems to determine if SEAD is appropriate for that CAS mission. Before requesting CAS that would require SEAD support, fire support personnel must first consider whether artillery or NSFS could range the target and achieve the desired effects. If so, an artillery or naval gun fire attack would be more efficient than a CAS attack supported by artillery or NSFS SEAD. **If the target cannot be ranged by indirect fire or is most efficiently attacked by aircraft, CAS supported by SEAD fires may be appropriate.**

- **Objectives. The primary objective of SEAD is to allow friendly aircraft to operate in airspace defended by an enemy air defense system**—including the target area and ingress/egress routes. **Surface-delivered SEAD** involves planning and coordination by the FSE/FSCC and at the maneuver units down to the company level. **Air-delivered SEAD and EW** must be coordinated and deconflicted in order to provide necessary support during the time CAS is being conducted. For these reasons, SEAD is another critical timing factor associated with CAS.

- **Coordination.** Like other suppression missions, surface-delivered SEAD normally requires only a few rounds per target for a short period. **Effective SEAD depends on accurate intelligence on the position and type of enemy weapons.** The FSCOORD/FSC, working with the terminal controller and forward observer, may coordinate surface-delivered SEAD with target marking.

d. **Airspace Coordination Area.** Indirect fire weapons and aircraft require the use of airspace to perform their missions. **A function of fire support coordination is to deconflict airspace usage when required.** ACAs are used to ensure aircrew safety and the effective use of indirect supporting fires. There are several techniques which may be used in this role. The method selected depends on the time available, tactical situation, unit standard operating procedures, and state of training. **There are two types of ACAs: formal and informal.**

- **Formal ACA.** (See Figure IV-3.) **The airspace control authority establishes formal ACAs at the request of the appropriate ground commander.** Formal

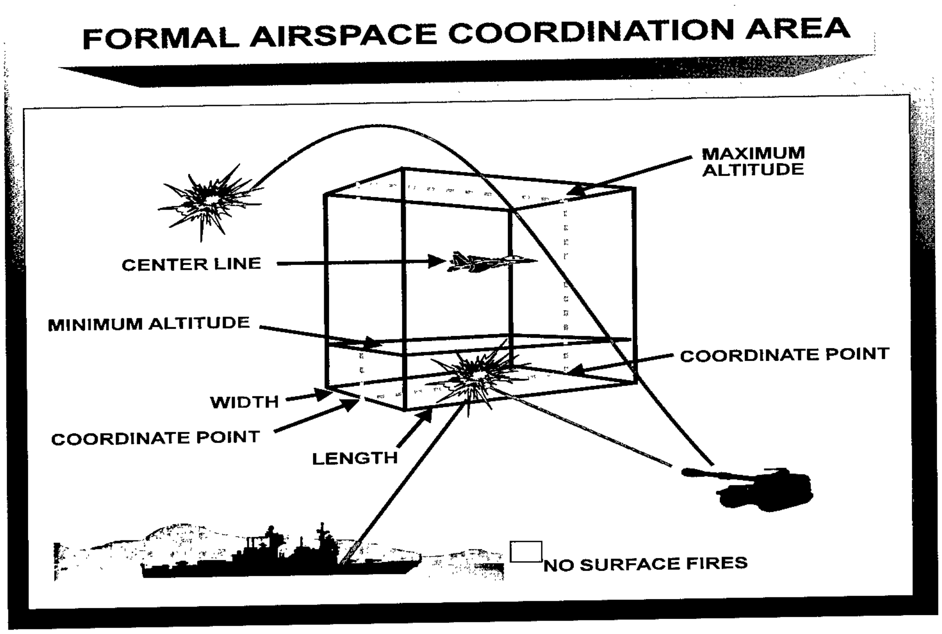


Figure IV-3. Formal Airspace Coordination Area

ACAs require detailed planning. Though not always necessary, formal ACAs should be considered. **The vertical and lateral limits of the ACA are designed to allow freedom of action for air and surface fire support for the greatest number of foreseeable targets.** Since only the fire direction center (FDC) can determine the trajectory for a specific battery firing at a specific target, **each target must be evaluated in the FDC** to ensure the trajectories of the artillery rounds do not penetrate the ACA. The FSCOORD/FSC should consult the FDC when deciding the altitude of an ACA to determine if that altitude would allow the majority of targets to be attacked without interference or problems.

- **Informal ACA. Informal ACAs can be established using separation plans and may be established by any maneuver commander.** Aircraft and surface fires may be separated by distance (lateral, altitude, and combination of lateral and altitude) or by time. Distance separation requires less detailed coordination between aircraft and firing units, but can be the most restrictive for aircraft routing. **Fire support personnel should select the separation technique that requires the least coordination** without adversely affecting the aircrew's ability to safely complete the mission.

•• **Lateral Separation.** (See Figure IV-4.) **Lateral separation is effective for coordinating fires against targets that are adequately separated from**

ARTILLERY-CAS AIRCRAFT LATERAL SEPARATION

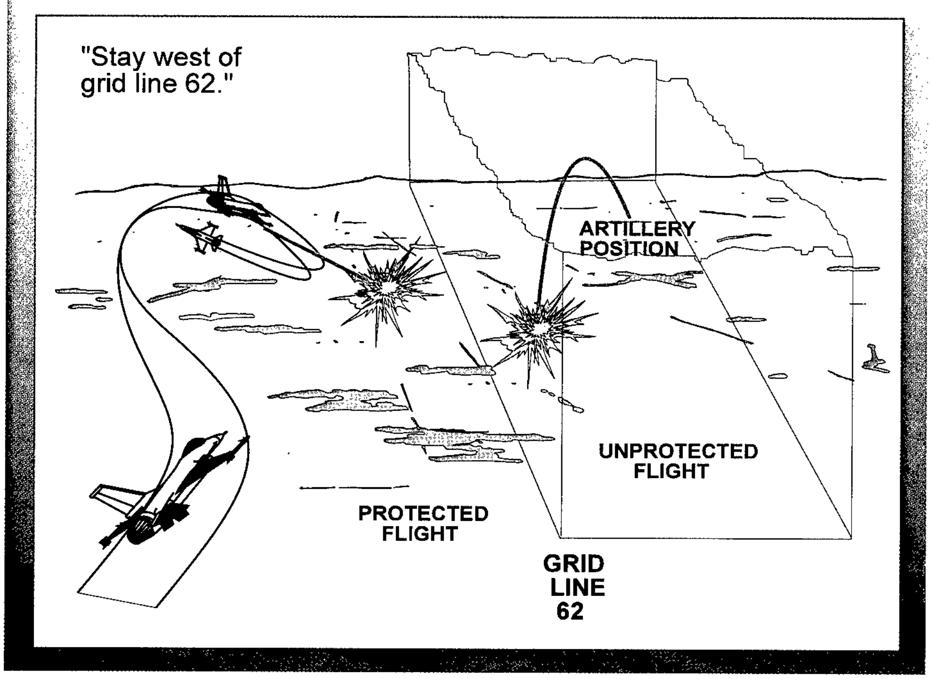


Figure IV-4. Artillery-CAS Aircraft Lateral Separation

flight routes to ensure aircraft protection from the effects of friendly fires. This is an appropriate technique when aircrews and firing units engage separate targets (at least 500 meters apart) and aircraft will not cross gun-target lines. Terminal controllers must know the gun-target line so they can restrict aircraft from crossing trajectories. (For example, "Stay west of grid line 62" or "Remain west of the river.")

•• **Altitude Separation.** (See Figure IV-5.) **Altitude separation is effective for coordinating fires when aircrews will remain above indirect fire trajectories and their effects.** This technique is effective when aircrews and firing units engage the same or nearby targets. (For example, "Remain above 3000 feet mean sea level (MSL) in quadrant northwest of grid 7325" or "Orbit above 5000 MSL at Possum Kingdom Lake.")

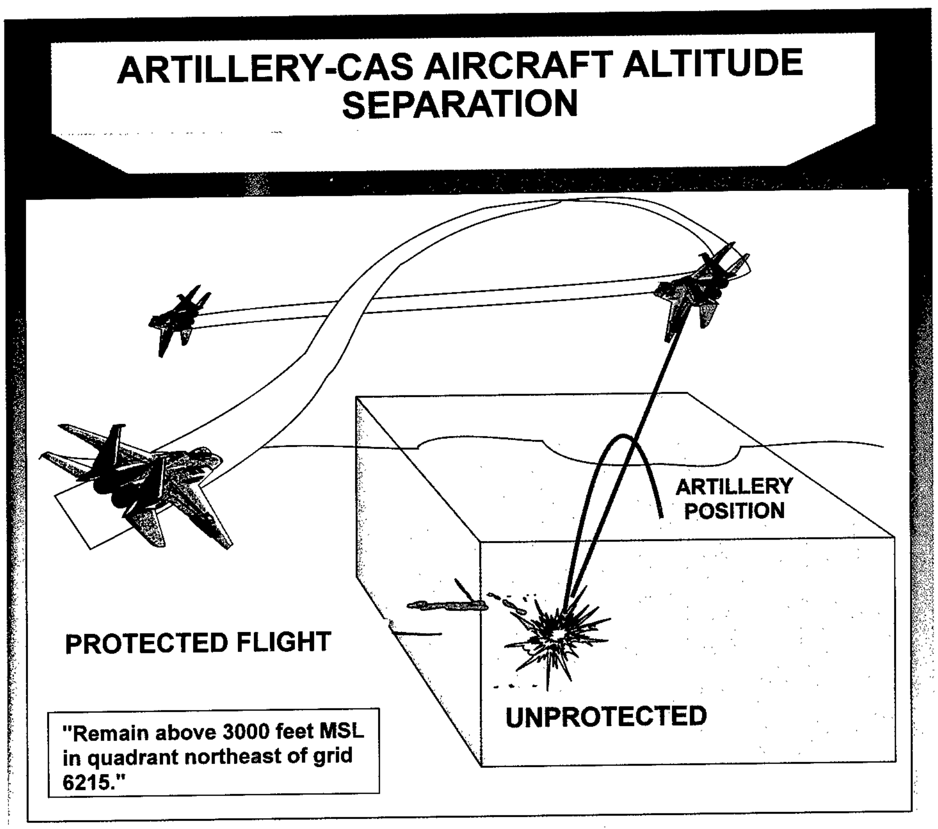


Figure IV-5. Artillery-CAS Aircraft Altitude Separation

•• **Altitude and Lateral Separation.** (See Figure IV-6.) **Altitude and lateral separation is the most restrictive technique for aircrews and may be required when aircraft must cross the firing unit's gun-target line.** This is an appropriate technique when aircraft and firing units engage separate targets and the CAS target is along the gun-target line. This requires aircrews to remain below indirect fire trajectories. Aircraft maneuvering requirements may also dictate that firing units deliver fires by high angle or reduced charge. For example, "Stay between north-south grid lines 58 and 62 and below 3000 feet MSL."

•• **Time Separation. Time separation requires the most detailed coordination and may be required when aircrews must fly near indirect fire trajectories or ordnance effects.** The timing of surface fires must be coordinated with aircraft routing. This ensures that even though aircraft and surface fires may occupy the same space, they do not do so at the same time. **All timing for surface fires will be based on the specific aircraft event time (TOT/TTT).** This technique is appropriate when aircrews and firing units engage the same or nearby targets. Consider weapons fragmentation envelope and the

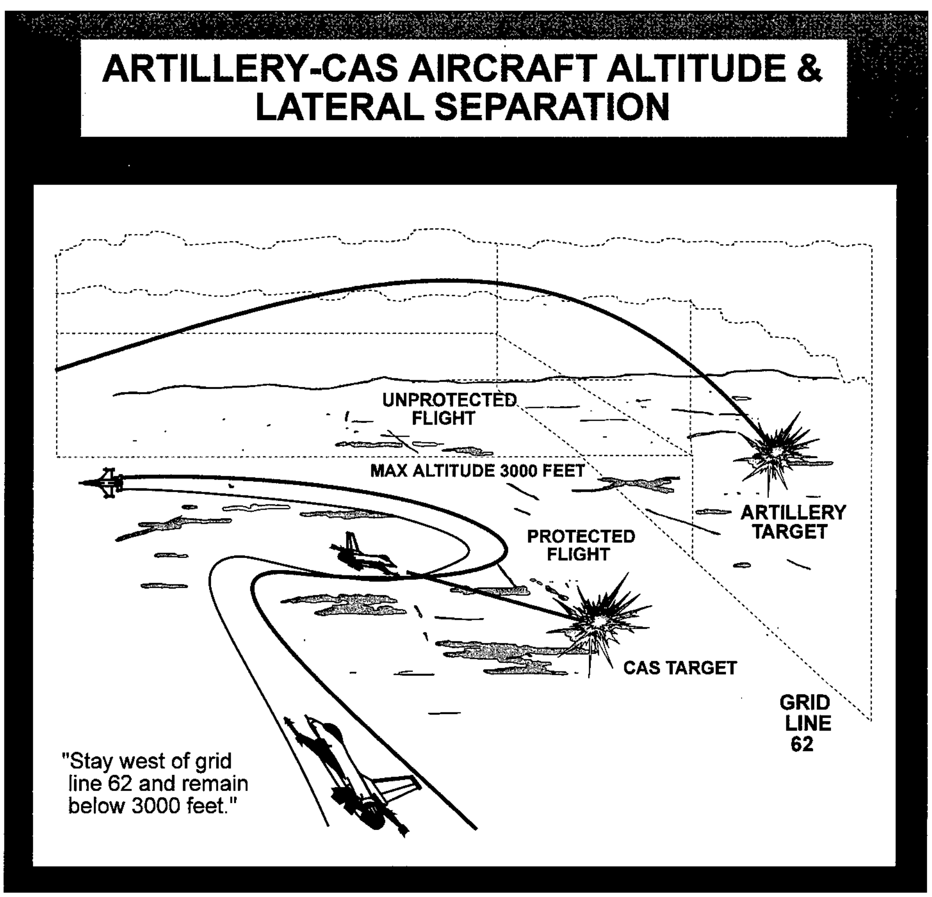


Figure IV-6. Artillery-CAS Aircraft Altitude and Lateral Separation likelihood of secondary explosions when deconflicting sorties. Figure IV-7 illustrates time separation. Figure IV-8 summarizes appropriate separation techniques for typical CAS scenarios.

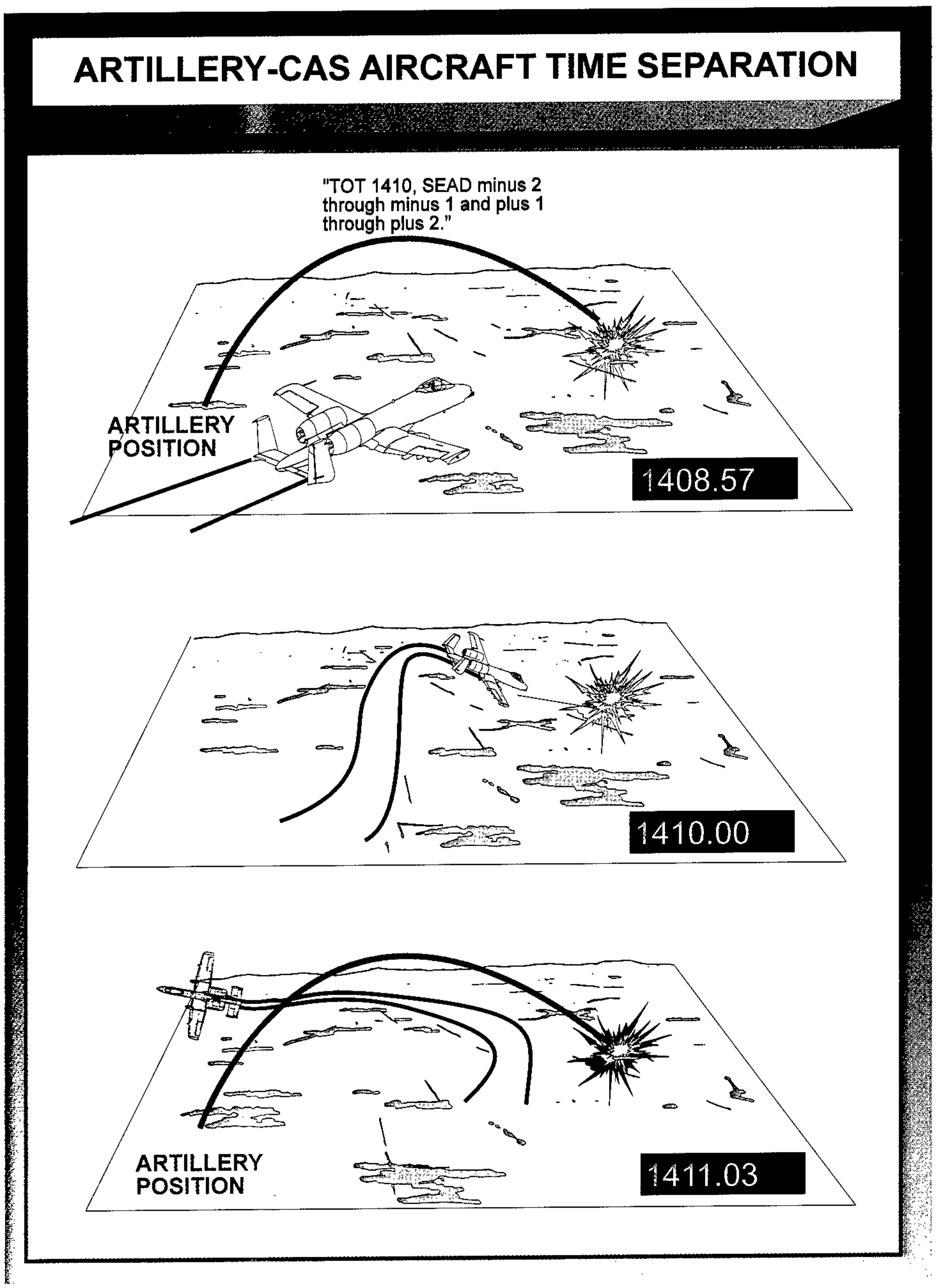


Figure IV-7. Artillery-CAS Aircraft Time Separation

SEPARATION TECHNIQUES

	CAS Target Same as/Near Surface Target	CAS Target Distant From Surface Target	CAS Target Along Gun-Target Line
High/Medium Altitude Attack	Altitude Separation	Altitude Separation	Altitude and/or Lateral Separation
Low/Very Low Altitude Attack	Time Separation	Altitude or Lateral Separation	Altitude and/or Lateral Separation

Figure IV-8. Separation Techniques

SECTION B. NIGHT/ADVERSE WEATHER CAS PLANNING

9. Introduction

The execution of night CAS is one of the most difficult missions on the battlefield. JFCs must be able to seize the initiative and apply overwhelming combat power at any time, day or night. **Night CAS employs a mixture of modern night vision devices, IR pointers, laser systems, battlefield illumination, and standard procedures.** Ground forces, both friendly and enemy, conduct operations around the clock. Therefore, **CAS must be provided at night, during periods of limited visibility, or under adverse weather conditions.** CAS demands rigorous training and detailed mission planning, as well as solid communications and procedural discipline. Successful CAS at night or in adverse weather only accentuates these requirements.

10. Basic Considerations

a. **Advantages.** The most important advantage of night and adverse weather CAS is **the limitation it imposes on enemy optically-directed antiaircraft artillery (AAA) and optical/infrared-guided surface-to-air missiles (SAM).** This advantage is greatest if enemy air defense operators do not possess night vision devices (NVDs). **Selectively placed airborne and ground illumination may further degrade enemy night vision capabilities while preserving or enhancing those of friendly forces.** As an example, overt airborne illumination flares, selectively placed at a distance well behind and above friendly positions (at the backs of, but not close enough to silhouette), could be employed to "gain down" enemy night vision goggles (NVGs), improve insufficient light conditions, and counter enemy IR SAMs as well. While radar-directed threat systems may remain as lethal as in daylight, gun muzzle flash, tracers, and missile/rocket motors are generally easier to see and react to at night.

b. **Disadvantages.** Darkness and weather can impose several limitations on CAS employment. During periods of low illumination and reduced visibility, both **CAS aircrews and ground forces may have**

difficulty in pinpointing targets and accurately locating both enemy and friendly forces. Night and adverse weather CAS missions may also require **greater time on station**. Thus, fuel capacity/ combat radius may be an important consideration when tasking aircraft by type for night CAS. **Twilight and overcast conditions may also highlight aircraft to enemy ground forces.** If planners have the option, dawn and dusk missions should be avoided in favor of missions flown in darkness.

c. **Friendly Force Location and Identification.** Perhaps the single most important task in conducting CAS is correctly locating and identifying the friendly ground forces who will be in close proximity. **However, the challenges of identifying friendly and enemy locations, identifying targets, and maintaining situational awareness become acute in the night or adverse weather CAS environment.** The entire training, equipping, planning, tasking, and execution process must recognize these challenges.

11. Aircraft, Munitions, and Equipment Selection

CAS planners should select those combinations of munitions and aircraft offering the greatest accuracy, firepower, and flexibility. When possible, use **NVD-equipped aircraft** compatible with laser or infrared marking/designation systems and munitions. See Appendix E, "Aircraft and Helicopter Weapons and Capabilities Guide," for specific aircraft capabilities.

a. **Precision Guided Munitions (PGMs).** While **PGMs** are the most accurate munitions for night CAS, they **are very hazardous when used for troops in contact situations**, day or night. The footprint for PGMs in the event of some type of malfunction such as loss of guidance or hard over fin is very large and has a very high probability of fratricide. PGMs span the entire spectrum of delivery platforms, to include fighters, attack helicopters, artillery, and naval guns. **One type of PGM is the laser guided weapon (LGW).** LGWs are only compatible with laser target designators (LTDs).

b. **Equipment Selection. Systems to identify and mark friendly positions or mark/designate targets are important** (e.g., IR pointers, IR gated laser intensifier [GLINT] tape, GPS, LTDs). When possible, ensure terminal controllers, FAC(A)s, and CAS aircraft are equipped with such systems, and that the ground force systems are compatible with those on the CAS aircraft.

c. **Equipment Compatibility.** Figure IV-9 compares IR and laser equipment compatibility. As depicted, **compatibility exists only between LTDs and laser spot trackers (LSTs)**. In other words, all coded laser target designators can work with all coded laser acquisition/spot trackers and all coded laser guided weapons. Likewise, IR pointers and NVGs are only compatible with each other. IR pointers cannot designate for LSTs and NVGs cannot see targets designated by LTDs. Forward looking infrared (FLIR) systems are not compatible with either.

12. Visual Employment

Visual deliveries during night or adverse weather are difficult, but are still a viable option. **Artificial illumination may be used to enhance target acquisition**. The target may be illuminated or marked by the TAC(A), FAC(A), artillery/mortars, small arms, or by a dedicated flare ship. **Airborne delivered marks/illumination may be provided** by forward firing rockets or by parachute flare. Coordination and approval for illumination will be made prior to entering the target area. **Artillery, mortar, and airborne delivered flares are available** which burn on the ground as

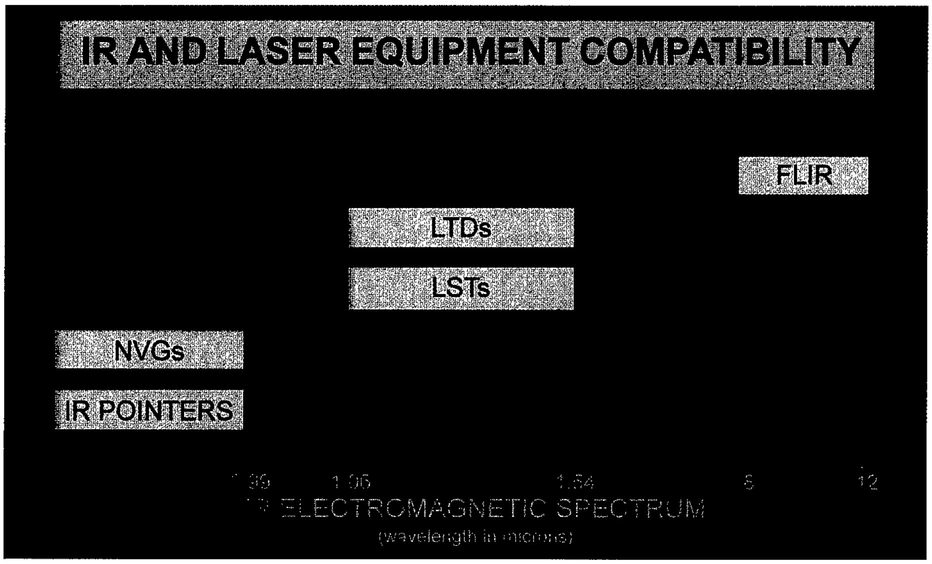


Figure IV-9. IR and Laser Equipment Compatibility

target spotting rounds. After the target area is illuminated, specific targets may be marked by white phosphorous (WP) rockets, mortars, or artillery to aid the attacking aircraft in locating specific aimpoints.

13. System-Aided Employment

System-aided target acquisition and weapons delivery methods are relied on more heavily during night and adverse weather. While these system-aided employment options can be used independently, combining the systems increases the probability of mission success. These systems include laser, electro-optical/infrared (EO/IR), radar, radar beacon, and GPS.

a. **Laser.** Night procedures for target identification and designation by laser are the same as those used during daytime operations. However, **adverse weather may limit the use of lasers**. Cloud cover and precipitation as well as battlefield conditions (smoke, dust, haze and other obscurants) can seriously degrade laser effectiveness.

b. **EO/IR Systems.** The capabilities of low light level television (LLLTV) and FLIR systems are the same day and night. **Cloud cover, humidity, precipitation and thermal crossover and battlefield conditions** (smoke, dust, haze and other obscurants) **may degrade FLIR and LLLTV effectiveness.**

c. **Radar.** Although not preferred, radar deliveries are an option in certain instances. **During severe weather or when the target cannot be marked, this type of weapons delivery may be the only option available.** Appendix E, "Aircraft and Helicopter Weapons and Capabilities Guide," lists the aircraft capable of radar-directed bombing. In order to perform a radar delivery, the target or offset aimpoint(s) must be radar significant.

d. **Radar Beacon Bombing.** Radar beacon bombing during night and adverse weather uses the same procedures as during day operations. Only the Navy's A-6E regularly trains for this mission, limiting the number of assets available to the maneuver force commander. **Severe weather may also limit the use of this capability.** Areas of heavy precipitation between the aircraft and the beacon may impair activation. Targets need not be radar significant. The radar beacon must be placed for optimum reception, with a clear line of sight between the beacon and the aircraft in the target area.

e. **GPS.** Weapons can be delivered at night or through the weather at specific coordinates by GPS equipped aircraft. **When supplied with GPS coordinates by terminal controllers, computed deliveries can be extremely accurate.**

14. Night Vision Device Employment

Night vision devices include NVGs and IR systems. NVGs and IR systems (e.g., FLIR, low-altitude navigation, and targeting infrared for night [LANTIRN]) **may provide the primary navigation, targeting and terrain avoidance reference for the night CAS mission.** NVGs and IR systems operate on the same basic principle—using the red and near IR area of the light spectrum to produce a visible image. **NVGs feature image intensifier tubes that produce a bright monochromatic (green) image** in light conditions too low for normal unassisted vision. This image is based on the relationship between the amount of light present, referred to as illuminance, and the amount of light which is reflected from objects in the scene, referred to as luminance or brightness. **IR systems use the far IR wavelengths to create an image** based on object temperature and emissivity relative to the surroundings.

a. **Advantages. NVDs may be used as an additional sensor with existing systems,** allowing all participating units to maintain enhanced situational awareness and crew confidence levels both on the ground and in the air. **NVDs**, under the proper weather and illumination conditions, **allow the user to basically "see in the dark."** NVDs also provide a covert method for identifying and attacking targets. **This increases the critical elements of surprise and survivability in any threat environment.** Ground forces (especially SOF) benefit from the smaller lightweight NVD equipment, allowing pre-H hour and H-hour methods of attacking targets, along with CAS target marking. Employed properly to enhance situational awareness of friendly and enemy positions, **NVDs and associated IR devices can play a key role in minimizing the risk of fratricide.**

b. **Disadvantages. Reduced illumination levels** caused by the moon phase, weather or battlefield obscurations **may degrade the ability to effectively employ NVDs without artificial illumination.** Under certain conditions, reduced illumination levels may be mitigated by properly placed artificial illumination sources. Used improperly, the limited field of view of NVGs can lead to loss of situational awareness, given the increased task workload demanded for CAS missions. Extensive training for all units is required to ensure mission success. **Additional disadvantages may exist if the enemy possesses NVDs**, thus limiting or even negating friendly use. **Decoy and deceptive lighting can easily be employed**, causing confusion for the aircrew if the terminal controller cannot communicate the correct lighting marks to the attackers.

c. **Planning Considerations**

- **NVDs can significantly increase the capability of ground and airborne units to identify ground targets in a night CAS environment.** Certain natural conditions determine the aircrew's ability to acquire the target visually. NVDs are particularly useful for increasing **situational awareness**, and in some instances can be utilized for **target acquisition**.

•• **Moon Phase and Elevation. The moon phase**, or percent moon disk as a fraction of full moon, **is the most significant night illumination factor.** A full moon can provide significant lighting for NVDs, and the elevation of the moon can play a significant role. Elevation of 20 degrees or more may be required to gain suitable illumination for NVG operation.

•• **Mean Starlight. When using NVGs, light from non-moon celestial sources provides limited illumination**, and on relatively clear nights will suffice for general situational awareness. Depending on the target size and orientation, there may not be enough light under mean starlight conditions for target acquisition.

•• **Weather Conditions.** The **cloud cover**, **cloud base height**, and **reduced atmospheric visibility** significantly degrade any benefits provided by moon and mean starlight illumination as well as degrading IR target sources.

•• **Cultural Lighting.** Light sources such as **city lights**, **highway lighting**, and other sources such as **fires** provide lighting which can help with general illumination. Extremely bright light sources will wash out the NVD field of view when looked at directly.

- **IR devices can be used to aid in specific target location and acquisition.** These can significantly increase the effectiveness of the CAS accuracy in the night environment, while still remaining covert. Several options are discussed as follows:

•• **IR Pointers.** IR pointers or IR spotlight/IR wands can aid in target acquisition by CAS aircrews by **highlighting the target with infrared light** in the spectrum usable by NVDs. Offset the IR pointer from the aircraft run-in heading to facilitate aircrew acquisition. Moving the pointer beam will also help in acquisition of the beam, and once acquired, the FAC can guide the pilot's eyes and sensors onto the intended target. Two way communication between the FAC and aircrew is beneficial. The IR GLINT spotlight employed by the AC-130 gunship can illuminate a large target area, but the use of this light source can highlight the illuminating aircraft, leaving it susceptible to ground fire.

•• **IR Strobe Lights.** IR strobe lights can be used by FACs and by properly equipped aircraft to provide **covert position identification** to NVD-equipped personnel. This can provide positive location of the FAC and/or friendly forces to CAS aircraft.

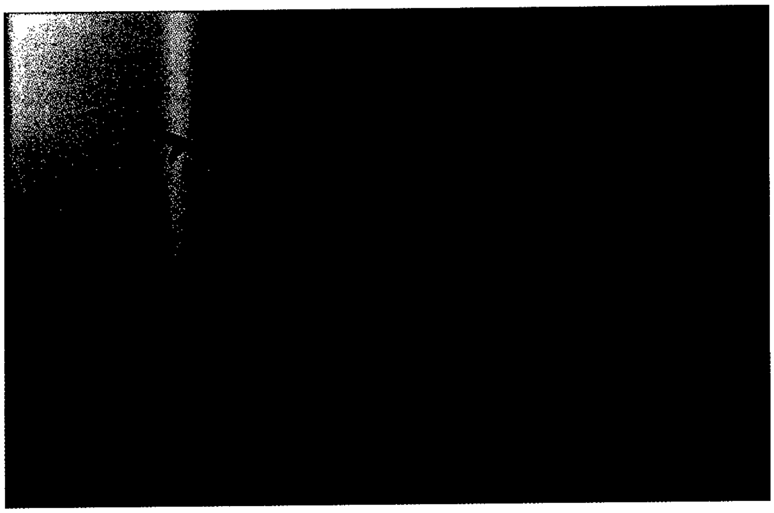
•• **IR Flares.** IR flares can provide **general target area illumination visible only to NVD-equipped personnel**, and can be useful from several miles away.

•• **FAC(A).** FAC(A)s can be used to **guide NVD-equipped CAS aircraft to targets** using IR detecting and targeting sources.

- **Proficiency of NVD aircrews and FACs has a significant impact on effectiveness** due to the complexity of the night CAS environment and NVD workload.

15. Target Identifiers

a. **Airborne Illumination. Many aircraft capable of providing CAS can deploy flares.** The aircraft capabilities figures in Appendix E, "Aircraft and Helicopter Weapons and Capabilities Guide," list flare-capable aircraft and the types of flares/illuminating devices they can carry.



The AC-130 gunship is equipped to provide close air support for extended periods in a night time environment.

b. **Surface Delivered Illumination.** Illumination can be delivered by artillery, mortars, and naval gunfire to **illuminate** the target area and/or to **mark** the target.

c. **Enemy Ground Fire.** Enemy ground fire, AAA, tracer rounds, and SAM firings can disclose targets.

d. **Laser Designators (Ground/Airborne).** Coded LTDs are ground and airborne systems that have two specific purposes. First, **they provide terminal weapons guidance for laser guided weapons.** Second, **they designate targets for coded LSTs.** Coded LTDs emit laser energy with a pulse repetition frequency (PRF) and require input of specific laser codes for operation. Codes are assigned to LGWs and directly relate to the PRF that harmonizes designator and seeker interface. The aircraft/helicopter capabilities figures in Appendix E, "Aircraft and Helicopter Weapons and Capabilities Guide," list aircraft with LTDs.

e. **Radar. Aircraft can use radar-significant terrain points, radar reflectors, or radar beacons to enhance bombing.** The radar beacon is a portable manpack transponder employed by terminal controllers that emits an electronic pulse on compatible radar-equipped aircraft. Appendix E, "Aircraft and Helicopter Weapons and Capabilities Guide," lists the radar beacon compatible aircraft.

f. **IR Pointers. IR pointers are low power, uncoded designators used for target cueing and identification in conjunction with NVGs.** They do not provide terminal weapons guidance, and they are not compatible with LSTs. These systems operate in the lower portion of the IR spectrum compatible only with NVGs. Aircraft and ground personnel operating with NVGs can acquire targets identified by IR pointers.

g. **Friendly Small Arms. Bullet tracers impacting on or near the target are excellent marks** if the threat allows their use. This may also help confirm friendly positions.

16. Night CAS Using AC-130 Gunships

The AC-130 gunship can provide accurate support for extended periods of time to ground units and static positions in a night time environment. The AC-130 has a GLINT which is part of the LLLTV targeting system. It is used as an alternate source of IR illumination and has the capability to illuminate and identify IR GLINT tape worn by friendly ground forces.

The drawback of the GLINT is that it highlights the aircraft to enemy forces using night vision devices. **To prevent fratricide** when using the AC-130 in a troops-in-contact situation, **the friendly position should be located using one of the following techniques:**

a. **Beacons. Several transportable beacon transponders are available for use** in conjunction with the APQ-150 Beacon Tracking Radar and the ASD-5 Black Crow sensor. For a complete list of AC-130 compatible beacons see Figure E-1.

b. **Other Methods.** Other methods to locate friendly positions include **IR** or **visible light strobes**, **GLINT tape**, **chemlights**, and **other light sources**.

SECTION C. PLANNING FIXED-WING CAS

17. Fixed-Wing Aircraft Positioning

a. **Basing Modes.** Fixed-wing CAS aircraft may be operationally based in a number of ways. **The more traditional basing modes include main operating bases on land and naval ships afloat.** Fixed base and shipboard deployment generally offers the **widest range** of available ordnance, mission equipment, and logistic support but these locations are often well behind the battle area. As a result, **aircraft have farther to fly to reach CAS target areas.** In addition to using main operating bases and ships, **aircraft can be deployed to FOBs**. Use of FOBs decreases transit time and may increase time on station, but may limit the flexibility of munitions available.

b. **Alert Status.** Aircraft may be placed on **ground alert** or launched into an **airborne alert** orbit near the battle area. **Alert aircraft must be configured with effective weapons** for anticipated targets; if different kinds of targets are encountered, the aircraft and its weapons may be less effective. Airborne alert aircraft consume fuel as they orbit, and eventually will have to be employed or land and refuel. Air refueling can increase both the combat radius and time on station for fixed-wing aircraft if tankers can be suitably positioned.

18. Fixed-Wing Logistics

a. **General.** Preparing weapons, configuring aircraft, and scheduling tankers for air refueling require time and coordination. **The more specific and timely a CAS request, the higher the probability the allocated aircraft will be appropriately armed for the mission.** Logistics efforts must ensure CAS is timely and responsive to adequately support the ground commander's scheme of maneuver.

b. **Forward Operating Bases. Forward deployment of fixed-wing CAS aircraft offers several advantages.** Operating from locations close to the battle area **can increase loiter time** in the objective area, **extend effective combat radius**, and, perhaps most importantly, **make the CAS firepower more responsive to ground commanders** by shortening the response time. Preplanned logistic support is vital to ensure sufficient ammunition, fuel, and servicing equipment is in position and ready for use when it is needed.

- **Responsibilities of Supported Units. Supported units should provide a forecast of anticipated CAS targets**, so appropriate munitions can be transported to FOBs and prepared for use.

- **Responsibilities of Supporting Units. Supporting units are responsible for keeping FOBs operational** by planning for and carrying out logistical support. FOB logistical support is a function of the number and type of aircraft using the location, operations tempo, quantity and type of munitions being employed, and system-specific support requirements.

- **Joint Use of FOBs. Logistics is a very**

important consideration when more than one component is operating out of a FOB. Direct liaison between all units involved is vital, and can be critical to mission success. Considerations include munitions handling equipment, fuel connections, type and grade of fuel, and weapon arming and fuzing equipment and configurations.

SECTION D. PLANNING ROTARY-WING CAS

19. Army Aviation Maneuver

The primary purpose of Army attack helicopter operations is the destruction of enemy armored and artillery units. Army attack helicopters are tasked and employed as units, as opposed to sorties. Additionally, the Army employs attack helicopters as maneuver units, as opposed to the traditional employment of fixed-wing CAS on a sortie-by-sortie basis. For cross-component support, Army attack helicopters can perform a CAS function, usually by being tasked as units. Attack helicopter assets are decentralized to divisions to the greatest possible extent and are employed as units with maneuver missions and objectives. Attack units can conduct close battle in conjunction with the ground maneuver commander. **Attack units are most effective when used to mass effects in conjunction with other arms at decisive points.** Night operations will be the rule. The attack battalion commander will coordinate with the supported ground commander. The attack battalion's scouts will clear the battle position, locate targets, and conduct target handoffs to the attack element.

20. Attack Helicopter Basing

See Figure IV-10.

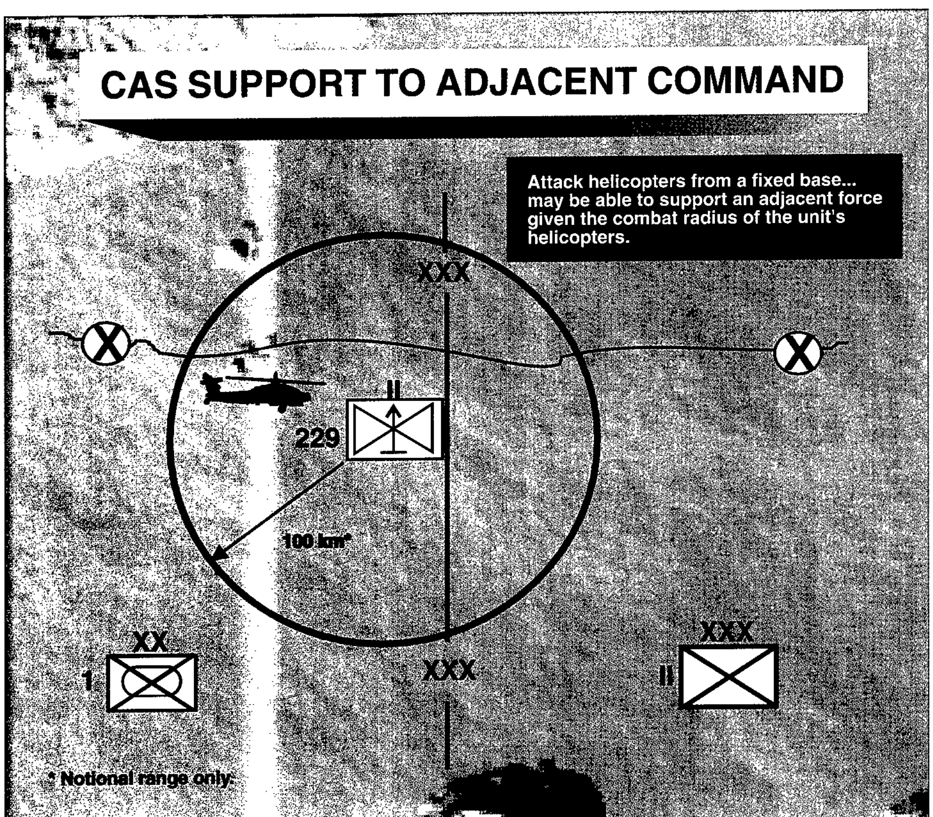


Figure IV-10. CAS Support to Adjacent Command

a. **Attack helicopters operate in the forward areas of the battlefield.** Like fixed-wing aircraft, attack helicopters also have main operating bases, yet these bases are fairly close to the battle area. Both the Army and Marine Corps make use of austere forward field locations to provide flexible and responsive fire support to supported commanders.

b. As an example, **attack helicopters tasked to provide CAS to an adjacent command may be able to do so from an established operating base**. The 229th Attack Helicopter Battalion of the 1st Division has been tasked to support II MEF. Given the location of the 229th's base, and the notional combat radius of the unit's helicopters, the 229th can cover targets in a portion of the II MEF sector while operating from their base. The II MEF commander capitalizes on this situation by focusing the 229th against objectives within the unit's effective combat radius, while concentrating other assets throughout the rest of the MEF sector.

21. Attack Helicopter Logistics

a. **Forward Arming and Refueling Point (FARP) Function and Location. Rotary-wing CAS aircraft support themselves through FARPs located in the forward area.** (See Figure IV-11.) The FARP extends the effective combat radius of attack helicopters and increases their time in the objective area. **Preplanned logistic support is vital** in order to ensure that sufficient ammunition and fuel and the proper servicing equipment is available when it is needed.

b. **Support to FARPs.** Logistical support to FARPs is a function of the **number of aircraft planning to use the FARP, tempo of operations, the types of**

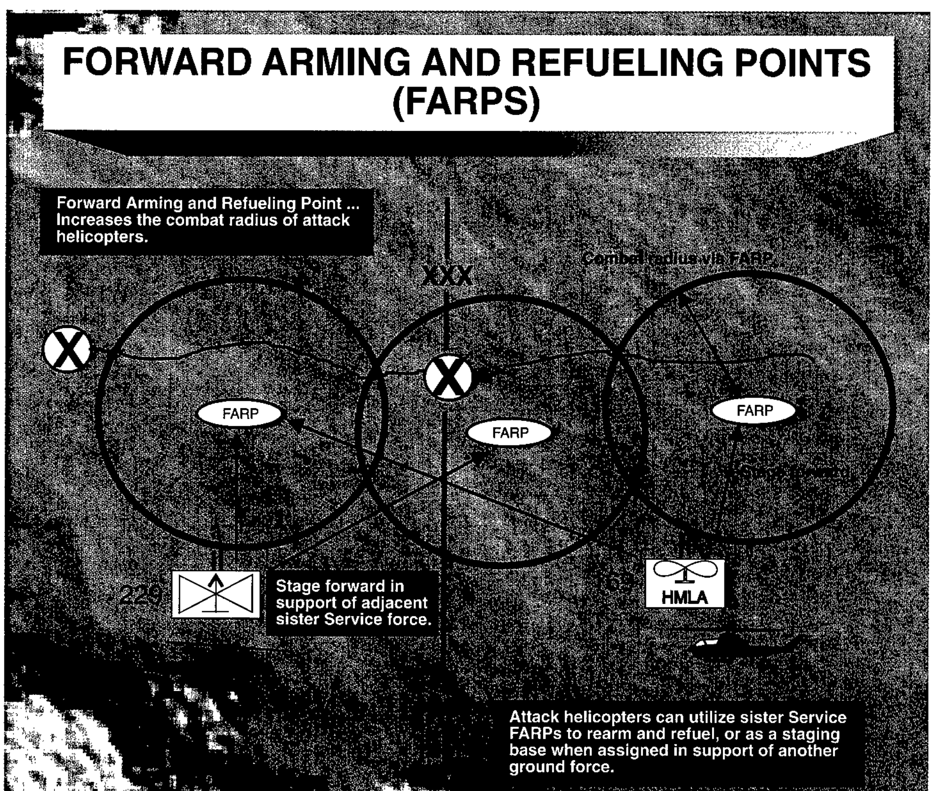


Figure IV-11. Forward Arming and Refueling Points (FARPs)

munitions to be employed, and **other system-specific support requirements**. There are both Service- and aircraft-unique equipment requirements (e.g., fuel connections, munitions handling equipment) that must be addressed.

c. **Inter-Service FARPs**. Logistics is a very important consideration during inter-Service use of FARPs. If attack helicopters must be shifted within a theater, direct liaison between all units involved is critical to mission success. **As a minimum, CAS aircraft operations require the following coordination:**

- Number and type of **aircraft staging** through the FARP.
- **Munitions**, to include weapon- or aircraft-specific munitions handling and support requirements.
- **Petroleum, oils, and lubricants support**, to include specific support needs (e.g., hose adapters).
- **Sequencing (timing) of aircraft** through inter-Service FARPs.

22. Army Attack Helicopter Planning Factors

A maneuver commander plans to employ attack helicopters using the factors of METT-T just as with other maneuver units. The aviation commander employs his attack helicopters in the way that best supports the maneuver commander's intent. **Rotary-wing CAS can be conducted in much the same way as fire and maneuver are executed against targets on the ground.** This differs from fixed-wing aircraft planning, which often specifies the sorties against a target with a precise TOT. **Specific planning considerations will differ depending on where operations are conducted (deep, close, and rear).** Supported units should state the type of target and desired effects when requesting CAS, so that planners can best match available weapons against the CAS targets.

a. **Organization. How a commander plans to organize attack helicopters for CAS will depend on the nature of the mission assigned.** The commander may employ attack helicopters to **conduct dedicated CAS alone**, as part of **a joint aviation task force** dedicated to CAS, or as an **augmenting force** to perform specific missions.

- **Separate Force.** Employing attack helicopters as a separate force, **the aviation commander will use the organic structure of the attack helicopter unit**. Using a pure force enables the commander to take advantage of the speed and mobility of the helicopter. The attack helicopter can give the commander the desired shock and killing effect of massed fires, particularly against armored forces.
- **Task Force.** To increase the lift capability of attack helicopter units, **a commander may attach assault helicopters** under TACON. This increases the capability to move fuel, munitions, and other supplies by air.
- **Augmenting Force.** The aviation commander may want to **reinforce an attack helicopter unit** with additional attack helicopters or a ground maneuver unit. The mission will dictate the size and type unit augmented.

b. **Planning Factors for Employment.** The commander employs attack helicopters when a lucrative target such as a large armored force has been identified. **Timing is critical** in employing attack helicopters; employed too early, they may be forced to disengage before mission completion because of low fuel or ammunition; employed too late, they may miss part or all of the targeted unit and fail to destroy the enemy forces at a critical time and place. **To properly employ the force, the commander may plan to use continuous attack, phased attack, or maximum destruction.**

- **Continuous Attack.** This method, called the one third rule, ensures **one attack helicopter unit is in battle while the other two prepare to relieve the engaged unit** by remaining in holding areas (HAs), the FARP, or move between the FARP and battle. The continuous attack method (Figure IV-12) provides the most flexibility, the most efficient FARP operations, and sustained fires over long periods. Multiple battle positions (BP) provide the flexibility needed for a coordinated battle handover between units.

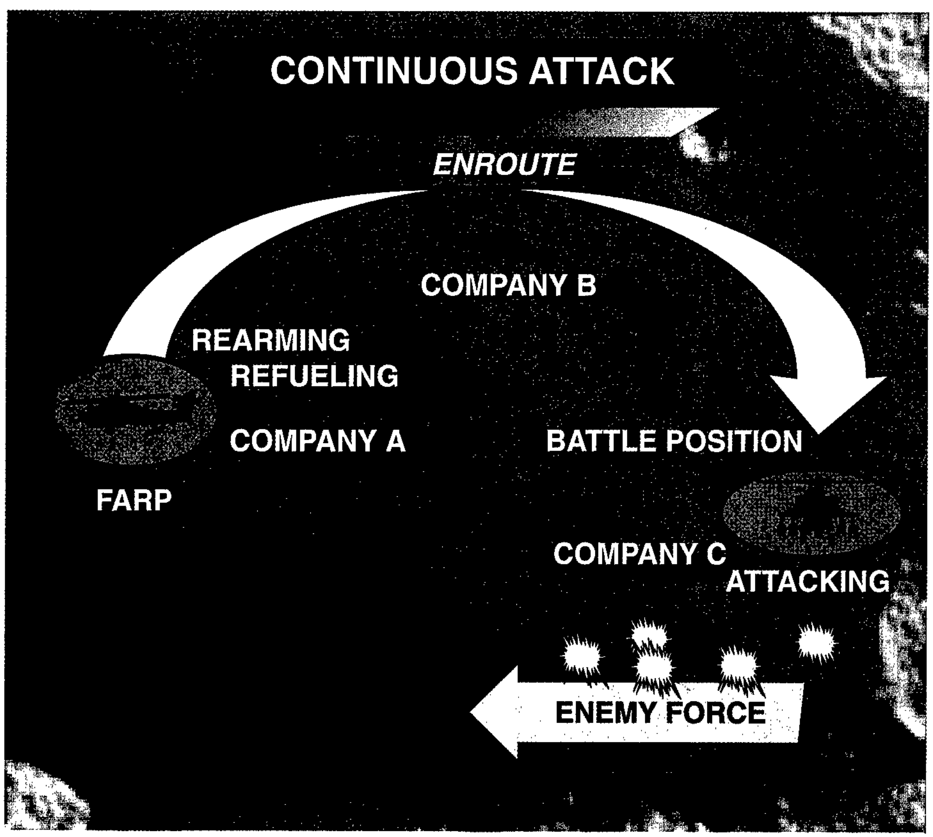


Figure IV-12. Continuous Attack

- **Phased Attack.** The phased attack method (Figure IV-13) is a modification of the continuous attack method and is used to increase the initial firepower of the unit. **The commander initially employs one unit to begin the attack,** then quickly **phases in the second element** from another BP. The **commander phases the third unit** into the fight when either of the other units is low on fuel or ammunition. Depending on the situation, the commander may reverse the attack method or use any variation to phase in subordinate units. If the commander uses this method, turnaround time in the FARP must be as short as possible.

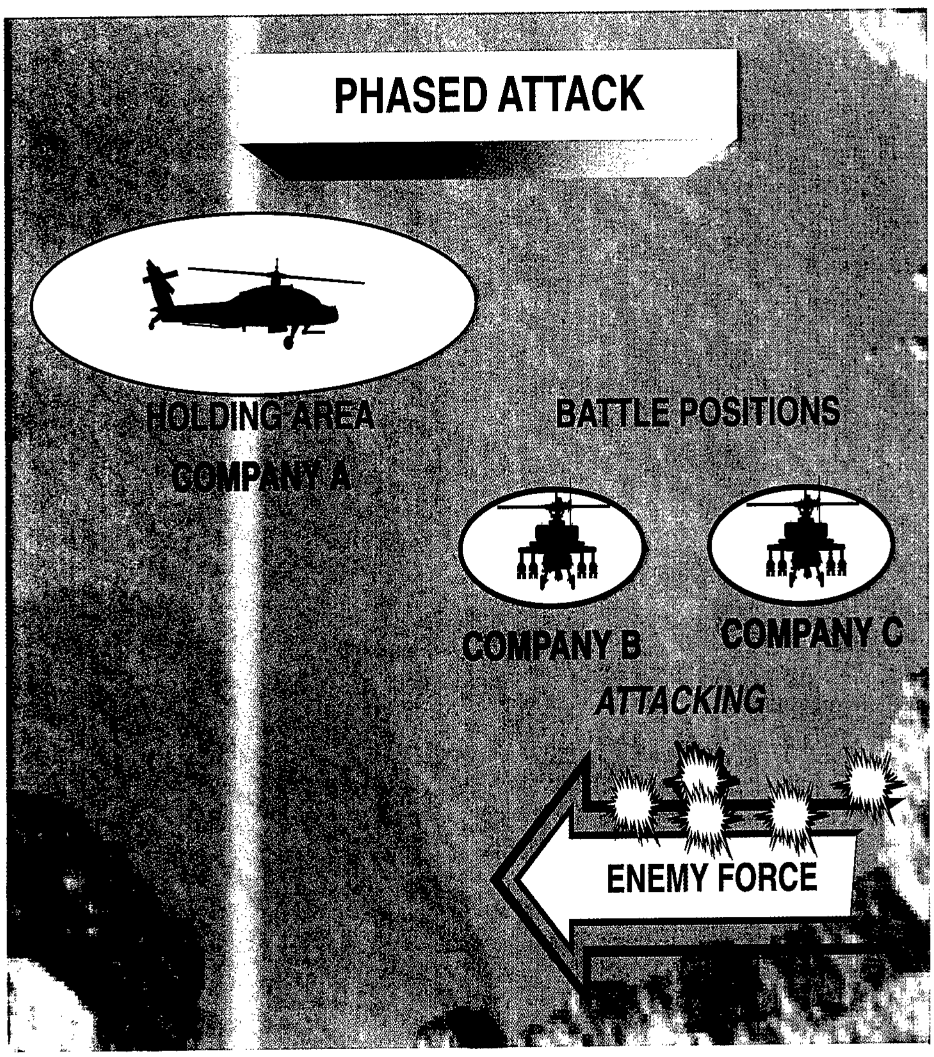


Figure IV-13. Phased Attack

- **Maximum Destruction.** To place as much combat power as possible into the battle, the commander uses the maximum destruction method (Figure IV-14). **This method allows the commander to mass fires and overwhelm the enemy by deploying attack helicopter units from different BPs.** The disadvantage of this method is that at the completion of the initial attack, the attack helicopters will require 20 to 90 minutes to refuel and rearm. The exact time depends on the distance of the FARP from the BPs, the number and size of FARPs, and the munitions to be loaded.

c. **Coordinated Operations with Fixed- and Rotary-Wing CAS Aircraft. A joint air attack team (JAAT) operation is a coordinated attack against one target by attack helicopter units and fixed-wing attack aircraft,** normally supported by artillery or NSFS. Terminal controllers may perform duties from airborne positions. JAAT planning considerations and employment methods are discussed in the multi-Service JAAT manual, FM 90-21/FMFRP 5-44/TACP/ USAFEP/ PACAFP 50-20.

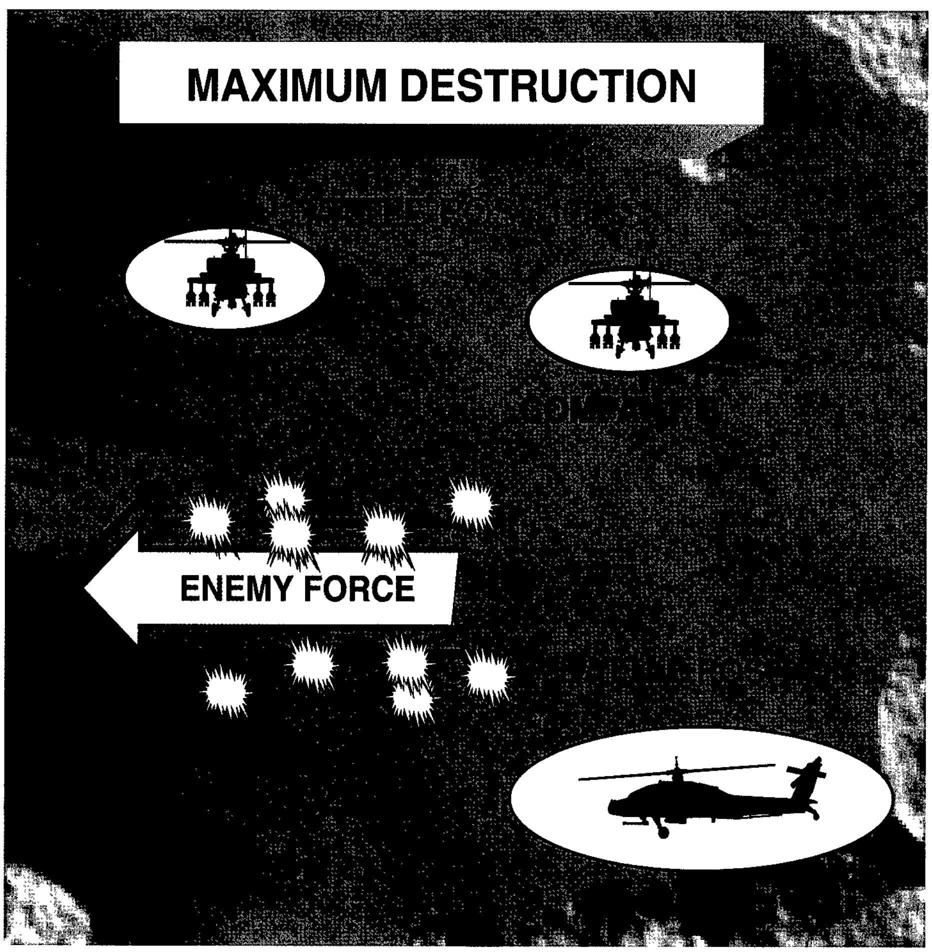


Figure IV-14. Maximum Destruction

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CHAPTER V
EXECUTION

"All movements on the battlefield have but one end in view; the development of fire in greater volume and more effectively than that of the opposing force."

T. Miller Maguire
The Development of Tactics, 1904

1. Purpose

Chapter V covers both general and specific JTTP for CAS execution. Section A provides standardized procedures applicable to all CAS operations. Sections B and C provide situation-specific JTTP for night/limited visibility conditions and laser-guided system employment. Sections D, E, and F address aircraft-specific execution procedures unique to fixed-wing, rotary-wing, and AC-130 aircraft respectively.

SECTION A. BASIC CONSIDERATIONS

2. Security

JFCs prescribe standardized cryptologic and authentication procedures in the joint force operation order, **and distribute updated instructions** via the ATO/special instructions and fragmentary orders to the JFC's operation order.

3. Synchronized Timing

A common reference time is essential to accomplish the high degree of coordination necessary for effective CAS. All participants — aircrew, terminal controller, TACC/SACC, ASOC/DASC, FSE/FSCC, and artillery — must use the same timing method. **There are two methods: TOT and TTT.** A synchronized clock using **TOT is the preferred method** of timing aircraft attacks. A synchronized clock solves the problem of coordinating a TTT "HACK" over several different radio nets. The ATO/operation order should specify the clock time (local or Zulu) and should also identify the unit or agency responsible for passing the synchronized time. Aircrews can update the clock on check-in with air control/fire support coordination agencies. They may also request a TTT if preferred, or if unable to use a TOT.

NOTE: Zulu time is available from the US Naval Observatory Master Clock as an automated, continuous broadcast on HF frequencies 5.000, 10.000, 15.000, 20.000, and 25.000 MHz. It is available by telephone on DSN 294-1800 or 685-3303. Consider using a GPS time hack.

4. Check-In

Aircraft check-in procedures are extremely important to the flow of information between airborne assets and control agencies. **Controlling agencies should update all CAS assets** on the current intelligence situation en route to the area of operations. The **CAS check-in briefing format** found in Figure V-1 is used upon check-in with terminal controllers.

5. CAS Briefing Form

The CAS brief (Figure V-2), also known as the "Nine-Line Briefing," **is standardized for use with fixed-wing and rotary-wing aircraft.** The brief is used for all threat conditions and does not dictate the CAS aircraft's tactics. The mission brief follows the numbered sequence (1-9) of the CAS Briefing Form. **Use of a standardized briefing sequence improves mission**

CAS Check-In Briefing
(Aircraft transmits to controller)
Aircraft: "__________ (controller call sign), this is __________ (aircraft call sign)"
1. Identification/mission number: "__________"
NOTE: Authentication and appropriate response suggested here. The brief may be abbreviated for brevity or security ("as fragged" or "with exception").
2. Number and type of aircraft: "__________"
3. Position and altitude: "__________"
4. Ordnance: "__________"
5. Play time: "__________"
6. Abort code: "__________" (if applicable)

Figure V-1. CAS Check-In Briefing

direction and control by allowing terminal controllers to pass information rapidly. This mission information and sequence may be modified to fit the tactical situation. **The CAS briefing form helps aircrews in determining if they have the information required to perform the mission.** When the terminal controller needs a confirmation that the aircraft has correctly received critical items of the brief, the terminal controller will request a "Read Back." When a "Read Back" is requested, the aircraft will repeat back items 1, 6, 8, and any restrictions (shown in bold in Figure V-2). When the nine-line briefing is used for AC-130 employment, lines 5, 6, and 8 are mandatory briefing items. Also remarks should include detailed threat description, marking method of friendly locations (including magnetic bearing and distance in meters from the friendly position to the target, if available), identifiable ground features, danger close acceptance (danger close is 200m with the 105mm and 125m with the 40mm, 25mm, and 20mm).

a. **Mission Brief Accuracy.** Ideally, **the controlling agency** (e.g., ASOC, DASC, TACC, TAC[A]), **briefs the aircrew before contact with the terminal controller** using the information from the JTAR, Section 1, Block 8 (See Appendix C, "Joint Tactical Air Strike Request [JTAR]"). **The brief must be concise and executed quickly.** The mission brief should not change once an aircrew leaves the initial point (IP)/BP inbound to the target. Changes during the final attack run could cause the weapon to miss the target, disrupt critical timing coordination, or worse, cause friendly casualties.

b. **Radar Beacon Missions. Missions involving radar beacons require additional information on the CAS briefing form.** CAS requests for beacon missions follow standard CAS procedures. Radar beacon missions require assignment of compatible aircraft. The terminal controller confirms that the coordinates and offset information are as accurate as possible. The accuracy of a radar

CAS Briefing Form (9-Line)

(Omit data not required, do not transmit line numbers. Units of measure are standard unless otherwise specified. * denotes minimum essential in limited communications environment. Bold denotes readback items when requested.)

Terminal controller: "___________________, this is___________________________"

(aircraft call sign) (terminal controller)

***1. IP/BP: "____"**

*2. Heading: "____" (magnetic).
(IP/BP to target)

Offset: "____ (left/right)"

*3. Distance: "____"
(IP-to-target in nautical miles/BP-to-target in meters)

*4. Target elevation: "____________________________________" (in feet MSL)

*5. Target description: "____"

***6.**
Target location: "____"

(latitude/longitude or grid coordinates or offsets or visual)

7. Type mark: "______________________" Code: "_______________________"
(WP, laser, IR, beacon) (actual code)

Laser to target line: "______________" degrees"

***8. Location of friendlies: "____"**

Position marked by: "__________________________"

9. Egress: "____________________________________"

In the event of a beacon bombing request, insert beacon bombing chart line numbers here. (See Figure V-3.)

____

Remarks (As appropriate):" ____"

(threats, restrictions, danger close, attack clearance, SEAD, abort codes, hazards)

NOTE: For AC-130 employment, lines 5, 6, and 8 are mandatory briefing items. Remarks should also include detailed threat description, marking method of friendly locations (including magnetic bearing and distance in meters from the friendly position to the target, if available), identifiable ground features, danger close acceptance.

Time on target (TOT): "_____________________________"

OR

Time to target (TTT): "Stand by _______ plus _______, Hack."

Figure V-2. CAS Briefing Form (9-Line)

beacon delivery relies on the accuracy of the data given the aircrew. See Figure V-3 and the "Radar Beacon Forward Air Controller" paragraph in Section D for more information.

c. **Coordination for Laser Missions. Missions involving LGWs require coordination of laser-compatible designators, ordnance, and attack parameters.** For preplanned missions, include the designation code in line 7 of the CAS Briefing Form. For immediate missions, the requesting unit includes the availability of a laser designator/code. If readily available, planners will task aircraft carrying LGWs. If not, the sourcing C2 agency sends aircraft with conventional ordnance.

6. Risk Estimate Distance

a. **Troops in Contact.** Terminal controllers and aircrews must be careful when conducting CAS close to friendly troops. **The terminal controller should regard friendlies within one kilometer as a "troops in contact" situation and so advise the supported commander.** However, friendlies outside one kilometer may still be subject to weapons effects. Terminal controllers and aircrews must still carefully weigh the choice of munitions and delivery profile in relation to the risk of fratricide.

b. **Danger Close.** Ordnance delivery inside the 0.1% probability of incapacitation (PI) will be considered "Danger Close." **The supported commander must accept responsibility for the risk to friendly forces when targets are inside 0.1% PI distance.** The supported commander passes initials indicating acceptance of the risk inherent in ordnance delivery inside the 0.1% PI distance. **Risk estimate distances allow the supported commander to estimate the risk to friendly troops from the CAS attack.** Risk estimate distances are listed in Appendix G, "Risk-Estimate Distances." **When ordnance is a factor to the safety of friendly troops, the aircraft's axis of attack should be parallel to the friendly forces.** This is to preclude long and/or short deliveries from being a factor to friendlies. Forward-firing ordnance such as 20mm/30mm cannon fire, Maverick missiles, or rockets should be expended with the ricochet fan away from friendly locations.

7. Target Marking

Target marking aids aircrews in locating the precise target that the supported unit desires to be attacked. Terminal controllers should provide a target mark. Although a mark is not mandatory, it helps reduce the possibility of fratricide. To be effective the mark must be **timely** and **accurate**. Marks may be confused with other marks, fires and detonations on the battlefield.

a. **Mark Timing**. **Laser marks** will be initiated by a **10 second warning** and "laser on" command from the CAS aircrew. **Infrared pointers** and **indirect fire munition marks** (except illumination) **should appear/ impact 30 to 45 seconds** prior to the scheduled CAS aircraft ordnance impact. **Illumination rounds should impact in sufficient time prior to target engagement to allow the illumination flare to become fully visible.** In high winds, the target mark should arrive closer to ordnance impact time (and upwind if possible) as the effects of the mark (smoke/dust) dissipate rapidly. An exception is timing for standoff or precision guided weapons, which may require the mark up to 60 seconds prior to air delivered ordnance impact. **When time of fall/time of flight of the weapon is greater than 15 seconds the CAS aircrew should request an earlier mark.** Delaying the request for a change to the standard mark timing will prevent proper coordination and can cause an aborted mission due to an inaccurate or missing mark.

b. **Mark Accuracy. The visual mark should impact within 100 meters of the**

Radar Beacon Bombing Line Numbers

Different aircraft require different information on beacon bombing. Select the appropriate line numbers. Transmit only after confirming the aircraft type. Follow this information with TOT or TTT.

*** A-6E Line Numbers:**

10. "Bearing ______________________" magnetic (beacon to target) or

    "Beacon grid ______________________" coordinates

11. "Range ______________________" in feet (beacon to target) or

    "Target grid ______________________" coordinates

12. "Beacon elevation ______________________" in feet-MSL

*F-111 Line Numbers:
F-111E requires lines 10 and 11.
F-111E with AMP (Avionics Modernization Program) requires offsets from target to beacon.
F-111F requires lines 10, 11, and 14 or lines 12, 13, and 14.

10. "Bearing ______________________" true (beacon to target)

11. "Range ______________________" in feet (beacon to target)

12. "Beacon grid ______________________" latitude, longitude*

13. "Target grid______________________ " latitude, longitude*

14. "Beacon delay ______________________" in milliseconds

15. "Beacon elevation ______________________" in feet-MSL

16. "Target elevation ______________________" in feet-MSL

***F-16 Line Numbers**

10. "Bearing ______________________" true (beacon to target)

11. "Range ______________________" in nm to nearest tenth (beacon to target)

12. "Beacon Elevation ______________________" in feet-MSL

13. "Target Elevation ______________________" in feet-MSL

*NOTE: When identifying position coordinates for joint operations, include the appropriate map the datum coordinates are based on.

Figure V-3. Radar Beacon Bombing Line Numbers

target to ensure a successful attack. Visual marks that land beyond 300 meters from the target may not provide a visual cue to the CAS pilot that allows the attack of the correct target. **The most accurate mark is a laser when the FAC or laser designator operator can maintain line of sight with the target.** Infrared and munition marks should be placed as near the target as possible to help ensure target identification.

c. **Laser Marking.** If the aircraft has a laser spot tracker, the preferred method of marking a target is by laser. **The laser ensures the accurate engagement of the target by laser-guided weapons** and also assists the CAS aircrew in more accurately delivering unguided ordnance. If using lasers (ground or airborne) to mark the target, laser designation must be selective and timely since laser devices can overheat and lengthy laser emissions may compromise friendly positions. For laser marks, the pilot will normally provide **a ten second warning** to activate the mark. See Joint Pub 3-09.1, "Joint Laser Designation Procedures," for more information. Use the standard laser brevity terms listed in Figure V-4.

d. **Infrared Marking. IR pointers and other IR devices can be used by terminal controllers to mark targets at night for pilots who are using night vision devices.** Unlike laser designators, these IR devices cannot be used to guide or improve the accuracy of aircraft ordnance. Use IR pointers with caution as they may expose the terminal controller to an enemy with night vision capability. IR marks should be initiated 20 to 30 seconds prior to the CAS TOT/TTT, or when requested by the pilot, and continue until the pilot transmits "terminate" or the weapon hits the target.

e. **Marking by Indirect Fire. Artillery, NSFS, or mortar fires are an effective means of assisting pilots in visually acquiring the target.** Before choosing to

STANDARD LASER BREVITY TERMS

CALL	MEANING
TEN SECONDS	Prepare to start LASER designation in 10 seconds
LASER ON	Designate the target with LASER energy now
SPOT	Aircraft has acquired LASER energy
SHIFT	Call to shift LASER energy from the offset position next to the target onto the target
TERMINATE	Cease LASER designation

Figure V-4. Standard Laser Brevity Terms mark by artillery, NSFS, or mortars, observers should consider the danger of exposing these supporting arms to the enemy's indirect fire acquisition systems, and the additional coordination between supporting arms required for this mission. **Munition marking rounds should be delivered as close to CAS targets as possible**, with WP marks timed to impact 30 to 45 seconds prior to the CAS TOT/TTT and illumination marks timed to impact 45 seconds prior to the CAS TOT/TTT. This lead time ensures that the munition marking round is in position early enough and remains visible long enough for the terminal controller to provide final control instructions and for the pilot of the lead aircraft to acquire the target. **Indirect fire marking rounds are most effective when delivered within 100 meters of the CAS target**, but those within 300 meters of the CAS target are generally considered effective enough to direct CAS aircraft. In case the indirect fire marking round is not timely or is inaccurate, terminal controllers should be prepared to use a backup marking technique or to rely completely on verbal instructions to identify the target to CAS pilots. If the situation requires precise marks, observers or spotters can adjust marking rounds early to ensure that accurate marks are delivered to meet the CAS schedule. This may, however, alert the enemy to an imminent attack.

f. **Marking by Direct Fire. Direct fire weapons can be used to deliver a mark.** While this method may provide more accuracy and timeliness than indirect fire marks, **its use may be limited by range and the visibility of the burst on the battlefield**. While M60A3 tanks can provide direct fire marks, the M1 tank has no WP round and marking can only be accomplished by detonation of a high explosive round.

g. **Marking by Aircraft. Aircraft may be used to deliver a mark.** For example, some FAC(A) aircraft can mark with WP/high explosives rockets and/or LASER. In addition, AC-130 gunships can mark a target with 105mm WP, 40mm MISCH, and/or laser. See Appendix E, "Aircraft and Helicopter Weapons and Capabilities Guide," for a complete listing of aircraft target marking capabilities.

h. **Radar Beacon Forward Air Controller (RABFAC)**. The RABFAC can be used to assist aircraft in acquiring the CAS target. Currently, the A-6, F-16, F-111, F-15E, and AC-130 can acquire the RABFAC.

i. **Backup Marks. Whenever providing marks, also plan backup marks.** For example, artillery may be tasked to deliver the primary mark, while a mortar or another aircraft may be assigned responsibility for backup marks.

j. **Miscellaneous Marking Information**

- **Voice-Only.** In a medium- or low-threat environment, **the terminal controller may "talk the aircrew onto the target."** Use the standard brevity terms in Figure V-5.

- **Combination.** When necessary and conditions permit, **terminal controllers can use a combination of verbal and visual marking** to aid in orienting the CAS aircrew to the target.

- **Marking Friendlies. Friendlies can mark their own position with night vision devices, smoke, signal panels, or mirror**, and can achieve the same results as marking the target as long as the mark is understood by the CAS aircrew. **Marking friendlies is the least desirable method of providing a target mark.** Marking friendlies can be confusing and should be used cautiously and only when no other method is available.

STANDARD CAS BREVITY TERMS

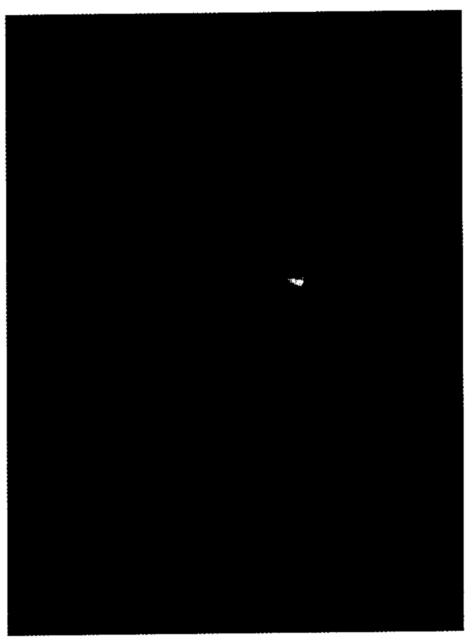
CALL	MEANING
VISUAL	The terminal controller has the attack aircraft in sight, or the attack aircraft has positively identified the terminal controller's or friendly position.
CONTACT	Acknowledges sighting of a specified reference point.
TALLY	The enemy position/target is in sight.

NOTE: All terms may be further amplified by adding additional words; e.g., "TALLY TARGET."

Figure V-5. Standard CAS Brevity Terms

8. Final Attack Control

After the aircraft departs the contact point (CP)/HA, the terminal controller provides target and threat updates to the aircrew. The terminal controller may direct aircrews to report departing the IP or established in the BP. This information may be used to coordinate the CAS attack with SEAD, marking, or the maneuver of the supported unit. **The terminal controller attempts to acquire the CAS aircraft visually and give them final corrections to help them acquire the target.** A direction and distance reference can be used to aid in target acquisition. **Corrections are given in two parts — direction and distance.** Corrections from a visual mark will be passed using the eight points of the compass and a common distance reference.



Aircrews release ordnance only after receiving a "cleared hot" clearance from the terminal controller.

a. **From Ordnance Impact.** (See Figure V-6.) **Corrections can be made from the last ordnance impact to the target.**

b. **From Other Reference Point.** (See Figure V-7.) **Corrections can be made from a recognizable reference point.** The terminal

"STAR 11, this is TANGO FOUR WHISKEY, from the mark, northeast two hundred meters."

Figure V-6. Correction from Ordnance Impact

"STAR 11, this is TANGO FOUR WHISKEY. The tree line runs east to west. From the road intersection east to the bridge is one hundred meters. From the bridge, the target is north two hundred meters."

Figure V-7. Correction from Reference Point

controller also selects a **ground feature** to establish a common distance reference.

9. Clearance to Drop/Fire

Responsibility for expenditure of ordnance rests with the maneuver force commander. **The terminal controller has the authority to clear aircraft to release weapons after specific or general release approval from the maneuver force commander.** Battlefield conditions, aircrew training, ordnance capabilities and terminal controller experience are factors in the decision to authorize weapons release. **The two levels of weapons release authority are positive control and reasonable assurance.** A "cleared hot" clearance should be given as soon as possible in the delivery sequence after the terminal controller is convinced the attacking aircraft sees the target and will not release on friendly positions. This allows the aircrew to concentrate on the weapons solution and improves delivery accuracy, further reducing the possibility of fratricide.

a. **Positive Control. Positive control will be used to the maximum extent possible.** The terminal controller or an observer in contact with the terminal controller must be in a position to see the attacking aircraft and target, and receive verbal confirmation that the objective/mark is in sight from the attacking pilot/aircrew prior to commanding "cleared hot." **Aircrews must receive positive clearance from the terminal controller ("cleared hot") before releasing any ordnance.** Aircrews may call "IN" (commencing an attack run) using the format in Figure V-8. Following the "IN" call, all other CAS aircraft should maintain radio silence except to make threat calls, allowing the terminal controller to transmit the appropriate call(s) in accordance with the guidance outlined in Figure V-9. **The two methods of exercising positive control are direct and indirect control.**

- **Direct Control. Direct control will be used whenever possible. It occurs when the terminal controller is able to observe and control the attack.** The terminal controller transmits "cleared hot" when he sees the aircraft is attacking the correct target. There may be times when the terminal controller may not be able to see the attacking aircraft (due to high altitude, standoff weapons, night, or poor visibility). In these cases, clearance to drop will only be given if the terminal controller can use other means to confirm that the aircraft is attacking the correct target and has friendly positions in sight. These means include, but are not limited to, confirming with a verbal description that the aircraft has friendly positions in

"_______________ (Call sign). IN FROM _____________" (Cardinal heading)
"MARK IN SIGHT/NOT IN SIGHT" (if appropriate)

Figure V-8. Attack Aircrew "IN" Call Format

TERMINAL CONTROLLER'S CALLS

CALL	MEANING
CONTINUE	Continue the pass, you are not yet cleared to release any ordnance.
ABORT (abort code)	Abort the pass. Do not release ordnance.
CLEARED HOT	You are cleared to release ordnance on this pass.
CONTINUE DRY	You are cleared to proceed with the attack run but you may not release any ordnance.

*** WARNING ***

The word "CLEARED" will only be used when ordnance is actually to be delivered. This will minimize the chances of dropping ordnance on dry passes further reducing the risk of fratricide.

Figure V-9. Terminal Controller's Calls

sight, the mark in sight, and the target in sight, as appropriate.

- **Indirect Control.** Indirect control is **not the preferred method** of positive control. **It is used when the terminal controller cannot observe the attack, but is in contact with someone who can.** The terminal controller can issue clearance or abort the attack based on information from the observer. This form of control must be authorized by the maneuver force commander.

b. **Reasonable Assurance**

- Aircrews normally operate under direct positive control and receive a "cleared hot" before releasing any ordnance. During combat operations, **battlefield conditions such as communications jamming or low altitude flight can prevent receipt of positive clearance to complete the attack. JFCs can establish guidelines that allow CAS aircrews to continue attacks on targets** under such unusual circumstances. Reasonable assurance is not a routine procedure but a set of specific guidelines. It is not a "comm out" rule of engagement.

- **Reasonable assurance is a risk assessment by the JFC** with concurrence from subordinate joint or component commanders who are either receiving or providing CAS. **The JFC establishes the conditions for reasonable assurance and when they will be in effect.**

- When reasonable assurance is in effect, **attacks can continue** if the maneuver force commander, terminal controller, and aircrew are **confident the attack will achieve objectives without harming friendly forces.** This only applies if the CAS aircrew has already received initial targeting information. Careful consideration must be given to using reasonable assurance because of the increased possibility of fratricide.

- **Examples of reasonable assurance scenarios:** Reasonable assurance for an A-6E radar beacon mission under night or limited visibility conditions can be positive beacon identification and weapon system function; for a day visual attack, verbal acknowledgment of the target brief or sighting the target mark. An abort can be accomplished via radio, a prebriefed code change, or shutdown of the radar beacon or laser designator. A radio transmission is the most desirable method. Backup visual abort signals are planned and briefed to all aircrews.

10. Abort Procedures

a. **Conditions.** The terminal controller must direct CAS aircraft to abort if they are **not aligned with the correct target, it appears that friendly troops may be endangered**, or **for the safety of the CAS aircraft and crew**.

b. **Abort Code**. The CAS abort procedure uses the challenge-reply response. During the CAS check-in briefing, the flight lead gives the terminal controller a **two-letter challenge code** for use with the flight only. The terminal controller refers to the authentication document, finds the reply, and notes but does not transmit it. The reply "letter" becomes that flight's abort code word. If no abort code was briefed, then the CAS attack is aborted by simply transmitting, "ABORT, ABORT, ABORT." See Figure V-10 for an illustration.

11. Battle Damage Assessment

a. **Purpose.** BDA is used to update the enemy order of battle. **Accurate BDA is critical to determine if the target should be reattacked. BDA should include:**

- **Information relating BDA to a specific target** (e.g., target coordinates, target number, mission number, munitions expended, target description).

- **Time of attack.**

- **Damage actually seen** (e.g., secondary explosions or fires, enemy casualties, number and type of vehicles/structures damaged or destroyed).

- **Mission accomplishment** (desired effects achieved).

ABORT CALL ILLUSTRATION

(The FAC is "NAIL 11"; the CAS attack flight is "SPIKE 41." SPIKE 41 flight has chosen "BR" (authenticated "D") as its abort code.)

RADIO CALL	ACTION TAKEN
(During the CAS check-in briefing): "NAIL 11, this is SPIKE 41, abort code BRAVO ROMEO."	NAIL 11 notes the correct reply for "BR" is "D".
(The FAC calls for an abort) "SPIKE 41, NAIL 11, ABORT DELTA, ABORT DELTA, ABORT DELTA."	SPIKE 41 aborts the pass.

Figure V-10. Abort Call Illustration

b. **Terminal Controller Responsibilities.** Whenever possible, **the terminal controller provides attack flights with BDA of their attack as they egress.** The terminal controller gives BDA for the flight, not for individual aircraft in the flight. It may not be possible to pass all BDA information. At a minimum, the terminal controller should pass an assessment of mission accomplishment (lines 3-6 of the inflight report [INFLTREP]).

c. **Aircrew Responsibilities. Use the abbreviated USMTF INFLTREP Format** (Figure V-11) **to report mission results.** The INFLTREP can be used to report other tactical information of such importance and urgency that if the aircrew were to wait for a normal post-flight debriefing the information might no longer be useful. **Send the INFLTREP directly to the supported unit or via any available relay.** Message recipients may add additional information and forward via another INFLTREP.

d. **Mission Reports** (MISREPs). Use the standard USMTF MISREP format to report mission results after return to base.

SECTION B. NIGHT/LIMITED VISIBILITY CAS

12. Introduction

Fundamental day CAS procedures do not go away at night. However, **night and adverse weather CAS demands a higher level of proficiency** that can only come about through dedicated, realistic, joint CAS training. **Night and limited visibility CAS relies heavily on systems and sensors. Equally critical is terminal controller and aircrew proficiency.** Terminal controllers

CAS Check-Out Briefing (USMTF INFLTREP)

Aircrew transmits:

____________, THIS IS ______________, INFLIGHTREP, OVER.
addressee aircrew call sign

****(authentication requested here, as required)****

THIS IS __________________, INFLIGHTREP.
(call sign)

LINE ONE/CALL SIGN ____________________

LINE TWO/MISSION NUMBER ____________________

LINE THREE/REQUEST NUMBER/JTAR ____________________

LINE FOUR/LOCATION ____________________
(latitude/longitude, UTM grid, place name)

LINE FIVE/TIME ON TARGET ____________________

LINE SIX/RESULTS ____________________

REMARKS____________________
(Target area weather, significant sightings, EEIs)

Figure V-11. CAS Check-Out Briefing (USMTF INFLTREP)

and aircrews must routinely train and jointly exercise the system in night and adverse weather CAS environments. Specific attack and delivery techniques for night/limited visibility CAS vary depending on the aircraft. **There are three general categories of night/limited visibility employment: visual, system-aided, and NVG.**

> *". . .[on direct air support] we talk of 'participating' in the ground battle. . .and 'participating' means how can we, with airpower, make the ground battle easier, cheaper."*
>
> **Major General Mordechai Hod**
> **Commander, Israeli Air Force, 1966-1973**

13. Visual Employment

During night visual employment, terminal controllers and aircrews must rely on **lower ambient light conditions, battlefield fires, or artificial illumination** to successfully attack targets. Threat permitting, the requirement to see the CAS aircraft may require use of aircraft lights or flares.

14. System-Aided Employment

Aircraft systems (radar, radar beacon, LASER, FLIR, and television) **are relied upon more at night and in adverse weather** because of degraded visual target acquisition range and recognition cues. **Aircrews and terminal controllers should incorporate redundant methods** (e.g., radar, LASER, and FLIR) into an attack, along with a target mark to find and attack a target. Avoid the temptation to rely solely on one information source.

15. NVG Employment

NVGs are an additional sensor for aircrews to use together with other systems to find and attack targets. Maneuver forces and aircrews must ensure there is no confusion between conventional and NVG terms. **Terminal controllers must be equipped with IR marking devices** to fully integrate with supported maneuver forces and exploit the potential of NVGs to enhance survivability and mission success. Figure V-12 lists terms used when marking with IR pointers for NVGs.

a. **Friendly Marking. Ground forces can illuminate their position with IR devices.** These IR lights should be placed where aircrew overhead can visually acquire and maintain sight of friendly positions. During low LUX level scenarios, the entire IR beam will be seen with NVDs. The shape of the IR beam can be used to identify the terminal controller's and target positions. The IR beam will appear narrow or pencil-like at the terminal controller's position, while the beam will be mushroomed at the target. **IR pointers can also be used to direct the NVG-equipped aircrew to the terminal controller's position,** either by walking the beam out to the aircraft (if the aircraft has an NVG external lights package) or by wiggling the IR pointer to designate to the aircrew the terminal controller's position (the nonmoving end of the pointer). Planning an attack axis (preplanned or as directed by the terminal controller) with only a small offset from the controller's pointer-to-target line can also help the aircrew confirm the controller's position.

b. **Clearance Parameters. Aircrews conducting night/limited visibility CAS must be in positive communication with ground forces.** When LTDs are employed, ground forces must hear "SPOT," meaning the aircraft has acquired laser energy. When IR pointers are employed, ground forces must further hear "VISUAL" (meaning terminal controller's position is positively identified) and "TALLY TARGET" (meaning the aircraft has positive target identification).

c. **CAS Briefing Form. When using IR target pointer/illuminators, indicate the**

NIGHT IR CAS BREVITY TERMS

TERM	MEANING
ROPE	Call made by exception if the terminal controller is to illuminate the aircraft with an IR pointer.
VISUAL	The terminal controller has the attack aircraft in sight, or the attack aircraft has positively identified the terminal controller's or friendly position.
CONTACT	Acknowledges sighting of a specified reference point
SNAKE	Call made by exception for the terminal controller to jingle the IR beam on the target. This aids in confirming the friendly position and helps the aircrew maintain sight of the target during conditions when the IR beam/mark is difficult to see.
SPARKLE	Terminal controller marks the target with an IR pointer. Also used by AC-130 aircrews to mark a target with 40mm MISCH
TALLY	The enemy position/target is in sight.
STEADY	Terminal controller steadies the beam.
STOP	Terminal controller stops the beam.

Figure V-12. Night IR CAS Brevity Terms

target mark type in line 7 of the CAS Briefing Form with "IR" or "IR pointer." Additionally, include the pointer-target line in the remarks section of the CAS briefing form.

SECTION C. CAS EXECUTION WITH LASER-GUIDED SYSTEMS

16. Introduction

Laser-guided systems provide the joint force with the ability to locate and engage high priority targets with an increased first-round hit probability. The accuracy inherent in laser-guided systems requires fewer weapons to neutralize or destroy a target. **Laser-guided systems effectively engage a wider range of targets, including moving targets.** Laser-guided systems provide additional capabilities, but also have distinct limitations. This section provides CAS-specific JTTP and background information on laser-guided system employment. See Joint Pub 3-09.1, "Joint Laser Designation Procedures," for more information on lasers and laser employment.

17. Basic Requirements

a. There are **five basic requirements** for using LSTs or LGWs:

- **Line of sight** must exist between the designator and the target and between the target and the LST/LGW.
- **Pulse repetition frequency codes** of the laser designator and the LST/LGW must be compatible.
- **Direction of attack** must allow the LST/LGW to sense enough reflected laser energy from the target for seeker lock-on.
- **Laser designator** must designate the target at the correct time.
- **Delivery system** must release the weapon within the specific weapon's delivery envelope. The spot must remain on the target through weapon impact.

b. **Environmental factors can affect laser designators and seeker head performance.** Tactics and techniques must consider low clouds and fog, smoke, haze, snow and rain, solar saturation, and other visually limiting phenomena.

18. Laser Hardware

a. **Laser-Guided Weapons**. All LGWs home on PRF-coded reflected laser energy. Some LGWs require target designation before launch and during the entire time of flight. Other LGWs require target designation only during the terminal portion of flight. All LGWs require designation through impact. **Typical laser guided weapons are:**

- Laser guided bombs (LGBs)
  - PAVEWAY I
  - PAVEWAY II
- Low level laser guided bombs
  - PAVEWAY III
- Laser guided missiles (LGMs)
  - AGM-65E Laser Maverick
  - AGM-114 HELLFIRE
- Laser guided projectiles
  - COPPERHEAD
  - Semi-active laser, general purpose

b. **Laser Target Designators**

- **Coded LTDs are ground and airborne systems** that have two specific purposes. First, they **provide terminal weapons guidance for laser guided weapons**. Second, they **designate targets for coded LSTs.** Coded laser target designators emit laser energy with a **PRF** and require input of **specific laser codes** for operation. Codes are assigned to LGWs and directly relate to the PRF that harmonizes designator and seeker interface.

- **Coded LTDs used for terminal weapons guidance must be set to the same code as the laser guided weapon.** Certain LGWs, such as LGBs, are coded prior to takeoff and cannot be changed once the fighter is airborne. However, **all coded laser target designators, with the exception of the AC-130H, can change codes while in the tactical environment**. (Note: The AC-130H's LTD is permanently preset with only one code (1688) and cannot be changed. Terminal weapons guidance of LGBs by an AC-130H is possible provided this code is pre-coordinated. The AC-130U has a codable LTD and can change codes in flight). **Coordination for the LTD to match the LGB code is conducted through the ATO or FAC nine-line briefing.** Sometimes, a designator will serve the dual purpose of target designation for a coded laser acquisition/ spot tracker and terminal weapons guidance for laser guided weapons. In these cases, the designator, spot tracker, and the weapon must have the same code.

- Weapons employment of laser guided bombs in conjunction with coded laser target designators is either autonomous or assisted. **Autonomous LGB employment uses the CAS aircraft's on-board LTD for terminal weapons guidance.** Most aircraft capable of delivering LGBs can provide on-board autonomous self-designation. **Assisted LGB employment uses an off-board LTD for terminal weapons guidance.** This is typically accomplished by a ground team operating a designator (such as a ground/vehicle laser locator designator) or by another aircraft (known as "buddy lasing"). Assisted LGB employment is often required by aircraft without on-board LTDs (such as A/OA-10s, F-14s, or AV-8Bs) that can carry and deliver LGBs but have no on-board terminal weapons guidance capability.

c. **Laser Spot Trackers. LSTs are systems which allow visual acquisition of a coded laser designated target.** LSTs must be set to the same code as the coded laser target designator for the user to see the target being lased. In the case of airborne LSTs, the aircrew acquires the laser designated "spot" (target) and either employs LGBs through use of an LTD or executes visual deliveries of non-laser ordnance. The aircrew can select PRF codes for the LST while in flight. See Appendix E, "Aircraft and Helicopter Weapons and Capabilities Guide," for a listing of aircraft/ helicopters with LSTs.

19. Laser Procedures

a. **Attack Headings. Terminal controllers provide aircrews with an attack heading.** The attack heading must allow aircrews to acquire the reflected laser energy. Due to the possibility of false target indications, **attack headings should avoid the target-to-laser designator safety zone,** unless the tactical situation dictates otherwise. The safety zone is a 20 degree fan whose apex is at the target and extends 10 degrees either side of the target-to-designator line. The optimal attack zone is a 120 degree fan whose apex is at the target and extends 60 degrees either side of the target-to-laser designator line, leaving an ideal attack zone of 50 degrees either side excluding the safety zone. (See Figure V-13.) The attack zone is generally accepted as safe for LST equipped aircraft. However, in some situations, LSTs have shifted from the designated target to the laser source (LTD) while operating in the attack zone. For this reason, **LSTs should not be used as the sole source for target**

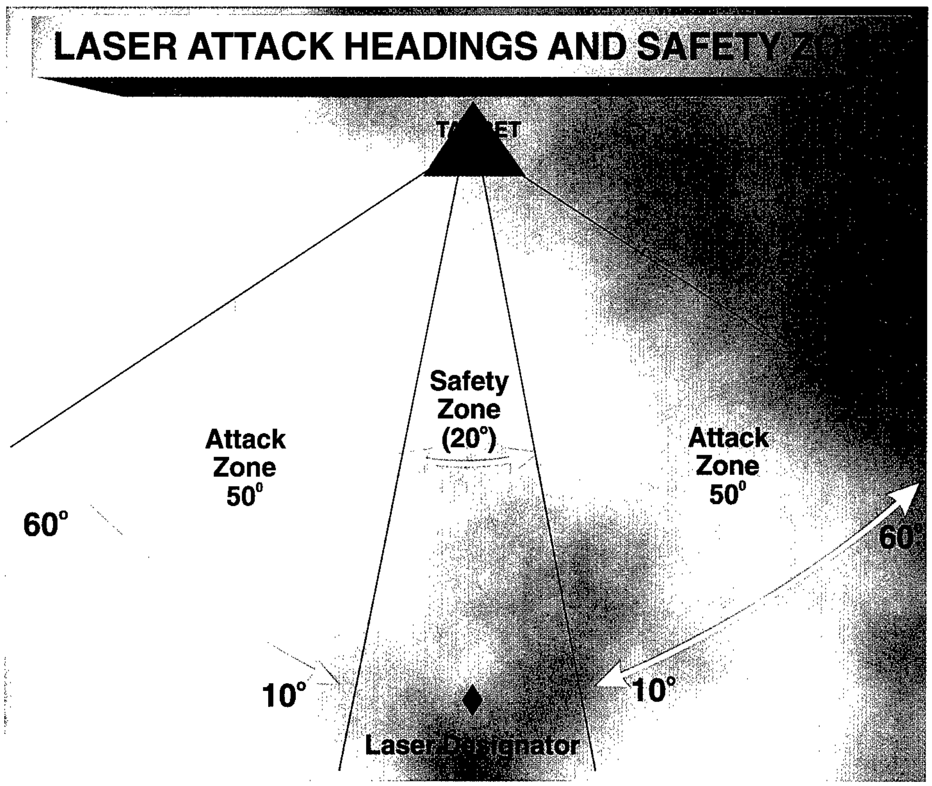


Figure V-13. Laser Attack Headings and Safety Zone

verification. Refer to individual LST/LGW technical orders and procedures for additional safety information.

b. **Attack Angles.** Aircrews release or launch LGWs so the reflected laser energy will be within the seeker field of view at the appropriate time. **The maximum allowable attack angle** (laser-to-target/seeker-to-target) **depends upon the characteristics of the weapon system employed.** If the angle is too large, the seeker will not receive enough reflected energy to sense the laser spot.

c. **Coordination with Terminal Controller.** Laser-guided systems improve the delivery accuracy of unguided ordnance. **If the attack aircraft has an LST, the terminal controller can designate the target for aircrew identification.** An aircrew can use the LST to visually locate the target. **Once the aircrew locates the target, they can conduct an accurate attack using unguided ordnance.** Aircraft equipped with laser designators can also be "talked onto" the target by the terminal controller, then designate the target and deliver the weapon using their own spot. Final clearance to release still comes from the terminal controller.

d. **Laser Designation Time.** The aircrew may request a **longer laser-on time** based on munitions characteristics. If communications are unreliable, the terminal controller should begin designating 20 seconds before TOT or with 20 seconds remaining on TTT (unless the aircrew is using loft delivery). Laser designation time with LGBs delivered from a loft profile will vary depending on the weapon being delivered. Refer to appropriate tactics manuals for loft laser designation time rules of thumb. While **reducing laser operating time** is important in a laser countermeasure environment or when using battery-operated designators, designation time must be long enough to guarantee mission success.

SECTION D. FIXED-WING EXECUTION (EXCEPT AC-130)

20. Introduction

This section identifies the JTTP used by fixed-wing aircrews to conduct CAS. Standardized procedures and tactics provide a baseline for further refinement and improvement. Commanders should adjust these JTTP as the combat situation develops. Aircrews can build upon these basic JTTP by using innovative thinking, experience and the information from aircraft tactical manuals to improve CAS for ground elements.

21. Launch and Departure Procedures

Component commander's posture their CAS assets to meet required response times for on-call aircraft. The appropriate air command and control agency issues launch orders to the ground alert aircrew. This may require land line or courier communications.

22. En Route Tactics (Prior to the CP)

a. **Purpose.** Ideally, **en route tactics allow CAS aircrews to avoid concentrated enemy air defenses and prevent early enemy acquisition of the attack force.** If en route tactics are successful, they can delay or hamper enemy air defense coordination and increase aircrew survival and mission success.

b. **Techniques.** Aircrews and mission planners use support aircraft and other countermeasures to degrade the threat. **Aircrews, terminal controllers, and air controllers select routes that avoid known threat weapon envelopes.** Routes should include course changes to confuse and deceive the enemy concerning the intended target area. **Aircrews use formations that complicate enemy radar resolution** and improve lookout capability against enemy fighters. Aircrews constantly watch for air defense weapons. **Aircrews use electronic protection and radar warning receiver/radar homing and warning equipment to detect and defeat enemy air defense systems.** Aircrews should delay entry into a heavily defended target area until they have a clear understanding of the mission.

CAS IN THE PERSIAN GULF: 50th TFW REPORT

On 24 February 1991, an Air Force captain leading a flight of four F-16s from the 10th Tactical Fighter Squadron was redirected to support a 16-member Special Forces (SF) team in trouble more than 135 miles from the flight's original target. The SF team was surrounded by a company-size Iraqi force. The lead pilot directed his flight to attack the approaching enemy troops. With disregard for intense enemy 23-mm and 37-mm anti-aircraft fire, his flight made multiple attacks, placing cluster bomb munitions on target—as close as 200 meters from friendly positions. On the last pass, while low on fuel, the captain put his bombs exactly on target, causing numerous enemy casualties and forcing the remaining enemy troops to retreat. Army helicopters extracted the SF team without a single Coalition casualty.

SOURCE: DOD Final Report to Congress,
Conduct of the Persian Gulf War, April 1992

c. **Navigation.** En route navigation tactics depend on the threat, the need for and availability of support aircraft, friendly air defense requirements, weather, and fuel. **En route navigation tactics include high altitude, medium altitude, low/very low altitude, or a combination of the above.**

- **High Altitude.** High altitude en route tactics are flown above 15,000 feet above ground level (AGL). **Aircrews use high altitude tactics to remain above short-range air defenses.**

  •• **Advantages of high altitude tactics include:** (1) Reduces fuel consumption rate; (2) Reduces navigation difficulties; (3) Improves formation control; (4) Allows considerable maneuver airspace and allows aircrews to concentrate on mission tasks instead of terrain avoidance tasks; (5) Allows communications, unaffected by terrain, between aircrews and control agencies; and (6) Reduces exposure to certain AAA and man-portable IR SAMs.

  •• **Disadvantages of high altitude tactics include:** (1) Enemy acquisition radars can detect the attack force at long range, allowing the enemy to prepare its air defenses; (2) The attack force may be vulnerable to some enemy SAM systems and enemy fighter interceptors before entering the target area if local air superiority has not been achieved; and (3) Weather may prevent visual navigation and obscure the target area.

- **Medium Altitude.** Medium altitude en route tactics are flown between 8,000 feet AGL and 15,000 AGL. Medium altitude tactics may not be advisable in a medium or high threat environment. **Medium altitude tactics have many of the same advantages and disadvantages as high and low altitude tactics.**

- **Low/Very Low Altitude.** Low altitude en route tactics are flown below 8,000 feet AGL. Very low altitude is flight below 500 feet AGL. **Aircrews use low/very low altitude tactics to keep the attack force below enemy early warning/ground controlled intercept (GCI) radar coverage** for as long as possible. Adverse weather can cause aircrews to use low/very low altitude navigation.

  •• **Advantages of low/very low altitude tactics include:** (1) Reduces enemy radar detection by using the earth's curvature for masking; (2) Reduces chance of attack from enemy surface-to-air weapon systems by using terrain for masking; (3) Degrades enemy GCI radar coverage, denying intercept information to enemy fighters and forcing enemy aircraft to rely on visual or onboard acquisition systems; (4) Reduces enemy weapons envelope lethal zones during high speed, low altitude ingress; and (5) Improves friendly aircraft maneuvering performance.

  •• **Disadvantages of low/very low altitude tactics include:** (1) Fuel consumption rates are high; (2) Navigation is extremely demanding and requires a high level of aircrew skill (Navigation is easier for aircraft equipped with INS or GPS.); (3) Exposure to small arms, AAA systems, and IR guided weapons increases; and (4) Communication and control are difficult.

- **Combination Low/Very Low, Medium, and High Altitude.** Aircrews **combine low/very low and medium altitude tactics** to gain the advantages of both while reducing the disadvantages of each. The en route portion of the flight is normally beyond the range of enemy air defense weapons and flown at a

medium or high altitude. The attack force descends to low/very low altitude to avoid detection by certain enemy SAM threats and/or gain surprise.

23. Ingress Tactics (CP to IP)

Ingress tactics apply from arrival at the CP until the target attack phase begins at the IP. The expected threat intensity and sophistication influence the selection of ingress tactics. **Terminal controllers and aircrews tailor communications and control requirements to counter the threat.** Normally, control of CAS flights is handed over to the terminal controller at the CP. In an intense jamming environment, preplanned scheduled missions may be the primary CAS method. Proper planning provides for mission success even if there is little or no chance of radio communications after the flight becomes airborne.

a. **Navigation.** Ingress tactics depend on the threat, the need for, and availability of, support aircraft, weather, and fuel. **Ingress navigation tactics include high altitude, medium altitude, low/very low altitude, and a combination of low/very low and medium altitude.**

- **High Altitude.** Aircrews use high altitude ingress tactics **to remain above the enemy AAA and short-range SAM threat**. High altitude ingress reduces fuel consumption rates and eases navigation.

- **Medium Altitude.** Medium altitude ingress tactics are a continuation of medium altitude en route tactics. **Aircrews can use medium altitude ingress tactics if support aircraft, air strikes, artillery strikes, or onboard EP equipment can suppress the enemy air defense threat** or if they can remain above the enemy surface-to-air weapon (SAW) threat. Medium altitude ingress reduces fuel consumption rates and eases navigation. These tactics may **provide better air support** for the requesting commander than low/very low altitude methods.

- **Low/Very Low Altitude**

•• In high and medium threat environments, **aircrews use low/very low altitude ingress tactics to degrade enemy detection capabilities**. These tactics can increase aircrew survivability but increase fuel consumption rates. Extensive training is required to develop accurate navigation techniques and the ability to perform effective evasive maneuvers. Detailed planning is critical. Aircrews plot, brief, and study the ingress routes to gain the maximum advantage from terrain masking.

•• **Extreme terrain** can dictate that the size of each attack element be small if flying low/very low altitudes. The terrain dictates the type of formation flown by the attack element.

•• **Fixed-wing aircrews must maintain adequate clearance from helicopter flights.** Helicopter aircrews using terrain flight (TERF) techniques must remain close to the terrain. This becomes critical when fixed-wing aircrews traverse vertically-developed terrain.

- **Combination Low/Very Low and Medium Altitude**

•• **The attack force enters the target area at low/very low altitude** to avoid early enemy radar detection. At a predetermined point, the **attacking force climbs to medium altitude** for the attack.

•• **This tactic protects the attack force** from early engagement by enemy long-range SAW systems and fighter aircraft. **The climb to medium altitude removes the attack force from the low altitude AAA and short-range IR missile envelopes** and aids target acquisition. This tactic does increase the attacking force's vulnerability to SAW systems in the target area but is designed to beat SAW system reaction times.

•• **Aircrews should consider this tactic when AAA is the major threat in the target area.** Climb to medium altitude before entering the lethal zone of low altitude air defense weapons. Delay the climb as long as possible to reduce vulnerability to long-range air defense systems.

b. **Communications and Control. Communications and control procedures at the CP vary by type of CAS, threat, support package, communication capabilities, and planned ingress tactics.** A preplanned, scheduled mission may require little or no communications. An immediate mission will probably be very communications-intensive. In the presence of an EW threat, communications discipline becomes more important, as effective communications may be considerably more difficult to conduct.

- **Mission Essential Information. The aircrew must receive mission essential information before arriving at the target area.** If communications at the CP permit, launch missions without specific targets or IP assignments. Such flights receive only a CP and a terminal controller call sign/frequency either before launch or from an air control agency once airborne. The aircrew receives the rest of the target brief at the CP. **Aircrews may have to divert or abort if they are unable to receive mission essential briefing items.**

- **Flexible Communications.** Communications between the aircrew and terminal controller may be difficult or nonexistent. **If the terminal controller cannot talk to the aircrew, the appropriate air control agency must pass mission-essential information.**

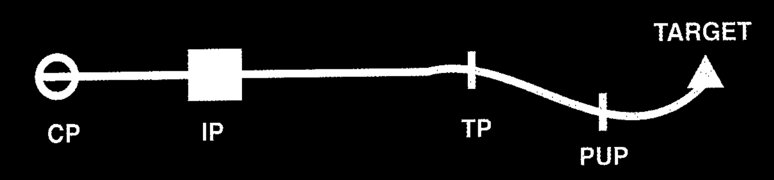
- **Minimum Communications. Preplanned, scheduled missions leave the CP to meet a TOT/TTT with minimal communications.** The terminal controller makes brief, coded transmissions or assignment changes. Airborne alert aircraft remain at a CP for immediate mission assignment. Aircrews given immediate CAS missions plan fuel or time cutoff points. The CP location may not allow aircrew and terminal controller communication because of radio range or line of sight. **Expect communication problems** and plan to use other air control agencies to provide radio relay.

24. Attack Phase (IP to Target)

The attack phase, or the final run-in from the IP to the target, **is the most crucial phase of the CAS mission.** Aircrew tasks increase as the aircrew must follow a **precise timing and attack profile** in order to produce the necessary effect on the target in a timely manner. Figure V-14 illustrates the attack phase of a typical fixed-wing CAS mission.

a. **Attack Tactics.** Attack tactics permit integration of CAS attacks into fire support plans. **Specific techniques used to attack a target are the choice of the pilot in command or mission commander.** Because of the risk to friendly ground forces, the FAC should avoid loft attacks with weapons release behind friendly positions.

FIXED-WING CAS ATTACK PHASE EXAMPLE



Key Actions in a Fixed-Wing CAS Attack

To perform a CAS Attack, the following actions must take place:

1. The attack aircrew receives the CAS brief.
2. The aircrew calculates the following, based on aircraft type, run-in airspeed, ordnance, and delivery maneuver:
   a. Time to leave the CP to cross the IP at the proper time.
   b. Distance and time from IP to turn point (TP).
   c. Degrees to turn at TP and direction of offset, if not directed by the terminal controller.
   d. Distance/time to pull-up point (PUP) (from TP or IP, whichever preferred).
   e. Pull-up angle (as applicable).
   f. Apex/roll-in altitude (as applicable).
   g. Release altitude (based on threat, friendly fires, and ordnance).
3. Terminal controller provides:
   a. Mark on target 20-30 seconds before TOT/TTT.
   b. Final corrections/directions, given concisely in cardinal direction and distance from the mark, to the aircrew to find the target.
   c. Clearance to deliver ordnance.

Figure V-14. Fixed-Wing CAS Attack Phase Example

- **High/Medium Altitude. High/medium altitude attacks are normally executed in a low/medium threat environment.** However, aircrews can perform a high/medium altitude attack after any type of ingress. High/medium altitude attack advantages and disadvantages are similar to those listed in the discussion on en route tactics. More time may be available for target acquisition, but bombing accuracy with unguided munitions may be degraded. **Terminal controllers can issue aircrews minimum altitude restrictions that reduce aircraft vulnerability to indirect fires.** High/medium altitude tactics may prevent the terminal controller from visually acquiring the aircraft.

- **Low/Very Low Altitude. During low/very low altitude attacks, the same considerations apply as in high/medium altitude attacks.** Aircrews may have less time to acquire the target and position their aircraft for a successful attack. When planning ordnance and attack profiles, consider the requirement for fragmentation pattern avoidance in the low altitude environment.

b. **Multiple Axis of Attack.** Tactical formations using multiple axes of attack provide effective mutual support throughout the attack. **Multiple axis of attack tactics increase the concentration of ordnance on target and force the enemy to split air defense assets.** The size of the attack force depends upon control requirements, time of exposure to enemy defenses, and time available in the target area. Multiple axis of attack tactics depend upon the threat. Regardless of the attack profile, the briefing format remains the same.

c. **Coordinated Attacks. Use of coordinated attacks must be approved by the terminal controller.** Coordinating flights for attacking the same target/target area can add firepower to the attack and help to split target defenses, while increasing the situational awareness of newly-arrived flights. **While the on-scene commander (OSC) directs deconfliction between flights, the terminal controller is still the "owner" of the target area.** An OSC is appointed for coordinated attacks. The OSC is usually the flight lead with the highest situation awareness of the target area. He will coordinate all attacks with the terminal controller. While the terminal controller and aircrews must conduct the attack using a common frequency, the aircrews can use a separate frequency to conduct interflight coordination (e.g., ordnance deconfliction, timing between flight members). Figure V-15 shows the relationship between attacks and attack timing:

- **The Type of Attack. The type of attack is based solely on the avenue to the target, and does not apply to the target itself.** Example: "Combined/Sequential/ Visual" means the avenue to the target is shared airspace, timing on target is sequential, with the trailing flight taking visual spacing on the lead flight's last attacker. "Sectored/Sequential/1 Minute" means the avenue to the target is sectored (using an acknowledged sector), and timing on target is sequential with the trailing flight taking one minute spacing from the lead flight's TOT.

COORDINATED ATTACK TYPES

Type of Attack	Simultaneous	Sequential	Random
COMBINED Same avenue of attack	Visual or Hack (Visual spacing or time hack separation)	Visual or Hack (Visual spacing or time hack separation)	NOT NORMALLY USED
SECTORED Acknowledged sector	Visual or Hack (Visual spacing or time hack separation)	Visual or Hack (Visual spacing or time hack separation)	Free Flow *

* Must ensure strafe fan / bomb & missile frag deconfliction

Figure V-15. Coordinated Attack Types

- **Deconfliction Procedures.** The following procedural guidelines are considered standard:

  •• Aircraft egressing from the target have the right-of-way.

  •• Reattacks must be approved by the terminal controller after coordination with the ground force commander.

  •• If an aircraft enters another flight's sector, the aircrew will immediately notify the other flight, the terminal controller, and deconflict or exit that sector.

  •• Coordinate munitions that may enter the other flight's sector before the attack.

d. **Procedural Control Measures.** Terminal controllers use procedural control measures to: provide target orientation for the aircrew; align aircraft for the attack or egress; provide separation from other supporting fires; and provide separation from enemy air defense weapons. **Procedural control measures include IP selection, offset direction, and attack heading.**

- **IP Selection. The terminal controller selects the IP** based on enemy capabilities, target orientation, friendly location, weather, and fire support coordination requirements. IPs should be radar- and visually-significant, and normally located from 4 to 15 miles from the target. If aircrews are not restricted, they are free to ingress and attack the target from any direction after they leave the IP. Attacks should have as few restrictions as possible.

- **Offset Direction. The offset direction tells the aircrew on which side of the IP-to-target line they can maneuver for the attack.** See Figure V-16 to understand the relationship between offset direction and IP-to-target heading. Terminal controllers use an offset direction to ease fire support coordination, aid target acquisition, align the aircraft for the attack or egress, or keep aircrews away from known threats.

  •• An offset direction **aids fire support coordination** by restricting aircrews from using airspace on the other side of the IP-to-target line. An offset direction **keeps aircraft clear of enemy air defenses** and **reduces interference with gun target lines**. It also reduces an aircrew's chance of being hit by direct/indirect fires.

  •• The offset **direction regulates the attack quadrant** without assigning a specific attack heading.

e. **Types of Delivery**

- **Level Delivery.** Deliver ordnance with a wings level pass over the target.

- **Dive Delivery.** Deliver ordnance using a dive delivery.

- **Loft Delivery.** To execute a loft delivery, the aircrew proceeds inbound to the target from the IP. At a calculated point, the aircrew starts a loft maneuver pullup. Once released, the weapon continues an upward trajectory while the aircrew egresses the target area. After the weapon reaches the apex of its trajectory, it follows a ballistic path to impact.

- **Pop-up Delivery.** To execute a pop-up delivery, the aircrew proceeds to the target from the IP at low/very low altitude. As the aircrew nears the target, they pop-up to the desired altitude and execute a dive delivery.

f. **Attack Heading. An attack heading is the assigned magnetic compass heading**

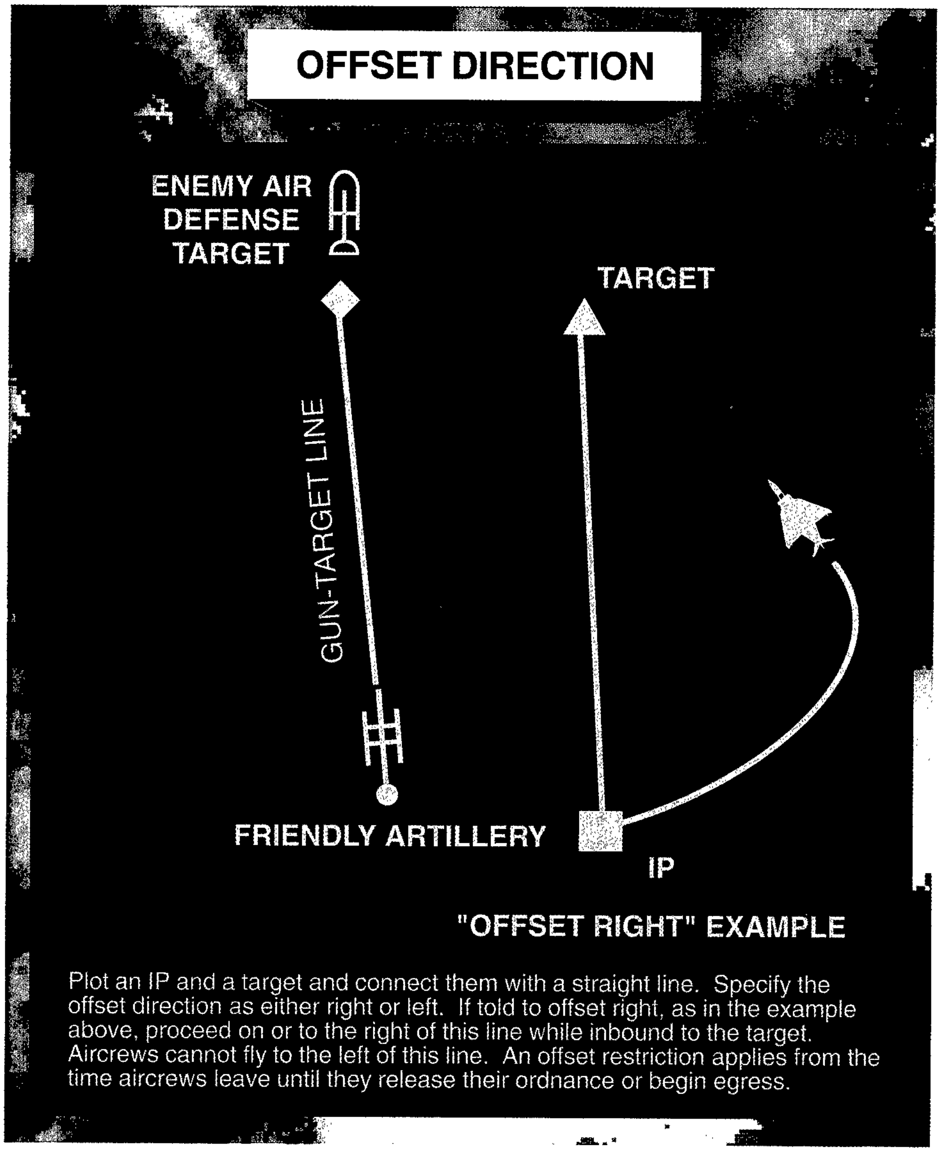


Figure V-16. Offset Direction

that an aircrew flies during the ordnance delivery phase of the attack. Terminal controllers assign attack headings for several reasons: to increase ground troop safety, aid in target acquisition, and help fire support coordination. Attack headings, especially during visual attacks, may reduce the flexibility and survivability of aircraft.

g. **Immediate Reattacks**

- **Single vs Multiple Sorties.** The aircrew's goal is to complete a successful attack on the first pass. Once acquired in the target area, an aircraft which remains for reattacks may be more vulnerable to enemy fire. Typically, **multiple single-pass sorties require less time in enemy air defense envelopes.**

- **Utility. In low and medium threat environments, immediate reattacks may be a practical option.** A reattack can help assure the desired effect on the target, aid visual orientation for the aircrew, and increase responsiveness to the supported commander.

- **Terminal Controller Responsibilities.** Terminal controllers authorize reattacks. If a reattack is necessary and possible, **the terminal controller may give the aircrew a pulloff direction and may assign different attack headings.** The terminal controller may provide **additional target marks** for the reattack and can describe the target location using the last mark, last hit, terrain features, or friendly positions. The reattack may engage other targets within a specific target area.

h. **Reduced Threat Considerations. Many times threat conditions allow aircrews to loiter safely in the target area.** This may be a high loiter, to stay above effective AAA fire, or a lower loiter if there is no effective AAA threat. **In this case, a "wheel" may be flown around the target.** Advantages are:

- All flight members can continuously observe the target area, the marks, and hits from other aircraft.

- Improved mutual support.

- The ability to roll-in from any axis requested by the terminal controller.

- Lower fuel consumption and increased time on station.

- Easier timing of TOT.

- Better ability to conduct reattacks.

25. Radar Beacon CAS Execution

a. **General.** Radar beacons, coupled with compatible aircraft, give joint forces the capability to deliver CAS firepower in poor weather or at night. **The terminal controller provides target information in relation to the radar beacon.** Typically, the radar beacon is located with the terminal controller. **The radar beacon provides an accurate radar offset aim point for radar bombing.** Terminal controllers can also use the radar beacon to direct aircrews to target areas. The terminal controller can then use laser designators to provide an exact target aim point or allow the aircrew to attack using their radar system. See Joint Pub 3-09.2, "JTTP for Ground Radar Beacon Operations (J-BEACON)," for more information.

b. **Basic Operation. The radar beacon is a portable, manpack radar transponder**, and is compatible with the A-6, F-16, F-15E, F-111, AC-130, B-52, and B-1B. **Electromagnetic pulses from compatible aircraft trigger the beacon.** Beacon operation is automatic when pulsed by the aircraft radar. Aircrews require specific radar beacon information depending on the aircraft type.

c. **Target Location Methods. Terminal controllers use two methods to locate targets for radar beacon missions.** Use of a particular method depends on the tactical situation.

- **Bearing-Distance.** The bearing-distance method is **the most accurate** method. **Use the bearing-distance method when position approximations do not complicate bearing and range errors.** Laser or other precisely derived offset data is highly desirable and increases the accuracy of this method. Terminal controllers normally use this method when located with the radar beacon.

- **Grid Coordinate. Terminal controllers use the grid coordinate method when accurate bearing and range information cannot be determined.** The accuracy of this method depends on the precision of the target/radar beacon position identification on a map. The beacon does not need to be with the terminal controller. The radar beacon can be at a known, fixed site while the terminal controller is on patrol or airborne.

d. **Aircrew Procedures.** After checking in with the terminal controller, **the aircrew acknowledges TOT/TTT.** After considering airspeed, ordnance, and delivery maneuvers, the aircrew:

- **Determines time to leave CP** to meet TOT/TTT.

- **Determines distance/time** to the release point or pull-up point (PUP).

- **Confirms offset/grid information** in computer.

e. **Run-In Heading/Attack Heading. Begin radar beacon attacks from the assigned IP.** If appropriate, the terminal controller provides an attack heading in the remarks portion of the brief. The assigned attack heading should reduce terrain masking of the radar beacon signal. **An attack heading should provide an aircrew with an appropriate run-in.** The run-in distance is based on aircraft type, and 10-15 nautical miles is generally optimum. Successful mission execution is possible with less than an optimum run-in, but the aircrew workload is extremely high.

- **Assignment of an attack heading depends on:**

  - Safety of friendly ground units.

  - Safety of attacking aircrews.

  - Fire support/airspace coordination requirements.

  - Terrain.

- **Safety of friendly ground units is of prime importance** in determining an attack heading/run-in heading. Consider the enemy situation, including the threat to attacking aircrews. A heading parallel to friendly lines allows the most flexibility.

- For safety and accuracy, **the attack heading/run-in-heading cannot cause the radar beacon signal to disappear from the aircraft radar scope before weapons release.** Loss of the radar beacon signal prevents the aircrew from making corrections during the final portion of the attack. If the radar loses the radar beacon signal before weapons release it may degrade delivery accuracy. To ensure troop safety, the radar beacon should be on the aircraft radar scope at weapons release if friendly troops are within 500 meters of the target.

- **If the attack heading is not a straight line from a CP to the target, aircrews may begin the attack from a CP and proceed on a course to intercept the assigned attack heading.** Aircrews must intercept the attack heading far enough from the target so that the aircraft has enough time to receive the radar beacon signal. **When intercepting the attack heading from a CP, extensive fire support/airspace coordination may be necessary for the safety of the aircrew and adjacent ground units.** The terminal controller must use precise control measures. These control measures can include a mandatory heading from the CP to intercept the assigned attack heading or a specific distance from the target to intercept the assigned attack heading.

f. **Abort Procedures. The terminal controller transmits the appropriate code over the radio to change, cancel, or abort the attack.** If radio communications are not possible or desirable, **the terminal controller may abort the attack by turning off the radar beacon.** The loss of the radar beacon signal shall constitute an abort.

g. **Radar Beacon as an IP. The terminal controller can use the radar beacon as an IP to orient the aircrew to a target area.** Use this tactic to locate radar-significant, hard targets or moving targets. As the aircraft approaches the target area, the aircrew locates the target on radar and begins the attack.

h. **Terminal Control**

- Ideally, the radar beacon team providing terminal control will be able to communicate with the aircrew and pass a complete target brief. However, **communications may be impossible during combat operations.**

- **Due to the clandestine nature of special operations, terminal control may be limited or nonexistent.** Since ground personnel may have to position the radar beacon without any direct radio contact with supporting elements, **prior coordination is essential.** In various situations, the communications system used may result in an inordinately **long lead time.** Additionally, special operations may require **unconventional authentication procedures**, and immediate adjustments of fire and/or mission effects reporting may not be possible.

- **The radar beacon operator will make bombing corrections by adjusting the original offset data.** The radar beacon operator gives aircrews corrections with respect to the beacon-target line using left/right or minus/plus in degrees for azimuth and add/subtract in meters for distance.

26. Fixed-Wing Laser-Guided System Employment

a. **General. Laser systems offer improved CAS weapons delivery capability and accuracy.** However, they require detailed coordination and additional procedures. See Joint Pub 3-09.1, "Joint Laser Designation Procedures," for more information.

b. **Types of Employment**

- **Laser Acquisition and LGWs.** Typically, **this combination requires the longest period of laser designation and can provide the best results.** Laser designation must allow the aircraft's LST adequate time to find the target. Laser designation may begin 20 seconds before planned TOT/TTT. Designation continues until ordnance impact. If communications permit, the aircrew may give "10 seconds," "laser on," "spot," and "terminate" calls.

- **Laser Acquisition and Unguided Weapons. This combination produces excellent results if the delivery aircraft has some type of computer-aided release system.** Laser designation can begin before or shortly after the aircraft crosses the IP. The aircrew may give a "laser on" call if communications permit. Designation continues until all ordnance has impacted the target or the aircrew calls "terminate."

- **LGWs Only. This combines "dumb aircraft"** (no LST or LST failure) **and smart weapon** (LGW). A supplemental mark (e.g., smoke) must be visible by the aircrew in order for them to locate the target. Unless coordinated otherwise, designation should begin with ordnance release and continue until impact.

c. **Employment Considerations**

- **Laser-Guided Bombs.** If designating for LGBs, **terminal controllers and designator operators must consider the following:**

  •• Older LGBs have **preset codes** that cannot be changed.

  •• Some newer LGBs **have codes that are manually set** before the aircraft launches. **Aircrews cannot change these codes while airborne.** On check-in, aircrews pass the designator code to the terminal controller.

  •• Certain aircraft/LGW combinations allow **inflight cockpit selection of codes.**

  •• **The terminal controller selects the IP/offset** to assure the attack heading allows LST lock-on and ordnance delivery on the first pass.

  •• **Aircraft carrying guided and unguided ordnance release LGBs first.** This allows the LGB a relatively dust- and debris-free environment and helps reduce interference. Unguided bombs are dropped during later passes.

  •• LGBs provide **greater accuracy**.

  •• There is an **increased hazard to friendly forces** when aircrews release weapons behind friendly lines.

  •• Designators **should coordinate laser on times** with the aircrew. The aircrew provides "Laser ON" and "Terminate" radio calls to the designator.

- **Laser-Guided Missiles.** LGMs for fixed-wing aircraft include the AGM-65E Maverick. **LGMs generally provide greater standoff launch ranges than LGBs.** Greater range provides **increased survivability for aircrews** operating in a high threat environment. Aircrews and terminal controllers must exercise caution when launching LGMs from behind friendly troops. Without a TOT or TTT, the aircrew gives a "10 seconds" warning call to the terminal controller. This alerts the terminal controller to begin laser designation in 10 seconds. The aircrew gives a "laser on" call to begin target designation. The aircrew may call "terminate" to end designation.

  •• **Laser Maverick Employment.** (1) In the event the laser signal is lost, the weapon will safe itself and overfly the target. The Maverick system allows aircrew to engage targets designated by either air or ground sources with inflight selectable PRF codes. (2) Must be able to acquire target visually or with FLIR in order to achieve weapons lock. (3) The missile must be locked-on to laser source prior to launch. (4) The Maverick and the laser designator must be set to the same PRF code prior to launch. (5) For other than self-designation, the attack heading must be adjusted to optimize the reflected laser energy.

d. **Attacks by Multiple Aircraft. Use of laser designators and LST-equipped aircraft simplifies rapid attacks by multiple aircraft.** If numerous aircraft operate under the control of a single terminal controller and use the same heading (threat permitting), it simplifies control of the attack.

- **Attacks on a Single Target. Multiple aircraft attacking a single target increase the chance of target destruction at the earliest possible time.** The attack requires a single designator with one (or all) aircraft achieving lock-on and ordnance release. The terminal controller may clear the second aircrew to perform a follow-up attack on the target using guided or unguided ordnance.

- **Attacks on Multiple Targets. Multiple aircraft attacking multiple targets require increased coordination and planning.** Attacks on multiple targets can be performed using a **single designator** or **multiple designators**. Separate designators on different codes for each target are preferred. Using multiple designators reduces the time any single designator is on and exposed to enemy countermeasures.

e. **Radar Beacon and Laser Procedures. Aircraft can use the radar beacon with laser designation to attack targets.** The aircrew uses the radar to locate the beacon. The target is then located using offset information computed from the known beacon location. They then use the aircraft's weapon system to attack targets with offset aim points based on the radar beacon's known position. **This capability provides night precision attack potential.** Use the following methods to combine the radar beacon and LGW delivery.

- **Radar Beacon to Laser Designator Handoff.** Aircraft can detect the radar beacon at greater ranges than a laser-designated target. This allows **aircrews to begin a normal radar beacon mission followed by a handoff for a laser-designated attack.** The terminal controller begins laser designation of the target at the appropriate time. **An aircrew can deliver LGWs using two methods:**

  •• Using the terminal controller's designator.

  •• Beginning self-designation using the aircraft laser designator after acquiring the terminal controller's laser spot with their LST. The aircrew must call "terminate" to the terminal controller designator when they begin self-designation.

- **Radar Beacon/FLIR Mission. Aircrews conduct a normal radar beacon mission using the FLIR for target acquisition.** The aircrew may then use autonomous laser designation to deliver LGWs rather than unguided ordnance.

27. Egress

In a high threat environment the need for a rapid egress may delay the ability to rendezvous and regain mutual support. **Egress instructions and rendezvous should avoid conflict with ingress routes and IPs.** Egress instructions may be as detailed as ingress instructions. Egress fire support coordination and deconfliction requirements are the same as those used during ingress. **Upon mission completion, aircrews follow the egress instructions and either execute a reattack, return to a CP for future employment, or return to base.**

SECTION E. ROTARY-WING EXECUTION

28. Introduction

This section identifies some of the tactics, techniques, and procedures (TTP) attack helicopter aircrews can use to perform the CAS mission. Do not interpret these TTP rigidly. Rigid standardization reduces flexibility and results in predictability. However, CAS TTP involves ground units and control agencies, so some standardization aids coordination. **Standard tactics provide aircrews with a baseline for further refinement and change.** Operation plans/orders reflect initial standardization. Commanders should change these procedures as the tactical situation evolves. Aircrews use the **tactical situation, imaginative thinking, experience,** and **aircraft tactical manuals** to refine and improve mission tactics.

29. Launch and Departure Procedures (Takeoff to Rendezvous Point [RP])

Position attack helicopters near the supported commander to reduce response time or increase time on station. The appropriate controlling agency issues launch orders through the proper command and control or fire support agency.

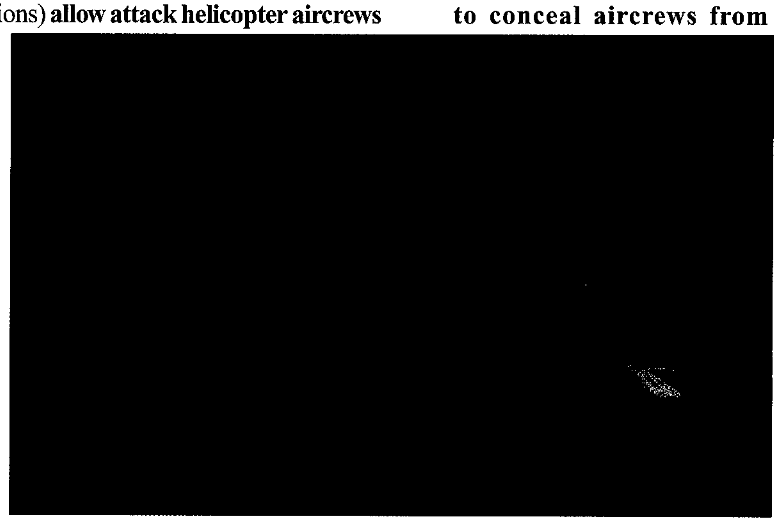
30. En Route Tactics (RP to HA)

a. **Purpose.** Ideally, **en route tactics** (route and altitude selection, TERF profile, and formations) **allow attack helicopter aircrews to avoid concentrated enemy air defenses and prevent early enemy acquisition of the attack force.** If en route tactics are successful, they can delay or hamper enemy air defense coordination and increase aircrew survival and mission success.

b. **Navigation. En route navigation tactics depend on the threat, need for and availability of support aircraft, friendly air defense requirements, weather, and fuel.** As aircrews approach the target area or probable point of enemy contact, they fly lower and with increased caution to arrive undetected in the HA. Aircrews use TERF to deny/degrade the enemy's ability to detect or locate the flight visually, optically, or electronically. **En route terrain flight profiles fall into three categories: low level, contour, and nap-of-the-earth (NOE).**

- **Low Level.** Conduct low-level flight at a constant MSL altitude and airspeed. **Low-level flight reduces or avoids enemy detection or observation.** Aircrews use low-level flight to reach a control point in a low threat environment.

- **Contour. Contour flight conforms to the contour of the earth or vegetation to conceal aircrews from enemy**



Attack helicopters positioned in littoral areas can provide CAS to the supported commander with reduced response time or increased time on station.

observation or detection. Contour flights use varying airspeed and altitude MSL as vegetation and obstacles dictate. Aircrews vary altitude MSL to produce constant altitude AGL. Aircrews use contour flight until reaching a higher threat area.

- **Nap-of-the-Earth. NOE flight is as close to the earth's surface as vegetation and obstacles permit** while following the earth's contours. **Terrain and vegetation provide aircrews cover and concealment** from enemy observation and detection. NOE flight uses varying airspeed and altitude AGL based on the terrain, weather, ambient light, and enemy situation. When flying NOE, **aircrews may maneuver laterally** within a corridor compatible with the ground scheme of maneuver and assigned route structures. Within the corridor, aircrews use a **weaving, unpredictable path** to avoid detection by the enemy. NOE flight should be used in high threat environments.

31. Ingress Tactics (HA to BP)

Ingress tactics apply from arrival at the HA until the target attack phase begins at the BP.

a. **Attack Helicopter Control Points.** In addition to normal CAS control points, **attack helicopter aircrews can use special attack helicopter control points**. Rotary-wing CAS can be performed with or without HAs or BPs. Terminal controllers and aircrews select HAs and BPs that are tactically sound, support the scheme of maneuver, and are coordinated with other supporting arms.

- **Holding Areas. HAs may be established throughout the battlefield to be used for helicopters awaiting targets or missions.** These HAs serve as informal ACAs while they are in use. **HAs provide the attack helicopter aircrews an area in which to loiter.** HAs may be established during planning, referred to by name or number, and activated/established during operations.

- **Battle Positions. BPs are maneuvering areas containing firing points for attack helicopters.** Like HAs, BPs serve as informal ACAs while in use. Planning considerations and methods of establishment for BPs are the same as those involved in the use of HAs.

b. **Techniques of Movement.** Due to proximity to the threat, **aircrews use TERF to move from the HA to the BP.** If aircrews are close to friendly artillery and mortars, they use TERF in conjunction with airspace control measures to deconflict with artillery and mortar trajectories. **Aircrews use three techniques of movement in TERF: traveling, traveling overwatch, and bounding overwatch.** Particularly when flying TERF, helicopter movement must be coordinated with the applicable FSCC/FSE. (See Figure V-17.)

- **Traveling.** Traveling is a technique that aircrews **use when enemy contact is remote.** The flight moves at a **constant speed** using **low-level** or **contour terrain flight.** Movement should be as constant as the terrain allows. Traveling allows rapid movement in relatively secure areas.

- **Traveling Overwatch.** Traveling overwatch is a technique that aircrews **use when enemy contact is possible.** The flight moves using **contour** or **NOE terrain flight.** While caution is justified, speed is desirable. **The flight consists of two major elements: the main element and the overwatch element.** The **overwatch element** may contain multiple subelements. The **main element** maintains continuous forward

MOVEMENT TECHNIQUES

Techniques of Movement	Likelihood of Contact	TERF Profile
Traveling	Remote	Low level or contour
Traveling Overwatch	Possible	Contour or Nap of the Earth
Bounding Overwatch	Imminent	Nap of the Earth

Figure V-17. Movement Techniques

movement. The overwatch elements move to provide visual and weapons coverage of the main element. The overwatch elements provide weapons coverage of terrain from which the enemy might fire on the main element.

- **Bounding Overwatch.** Bounding overwatch is a technique that aircrews **use when enemy contact is imminent**. The flight moves using **NOE terrain flight.** Movement is deliberate and speed is not essential. The flight consists of two elements. **One element moves or "bounds" while the other element takes up an overwatch position.** The overwatch element covers the bounding elements from covered, concealed positions that offer observation and fields of fire.

c. **Communications and Control. An attack helicopter's inherent flexibility allows a variety of communication and control procedures.** TERF techniques of movement restrict the terminal controller's ability to exercise control through radio communications. Typically, communications may not be desirable during the ingress phase. To preserve operational security, aircrews can land to receive face-to-face mission briefs and mission-essential information from the supported commander or terminal controller before leaving the HA. An airborne relay may be used to maintain communications.

32. Attack Phase (Within the BP)

The attack phase is the most important phase of the helicopter CAS mission. The attack must produce the **necessary effect** on the target in **a timely manner.** Figure V-18 illustrates an example of an attack helicopter CAS attack.

a. **Control.** Once the aircrew reaches the BP, **the terminal controller or mission commander issues final instructions to the flight.** Aircrews select individual firing points (FPs) and remain masked while awaiting the TOT/TTT or the order to attack.

b. **Attack Tactics. Specific techniques used to attack a target are the choice of the air mission commander.** Select attack tactics considering the threat, target size and vulnerability, weather, terrain, accuracy requirements, weapons effectiveness, and fragmentation patterns.

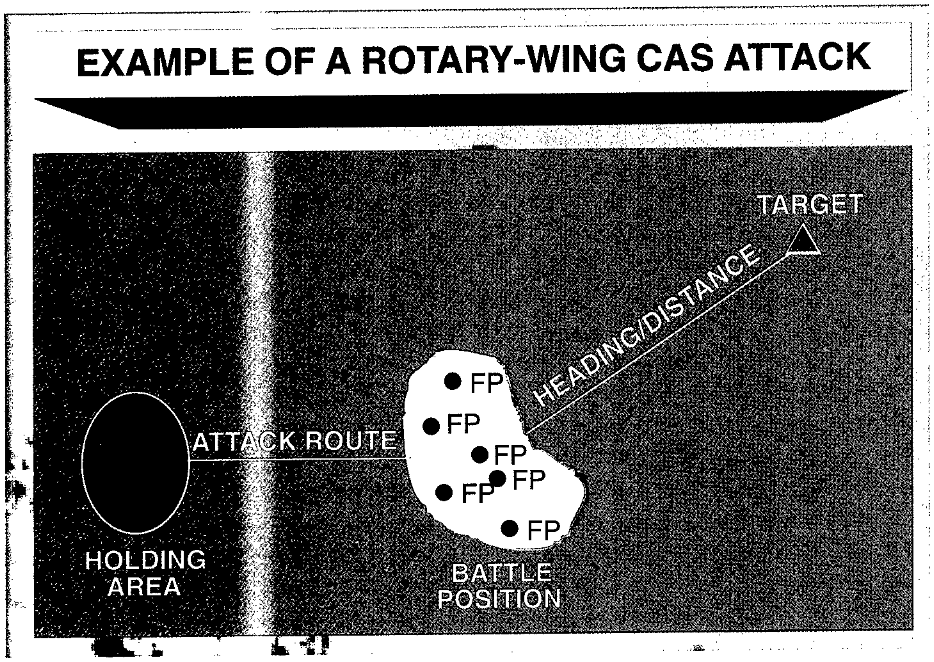


Figure V-18. Example of a Rotary-Wing CAS Attack

- **Hovering Fire. Hovering fire is performed when the aircraft is stationary or has little forward motion.** Aircrews perform hovering fire after unmasking from a defilade position. To prevent being targeted by enemy weapons, aircrews maintain the hovering fire position only for **short periods.** Deliver indirect hovering fire from **FPs hidden from the enemy** by terrain features. After delivering hovering fire, aircrews **remask behind terrain**. If terrain permits, aircrews should move to an alternate FP. Unguided ordnance (rockets, cannon, or 20/30 mm gun fire) reduces accuracy because the aircraft may be less stable in a hover. **Precision-guided weapons are the most effective ordnance** fired from a hover.

- **Running Fire. Running fire is performed when the aircraft is in level, forward flight.** Forward flight may add **stability** to the aircraft and **improve weapon delivery accuracy**. Use running fire at TERF altitudes. Running fire reduces an aircrew's vulnerability to enemy air defenses by providing a **moving versus stationary target** and by providing **a smaller signature** than a hover would because of less dust and debris. While performing running fire, **aircrews can use direct and indirect fire techniques**. Aircrews deliver direct fire when they have an unobstructed view of the target. Aircrews deliver indirect fire when they cannot see the target.

- **Diving Fire. Diving fire is delivered while the aircraft is at altitude and in descending forward flight.** If delivering unguided ordnance, diving fire may produce the most **accurate results**. Use diving fire if the aircrew can remain **above or outside the threat envelope**.

- **Unmasked Fire. Unmasked fire is a combination of running and diving fire.** Aircrews climb slightly and then perform a shallow angle dive. Unmasked fire provides aircrews the protection of running fire from enemy air defenses and the increase in accuracy of diving fire.

c. **Scout/Attack Team.** Scout/attack teams provide the joint force with a highly mobile, powerful, combined-arms capability. **They consist of two or more helicopters combining the scout and attack roles**. This capability allows the scout/attack team to **quickly and effectively react to a rapidly changing battlefield**. Commanders can use the scout/attack team separately, as a reinforcing asset, or reinforced with other assets.

- **Team Elements**

  •• **Scout Element. The scout element contains one or more helicopters. Multiple helicopters are preferred**, to provide mutual support within the scout element. The **air mission commander** is normally a member of the scout element. He is **responsible for mission planning and execution. The air mission commander's duties include:** (1) Providing liaison and coordination between the team and the supported unit to receive the current situation and mission brief; (2) Providing reconnaissance of the HA and BP if time and threat permit; (3) Briefing the attack element; (4) Planning and coordinating target marking/designation; (5) Providing security for the attack element from ground and air threats; and (6) Controlling the mission's supporting arms.

  •• **Attack Element. The attack element contains a minimum of two attack helicopters.** The attack element is subordinate to the mission commander. **The attack element leader's duties include:** (1) Assuming all the duties of the mission commander if required; (2) Attacking specified targets with the proper ordnance; and (3) Providing a rapid reaction base of fire.

33. Disengagement and Egress

Following the attack, the CAS flight disengages and egresses from the BP. Egress instructions may be as detailed as ingress instructions. **Egress fire support coordination and deconfliction requirements are the same as those used during ingress.** Upon mission completion, the flight can:

a. Proceed to an **alternate BP.**

b. **Return to the HA** for further operations.

c. **Return to the FARP** for refueling/rearming.

d. **Return to the FOB/ship.**

34. Rotary-Wing Laser-Guided Systems Employment

a. **General. The AGM-114 HELLFIRE missile allows attack helicopters to engage targets with the precision inherent to LGWs.** Aircrews use the HELLFIRE system to engage **critical hardpoint targets at extended ranges. The HELLFIRE system:**

- Provides aircrews with the ability to engage **multiple targets simultaneously.**
- Allows aircrews to **select or change missile-seeker PRF codes** from the cockpit.
- **Increases standoff and lethality.**
- **Reduces the risk to aircrew** by reducing or eliminating exposure time.

b. **Employment Considerations**

- Designator/launcher separation angle.
- Aircrew/designator coordination.
- Weather effects/obscuration.
- Countermeasures.

c. **Coordination. Terminal controllers and aircrews consider the following factors** when coordinating engagement procedures for HELLFIRE-equipped aircraft:

- **Adequate communications** between the terminal controller, laser designator, and aircrew.
- The terminal controller must provide **accurate target location information** and laser-to-target line to the aircrew.
- **PRF code settings** are coordinated before the attack.
- The **number of missiles** and the **interval between missiles** for rapid or ripple fire.
- **Proper geometry** between the laser, the target, and the attack aircraft must exist to maximize the probability of kill.

d. **Characteristics. The HELLFIRE LGM homes on targets designated by US and North Atlantic Treaty Organization laser designators.** The HELLFIRE system should use PRF codes in the range of 1111 to 1488 to achieve the desired probability of hit. The HELLFIRE system allows the aircrew to conduct **multiple, rapid launches** using **one or two designation codes simultaneously**. The aircrew can assign missiles to search for two codes simultaneously. **The aircrew can set or change the PRF code from the cockpit.** If using a single designator, the aircrew delays launching subsequent missiles (all set on the same PRF code) until the terminal controller shifts the laser designator to the next target. If using two designators (each set to a different PRF code) the missile launch interval can be less than two seconds. The use and coordination of **multiple designators** present a complex problem for the aircrew and the terminal controllers.

e. **HELLFIRE Missile Lock-On Options**

- **Lock-On Before Launch (LOBL). Aircrews use the LOBL mode of fire to launch missiles after they have locked onto and tracked the properly coded reflected laser energy.** The LOBL method requires direct line of sight from the missile to the target. Terminal controllers and aircrews use LOBL when they want to confirm that the aircraft is within launch parameters before launch. **LOBL allows a higher probability of kill against obscured or close range targets.** Use LOBL when the threat does not require delayed designation (laser countermeasures) or launch from a defilade position.
- **Lock-On After Launch (LOAL). Aircrews use the LOAL mode of fire to launch missiles without acquiring or locking onto any laser energy.** Lock-on occurs after the aircrew launches the missile. LOAL allows the aircrew to launch missiles without exposing themselves to the threat. **Three trajectories are available for LOAL launch: low (LOAL LO), high (LOAL HI), and direct (LOAL DIR).** The trajectory selected depends on terrain obstacles and distance to the target. LOAL LO mode allows the missile to clear a low terrain obstacle. LOAL HI mode allows the missile to climb to a higher altitude to clear a high terrain

obstacle. Aircrews use LOAL DIR mode when the target is within line of sight but enemy countermeasures prevent designation before launch or when cloud ceiling is low.

f. **Types of HELLFIRE Delivery**

- **Direct Fire. Use direct fire for either LOBL or LOAL options.** The LOBL option requires direct line of sight to the target and seeker lock-on before launch. If the target is not designated by delivery aircraft the aircrew can fly behind terrain after missile launch.

- **Indirect Fire. Aircrews use indirect fire to fire the missile before achieving lock-on (LOAL).** The aircrew launches the missile while the aircraft is hidden. **Aircrews can also use indirect fire when the missile cannot receive the laser energy reflecting off the target because of distance.** The aircrew launches the missile in a preprogrammed sequence causing it to fly an elevated trajectory. The missile then locates and locks-on the designated target.

g. **HELLFIRE Attacks on Multiple Targets. Multiple missiles attacking multiple high-threat targets reduce the number of aircrews exposed to risk.** Rapid fire reduces laser operating time when engaging multiple targets. During rapid fire, the aircrew uses a minimum of 8 seconds between missiles. Use longer intervals based on experience, terrain, target array, and battlefield obscuration. During multiple missile launches, **the terminal controller must be sure that subsequent missiles can receive reflected laser energy without interruption**. Dust and smoke from initial missile detonations can block or interrupt reception of laser energy by follow-on missiles. The terminal controller should consider wind speed and direction when selecting multiple targets. **Multiple missile launches require close coordination and timing.**

SECTION F. AC-130 EXECUTION

35. Introduction

This section identifies the basic JTTP used by AC-130 aircrews to conduct CAS. Standardized tactics provide a baseline for further refinement and improvement. Commanders should adjust these procedures as the combat situation develops. Aircrews can build upon these basic tactics and procedures by using innovative thinking, experience and information from aircraft tactical manuals to improve CAS for ground maneuver elements.

36. AC-130 En Route Tactics

a. **Sensor Alignment/Wet Boresight. The AC-130 should complete airborne sensor alignment and wet boresight (test fire) procedures prior to any CAS mission.** Only under extreme circumstances will a CAS mission be attempted without performing a sensor alignment/wet boresight. Planners will normally allot 30 minutes for sensor alignment/wet boresight.

b. **Ingress Tactics. The main consideration in selecting en route tactics is the avoidance of enemy detection and fires.** AC-130 crews conduct an extensive threat assessment using all available intelligence data, and combine the threat assessment with a careful study of the terrain in order to establish the ingress/egress routes, loiter areas, refueling tracks, and altitudes. **Medium altitude ingress reduces fuel consumption and simplifies navigation.** When necessary, **the AC-130's low-level capability allows ingress/egress through medium threat hostile territory** to arrive in a low threat objective area.

c. **Orbiting.** If no preplanned targets exist, the aircraft will normally proceed to a designated orbit area and await target assignment. **Upon arrival at the orbit point, the AC-130 crew will contact the terminal controller for ingress instructions** from the control point to the target area.

d. **Coordination. The AC-130 aircrew will make every effort to establish radio contact** while en route to speed acquisition of friendly position(s) and authenticate the terminal controller.

e. **CAS Briefing Form. AC-130 aircrews use the standard CAS Briefing Form** ("9-Line," Figure V-2). In addition to the standard briefing items, **the following items are mandatory for AC-130s:** a detailed threat description, marking of friendly locations, identifiable ground features, and ground commander's willingness to accept "danger close." Because the AC-130 is capable of extended loiter, AC-130 crews can work a series of targets with a single ground party. In these cases, the CAS briefing format can be abbreviated but must include: magnetic bearing and range to the target in meters from the friendly position to the target; and a brief description of the target.

37. Attack Phase

a. **Capabilities. The AC-130 can provide accurate fire support to ground units for extended periods of time during the hours of darkness.** Additionally, the sensor target acquisition capabilities, coupled with ground beacon position marking, give the AC-130 a limited **all-weather capability**.

b. **Locating Friendly Positions.** Normally, **the first consideration in the attack phase is to identify the friendly position.** Various aids may be used by friendly ground forces to expedite acquisition (e.g., strobe lights, flares, GLINT tape). In addition, there are several electronic beacons which may be used to assist in locating friendly forces. **The AC-130 crew will maintain radio contact with the ground forces at all times during firing.**

c. **Considerations for Close-in Fires.** Due to the accuracy of the gunship fire control system, **ordnance can be delivered very close to friendly positions.** However, several factors must be considered:

- **Ricocheting Rounds.** The greatest hazard to friendly forces is the possibility of ricocheting rounds.
- **Terrain Features.** Firing down an incline can cause considerable miss distances.
- **Burst Pattern.** Consider burst patterns for the various type ordnance (105mm, 40mm, 25mm, 20mm).

d. **Parameters for Attacking the Target.** The **type of target**, its **value**, the **proximity of friendly forces**, and the **damage already inflicted** will determine the gun selection, type ammunition, and the number of rounds required to successfully attack the target.

e. **Procedures.** One factor that distinguishes the AC-130 from other weapon systems, other than precision night strike capability, is **its ability to deliver firepower under conditions of low ceilings and/or poor visibility.** The AC-130H accomplishes this using the **APQ-150 radar and Black Crow sensors**. When employing the AC-130 with radar beacons, the terminal controller must give all target ranges and bearings from the location of the beacon. The beacon should be located as close as practical to the perimeter of the friendly forces. The shorter the offset distance, the more accurate the weapons delivery. For longer offset distances first round accuracy may be reduced. The AC-130U is equipped with a APQ-180 radar, giving it a true adverse-weather capability.

38. Egress

Egress fire support coordination and deconfliction requirements are the same as those for ingress. Upon mission completion, aircrews follow the egress instructions and either await further mission tasking or return to base.

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APPENDIX A
SERVICE AND SPECIAL OPERATIONS PERSPECTIVES ON CAS

1. Army (FM 100-5, "Operations")

CAS supports land operations by providing the capability to deliver massed firepower at decisive points and attacking hostile targets in close proximity to friendly forces with preplanned or immediate attacks. CAS can surprise the enemy, create opportunities for the maneuver or advance of friendly forces through shock action and concentrated attacks, protect the flanks of friendly forces, blunt enemy offensives, and protect the rear of land forces during retrograde operations.

2. Navy

CAS supports amphibious and land operations with massed firepower, requiring detailed integration with the ground scheme of maneuver. CAS requires close coordination during tasking, planning and execution. CAS is a force multiplier, enabling the supported commander to mass combat power decisively. Traditionally, the Navy has been a provider of CAS, but can be a recipient of CAS as well, in support of naval operations.

3. Air Force (AFM 1-1, "Basic Aerospace Doctrine of the United States Air Force")

CAS is the application of aerospace forces in support of the land component commander's objectives. At times, CAS may be the best force available to ensure the success or survival of surface forces. Since it provides direct support to friendly forces in contact, CAS requires close coordination from the theater and component levels to the tactical level of operations. CAS should usually be massed to apply concentrated combat power, should create opportunities, and should be planned and controlled to reduce the risk of friendly casualties.

4. Marine Corps (FMFM 5-41, "Close Air Support")

The Marine Corps fights using maneuver warfare through the application of combined arms. CAS is fully integrated with other supporting arms to support the MAGTF commander's plan. The MAGTF commander uses CAS at the decisive place and time to achieve local combat superiority or take advantage of battlefield opportunities. CAS is employed for operational effectiveness and is used to weight the main effort.

5. Special Operations Forces (Joint Pub 3-05, "Doctrine for Joint Special Operations")

Air Force SOF AC-130s train extensively for CAS in support of special operations direct action missions. Also, AC-130s may provide CAS in support of other component commanders. Special operations helicopters provide limited CAS to SOF land and maritime units.

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APPENDIX B
CLOSE AIR SUPPORT REQUEST (CASREQ)

NOTE: This publication has proposed the CASREQ, a new message text format to be included in the USMTF system. The CASREQ does not replace other messages such as the USMTF AIRSUPREQ; rather, it is intended to be used in lieu of the AIRSUPREQ **specifically for close air support requests.**

1. General

a. The CASREQ is used to request preplanned scheduled and preplanned on-call CAS missions. This format standardizes the message sets for digital transmission of CAS requests.

b. Section I of the JTAR (see Appendix C) will be used as a voice back-up for preplanned and immediate CAS requests. However, fire support channels are normally used to coordinate preplanned CAS requests. The JTAR prescribed by this proposed publication is an update of DD Form 1972 JTAR, with minor changes to reflect the use of the ACA (instead of the restricted fire plan) and the standdown of air support radar teams (ASRTs).

2. Message Map

EXER/exercise name/additional identifier//

OPER/operation name/plan originator and number/option name/second option name//

MSGID/CASREQ/originator/serial number/month/qualifier/qualifier serial number//

REF/serial letter/(message title) or (reference type)/originator/date/date-time group/(msg ser number) or (DOCSN: doc ser number)/special notation/(sic) or (filing number)//

AMPN/ free text to explain preceding reference set//

NARR/ free text to explain preceding reference sets//

CANX/ (message title) or (reference type)/originator/date-time group/(message) or (document) serial number/special notation/(sic) or (filing number)//

PERIOD/FROM: time period from/TO: time period to//

REQ/REQNO: CAS request number/request type: PPOC, PPS, IMM//PRI/priority number//

TGTDESC/TYP: target type/TGTLOC: target location/SIZ: size/DOP: degree of protection//

TIME/TOT or TOS or NLT or ASAP/EFF: effect on target//

CONT/CALLSIGN: terminal controller call sign/PRIFRQ: primary TAD frequency/ SECFRQ: secondary frequency/CP: contact point for terminal controller//

CASBRF/IP: initial point/HDG: IP-tgt heading and offset/DIST: IP-tgt distance/TGTEL: target elevation/DESC: target description/MARK: target mark/FRIEND: direction and distance to closest friendly location/EGRESS: egress instructions-direction and control point/BCN: beacon information//

REMARKS/ free text to amplify preceding reference set//

AMPN/free text to explain preceding sets//

DECL/downgrading instructions//

NOTE: Sets REQ, TGTDESC, TIME, CONT are mandatory in CASREQ messages

3. Entry Lists

The CASREQ uses the following entry lists:

LIST NUM	TITLE
11	Location
20	Target Type
99	Degree of protection
995	Generic target type

Figure B-1 is a sample CASREQ and Figure B-2 shows the CASREQ format.

Sample CASREQ	
1	EXER/SOLID SHIELD 93/UMPIRES ONLY//
2	OPER/BOLD SHOT/USJTF1640/HOT SHOT/APPLE PIE//
3	MSGID/CASREQ/1/25INF/200205/FEB/DEV/1//
4	REF/A/CASREQ/1/1-337INF/150900ZFEB90/150703/PASEP/ABC//
5	CANX/CASREQ/IIIMEF/240001Z-242359Z//
6	PERID/FROM:240001Z-242359Z//
7-8	REQ/REQNO:24P01/PPS//PRI/1//
9-12	TGTDESC/TGTYP:ARMOR/TGTLOC:32SMV12341234/SIZ:CO/DOP:OPEN
13-15	TIME/ASAP/EFF:DEST//
16-20	CONT/CALLSIGN:BAT21/PRIFRQ:315.0/SECFRQ:49.85/CP:BULL//
21-30	CASBRF/IP:STALLION/HDG:330R/DEST:12/5/TGTEL:1450/DESC:10 TANKS/LOC:32SMV12341234/MARK:LASER1588/FRIEND:SW2000/ EGRESS:EINVADER//
31	REMARKS/DTL:320/FINAL ATTACK:290-350/REQUEST LMAV/HELLFIRE//
32	DECL/010001ZJAN94//
NOTE:	The example is not meant to show an actual message. Use it as a guide for completing individual sets.

Figure B-1. Sample CASREQ

EX	SET NAME	FIELD NAME	CAT S	CAT F	Number of Character	Explanation
						NOTE: The initial sets (EXER, OPER, MSGID, and REF) are described briefly below. See JTC3 AH 9000 for complete details. NOTE: Do not use sets EXER and OPER in the same message. If there is no exercise or operation, do not use either one.
1	EXER		c			
		exercise name		m	1-56X	Enter the exercise name.
		add identifier		o	1-16X	Enter the additional exercise identifier.
2	OPER		c			
		oper name		m	1-32X	Enter the operation name.
		plan originator and number		o	1-23AN	Enter the headquarters originating the plan and the plan number.
		option name		o	1-23X	Use these two fields to enter code names for options within the operation plan.
		second option		o	1-23X	
3	MISGID		m			
		title		m	6A	Enter CASREQ.
		originator		m	1-20X	Enter the unit name of message originator.
		serial number		o	1-7X	Enter message serial number.
		month		o	3A	Enter first three letters of the month.
		qualifier		o	3A	Enter qualifier code.
		qlf serial		o	1-3N	Enter qualifier serial number.
4	REF		o r			Use this set to reference other messages and documents.
		serial letter		m	1A	Enter reference serial letter (A for the first).
		msg title or reference type		m	1-20X	Enter the USMTF message short title OR a code for other types of references: CON, DOC,LTR, TEL, or MSG (add free text

Figure B-2 CASREQ Format

EX	SET NAME / FIELD NAME	CAT S F	Number of Character	Explanation
	originator	m	1-20X	Enter the name of the unit that orginated the references.
	dtg	m	6-12AN	Enter the date-time group of the reference.
	serial number	o	1-7X	Enter the serial number of the referenced message.
	OR			OR
	DOSCN		1-10X	Enter the field descriptor followed by the serial number of the referenced document.
	spec notation	o	5A	Enter PASEP or NOTAL.
	subject id code	o r	3A	FOR NATO USE ONLY. Enter the subject identification code (SIC) for message subject matter. For further US guidance, see JUHJTC3AH 9000.
	OR			OR
	filing number		1-10X	Enter the filing number of the referenced document.
	AMPN NARR	c c		Use a free-text set to explain the reference if it is not a USMTF message. NOTE: A free-text set may be added throughout the message. See Chapter 2, Section VI, JUH JTC3AH 9000 for instructions.
5	CANX	o r		Set CANX is used if this message cancels previous messages and reports new information. (If you wish to cancel a previous message and not report new information, use set IDENT in the MSGCHANGEREP message). Repeat this set as many times as necessary to indicate all messages canceled by this message.
	serial letter	m		Identify the type of message to be canceled, using one of the following methods.

Figure B-2. CASREQ Format (continued)

EX	SET NAME FIELD NAME	CAT S F	Number of Character	Explanation
			1-20X	USMTF message short title (as listed in JUH Chapter 3 Table of Contents).
	OR			OR
			3A	Enter CON (conference/ meeting),DOC (document), LTR (letter),TEL (telephone conversation), orMSG (nonformatted message) to identify the communication type to be canceled. If you use one of these codes you must use a free-text set to describe further the message to be canceled.
	originator	m	1-20X	Enter the name of the unit or agency that originated the message being canceled. Note that spaces may be used; the only special characters that may be used in this field are periods, hyphens, and parentheses.
	date of reference	m		Enter the date of the message to be canceled using one of the following methods:
			12AN	Date-time group (two digits each for day, hour, and minute, one letter for time zone, three letters for month, and two digits for year, e.g., 150710ZJAN94). NOTE: Date-time group is the preferred method.
			6N	Date (two digits each for year, month, and day, e.g., 940115).
			7AN	Day-time (two digits each for day, hour, and minute, and one letter for time zone, e.g., 150710Z).
			6N	Day-month-year (two digits each for day, month, and year, e.g., 150194).
			7AN	Day-alphamonth-year (two digits for the day, three letters for the month, and two digits for the year,e.g., 15JAN94).

Figure B-2. CASREQ Format (continued)

EX	SET NAME / FIELD NAME	CAT S F	Number of Character	Explanation
			8AN	Verified day-time (two digits each for day, hour, and minute, one letter for time zone, and one digit for checksum. A checksum is the last digit of the sum of all digits in the field. The checksum of 150710Z is 4 since 1+5+0+7+1+0=14, e.g., 150710Z4).
			11AN	Verified month-day-time (two digits each for day, hour, and minute,one letter for time zone, one digit for checksum, and three letters for month, e.g., 150710ZJAN).
			13AN	Verified day-time group (two digits each for day, hour, and minute,one letter for time zone, one digit for checksum, three letters for month, and two digits for year,e.g., 150710Z4JAN94).
	serial number	o		Enter the identifying number of the message being canceled, using one of the following methods.
			1-7X	Message serial number (two digits each for day and month, followed by a three-digit message sequence number, 001-999).
			1-10X	Document serial number.
	special note	o	5A	Enter PASEP or NOTAL if applicable.
	subject id code	o r	3A	FOR NATO USE ONLY. Enter the SIC for message subject matter. For further US guidance, see JUH SUPPLEMENT 2, item 4. OR
	filing number		1-10X	Enter the filing number assigned to the document to be canceled.
6	PERID	o	5A	Use this set to report the effective time period of the information in this message.

Figure B-2. CASREQ Format (continued)

EX	SET NAME / FIELD NAME	CAT S F	Number of Character	Explanation
	FROM:	m	7AN	Enter the field descriptor and two digits each for day, hour, and minute, and one letter for time zone to indicate the time at which the reporting period started.
	TO:	m	7AN	Enter the field descriptor and two digits each for day, hour, and minute, and one letter for time zone to indicate the time at which the reporting period ended.
7	REQ	m		Use this set to give the basic CAS request data.
	REQNO	m	10AN	Enter the field descriptor followed by the request number.
	TYPE	m	3-4A	Enter the field descriptor followed by one of the following codes for the type of request. TYPE — CODE Preplanned scheduled — PPS Preplanned on-call — PPOC Immediate — IMM
8	PRI	m	3A	Use this set to provide request priority.
	target priority	m	1N	Enter the priority of the request (1-3), with 1 highest.
9	TGTDESC	m	7A	Use this set to provide information about the CAS target.
	TYP:	m	2-6A	Enter the field descriptor followed by the target type. ENTRY LIST 20 OR
	TGTYP:		3-6A	Enter the field descriptor followed by the code for the generic target type. ENTRY LIST 995
10	TGTLOC:	m		Enter the field descriptor followed by the target location using one of the following methods:

Figure B-2. CASREQ Format (continued)

EX	SET NAME FIELD NAME	CAT S F	Number of Character	Explanation
			15AN	Lat/long (seconds) ENTRY LIST 11
			13AN	UTM (10 meters). ENTRY LIST 11
11	SIZ:	m	2-4A	Enter the field descriptor followed by one of the following codes for the size of the target: SIZE — CODE Small — SM Medium — MED Large — LGE Battalion — BN Battery — BTTY Brigade — BDE Company — CO Division — DIV Platoon — PLT
12	DOP:	m	2-6A	Enter the field descriptor followed by the code for the degree of protection for personnel/weapons. ENTRY LIST 99
13	TIME	m		Use this set to provide the time of the attack or the time on station the CAS is required.
14	TOT:		7AN	Enter the field descriptor followed by the day-time (two digits each for day, hour, and minute, and one letter for time zone, e.g., 150710Z). OR
	TOS:		15X	Enter the field descriptor followed by the required time on station (two digits each for day, hour, and minute, and one letter for time zone, e.g., 151001Z-150130Z). OR
	NLT:		7AN	Enter the field descriptor followed by the "no later than" time (two digits each for day, hour, and minute, and one letter for time zone, e.g., 150710Z).

Figure B-2. CASREQ Format (continued)

EX	SET NAME / FIELD NAME	CAT S F	Number of Character	Explanation
				OR
	ASAP		4A	Enter the field descriptor ASAP toindicate as soon as possible.
15	EFF:	o	3-6A	Enter the field descriptor followed by one of the following codes to report the effect of the CAS attack on the target. EFFECT — CODE Burn — BURN Destruction — DEST SEAD — SEAD Illumination — ILLUM Neutralization — NEUT Mark — MARK
16	CONT	m		Use this set to provide terminal control information.
17	CALLSIGN:	m	1-17X	Enter the field descriptor followed by the call sign of the terminal controller.
18	PRIFREQ:		1-8NS	Enter the field descriptor followed by the primary frequency in MHz for the control agency (0-9999999,0-7 digits permitted).
19	SECFREQ:	o	1-8NS	Enter the field descriptor followed by the secondary frequency in MHz for the control agency (0-9999999, 0-7 digits permitted).
20	CP:	o	1-10X	Enter the field descriptor followed by the contact point where the CAS aircrew is to contact the terminal controller.
21	CASBRF:	o		Use this set to provide the CAS brief.
22	IP: or AP:	o	1-10X	Enter the field descriptor followed by the IP or AP from where the CAS attack begins.
23	HDG:	o	3-4AN	Enter the field descriptor followed by the heading in degrees magnetic and an offset, if applicable, (three digits and one letter, e.g., 270R).

Figure B-2. CASREQ Format (continued)

EX	SET NAME FIELD NAME	CAT S F	Number of Character	Explanation
24	DIST:	o	5NS	Enter the field descriptor followed by the distance from the IP to the target in nautical miles to within 0.1 nautical mile. OR
	DIST:	o	6NS	Enter the field descriptor followed by the distance from the AP to the target in meters to within 10 meters.
25	TGTEL:	o	5N	Enter the field descriptor followed by the target elevation in feet MSL.
26	DESC:	o	21X	Enter the field descriptor followed by a concise target description.
27	LOC:	o	13AN	Enter the field descriptor followed by the target location using UTM. ENTRY LIST 11
28	MARK:	o	10AN	Enter the field descriptor followed by the type of target mark.
29	FRIEND:	o r	7AN	Enter the field descriptor followed by the cardinal direction and distance to the nearest friendlies in meters (e.g.,SW4000). This field may be repeated to indicate other close friendly units.
30	EGRESS:	o	15X	Enter the field descriptor followed by the egress instructions, (egress direction and control point the CAS aircrew is to use, e.g., N-STALLION).
	BCN:	o r	15X	Enter the field descriptor followed by the RABFAC beacon data for the aircraft expected. This field may be repeated up to four times.
31	REMARKS:	o		Free text to amplify the preceding sets.
32	DECL	c		If the message is classified, use this set to enter declassification or down grading instructions.
	instructions	m	1-25X	Enter declassification instructions.

Figure B-2. CASREQ Format (continued)

APPENDIX C
JOINT TACTICAL AIR STRIKE REQUEST (JTAR)

1. All Armed Forces of the United States use the JTAR Request Form (DD Form 1972) to request CAS. The use of this form is mandatory unless otherwise authorized by higher authority. Joint Pub 3-56.24, "Tactical Command and Control Planning Guidance and Procedures for Joint Operations (Procedures and Formats)," contains detailed instructions on the use of the JTAR. The following paraphrased instructions are included for reference only.

2. The instructions in this appendix reflect a minor revision to DD Form 1972 dated April 1975. Upon approval of this publication, the version of DD Form 1972 contained in this publication will supersede the April 1975 edition.

Figure C-1 shows the JTAR Request Form (DD Form 1972).

JOINT TACTICAL AIR STRIKE REQUEST — See Joint Pub 3-09.3 for preparation instructions.

SECTION I - MISSION REQUEST

DATE — SENT: TIME ___ BY ___ ; RECEIVED: TIME ___ BY ___ ; CHECKED: BY ___

1. UNIT CALLED ___ THIS IS ___ REQUEST NUMBER ___

2. PREPLANNED: [A] PRECEDENCE ___ [B] PRIORITY ___
   IMMEDIATE: [C] PRIORITY ___

3. TARGET IS / NUMBER OF
   [A] PERS IN OPEN ___ [B] PERS DUG IN ___ [C] WPNS/MG/RR/AT ___ [D] MORTARS, ARTY ___
   [E] AAA ADA ___ [F] RKTS MISSILE ___ [G] ARMOR ___ [H] VEHICLES ___
   [I] BLDGS ___ [J] BRIDGES ___ [K] PILLBOX, BUNKERS ___ [L] SUPPLIES, EQUIP ___
   [M] CENTER (CP, COM) ___ [N] AREA ___ [O] ROUTE ___ [P] MOVING N E S W ___
   [Q] REMARKS ___

4. TARGET LOCATION IS
   [A] ___ (COORDINATES) [B] ___ (COORDINATES) [C] ___ (COORDINATES) [D] ___ (COORDINATES)
   [E] TGT ELEV ___ [F] SHEET NO. ___ [G] SERIES ___ [H] CHART NO ___

5. TARGET TIME / DATE
   [A] ASAP ___ [B] NLT ___ [C] AT ___ [D] TO ___

6. DESIRED ORD / RESULTS [A] ORDNANCE ___
   [B] DESTROY ___ [C] NEUTRALIZE ___ [D] HARASS/INTERDICT ___

7. FINAL CONTROL
   [A] FAC/RABFAC ___ [B] CALL SIGN ___ [C] FREQ ___
   [D] CONT PT ___

8. REMARKS
   1. IP ___
   2. HDNG ___ MAG OFFSET: L/R
   3. DISTANCE ___
   4. TGT ELEVATION ___ FEET MSL
   5. TGT DESCRIPTION ___
   6. TGT LOCATION ___
   7. MARK TYPE ___ CODE ___
   8. FRIENDLIES ___
   9. EGRESS ___
   10. BCN-TGT ___ MAG BCN GRID ___/___
   11. BCN-TGT ___ METERS TGT GRID ___/___
   12. BCN ELEVATION ___ FEET MSL

SECTION II - COORDINATION

9. NGF ___ 10. ARTY ___ 11. AIO/G-2/G-3 ___

12. REQUEST [ ] APPROVED [ ] DISAPPROVED 13. BY ___ 14. REASON FOR DISAPPROVAL ___

15. AIRSPACE COORDINATION AREA [A] IS NOT IN EFFECT [B] NUMBER ___
16. IS IN EFFECT [A] (FROM TIME) ___ [B] TO TIME) ___

17. LOCATION [A] ___ (FROM COORDINATES) [B] ___ (TO COORDINATES)
18. WIDTH (METERS) ___
19. ALTITUDE/VERTEX [A] ___ (MAXIMUM/VERTEX) [B] ___ (MINIMUM)

SECTION III - MISSION DATA

20. MISSION NUMBER	21. CALL SIGN	22. NO. AND TYPE AIRCRAFT	23. ORDNANCE
24. EST/ACT TAKEOFF	25. EST TOT	26. CONT PT(COORDS)	27. INITIAL CONTACT
28. FAC/FAC(A)/TAC(A) CALLSIGN/ FREQ	29. AIRSPACE COORDINATION AREA	30. TGT DESCRIPTION	*31. TGT COORD/ELEV

32. BATTLE DAMAGE ASSESSMENT (BDA) REPORT (USMTF INFLTREP)
   LINE 1 / CALL SIGN ___ LINE 4 / LOCATION ___
   LINE 2 / MSN NUMBER ___ LINE 5 / TOT ___
   LINE 3 / REQ NUMBER ___ LINE 6 / RESULTS ___
   REMARKS ___

* TRANSMIT AS APPROPRIATE.

DD FORM 1972 (REVISED) 15 NOV 1994. Supersedes DD Form 1972, Apr 1975.

Figure C-1. JTAR Request Form

SECTION I. MISSION REQUEST

Line	Title and Elements	Explanation
1	UNIT CALLED	Identifies the unit designation/call sign/preassigned number.
	THIS IS	Identifies the request originator by unit designation/ call sign/preassigned number.
	REQUEST NUMBER	For preplanned missions, indicates the originator's request number in series. For immediate missions, this number is assigned by the ASOC/DASC.
	SENT	Indicates the time and the individual who transmitted the request.
2	(Mission categories)	
	PREPLANNED: A. PRECEDENCE	For preplanned requests, enter precedence (block A)
	B. PRIORITY	or priority (block B). Precedence is stated numerically in descending order of importance, as determined by the requestor. Priority is expressed as shown below.
	IMMEDIATE: C. PRIORITY	For immediate requests, enter priority (block C). A precedence entry is not required for immediate requests because, by definition, all immediate requests are precedence #1. Use the numerical designation below to determine priority (e.g., define the tactical situation) for preplanned (block B) or immediate (block C): 1. Emergency. Targets which require immediate action and supersede all other categories of mission priority. 2. Priority. Targets which require immediate action and supersede routine targets. 3. Routine. Targets of opportunity. Targets which do not demand urgency in execution.
3	TARGET IS/ NUMBER OF	Describes the type, approximate size, and mobility of the target to be attacked. It is necessary to specify, even if a rough estimate, the number of targets (i.e., 10 tanks) or the size of the target area (i.e., personnel on a

		500 meter front). Otherwise planners cannot accurately determine what force is required — aircraft numbers/type and ordnance amount/type.
4	TARGET LOCATION IS	Locates the target by using the military grid reference system prescribed for the area concerned.
	A. COORDINATES	Locates a point target or starting point.
	B. COORDINATES	When used together with A, provides from ____ to ____ coordinates.
	C. COORDINATES	When used together with A and B, provides a route.
	D. COORDINATES	When used together with A through C, provides a route or describes a target area.
	E. TARGET ELEV	Target elevation in feet above sea level.
	F. SHEET NO.	Self-explanatory.
	G. SERIES	Self-explanatory.
	H. CHART NO.	Self-explanatory.
	CHECKED	Indicates with whom target information has been cross-checked.
5	TARGET TIME/DATE	Indicates the time/date when the airstrike is requested.
	A. ASAP	As soon as possible.
	B. NLT	The target is to be attacked before, but not later than the time indicated.
	C. AT	Indicates time at which target is to be attacked.
	D. TO	Denotes end of period of time in which support such as airborne alert or column cover is required. When D is used with C, B is unnecessary.
6	DESIRED ORD/ RESULTS	Indicates the requestor's desired airstrike results. This is essential information for the planner and must be carefully considered by the requestor.
	A. ORDNANCE	Desired ordnance.

	B. DESTROY	Self-explanatory.
	C. NEUTRALIZE	Self-explanatory.
	D. HARASS/ INTERDICT	Self-explanatory.
7	FINAL CONTROL	Identifies the final controller (e.g., FAC, RABFAC, FAC[A]) who will conduct the briefing and control the release of ordnance.
	A. FAC/RABFAC	Transmit the type of terminal control.
	B. CALL SIGN	Call sign of terminal controller.
	C. FREQ	Recommended TAD frequency that is usable on the FEBA.
	D. FIX/CONT PT	Military grid coordinates and/or NAVAID fix of a control point which is the furthest limit of an attack aircraft's route of flight prior to control by the final controller.
8	REMARKS	Allows incorporation of briefing information not included elsewhere in the request. Enter data for the standard CAS brief.

1. IP/AP ____
2. HDG _____________________ °MAG: OFFSET L/R
3. DISTANCE _____________________________________
4. TGT ELEVATION ___________________________FT MSL
5. TGT DESCRIPTION ______________________________
6. TGT LOCATION _________________________________
7. MARK TYPE ________________________ CODE _______
8. FRIENDLIES ___________________________________
9. EGRESS ______________________________________
10. BCN-TGT _________ °MAG BCN-GRID _____/_____
11. BCN-TGT _________ METERS TGT GRID _____/_____
12. BCN ELEVATION ____________________________FT MSL

SECTION II. COORDINATION

Line	Title and Elements	Explanation
9	NGF	Now known as NSFS.
10	ARTY	Artillery coordination.

11	AIO/G-2/G-3	Air Intelligence Officer, G-2, G-3, or other Service equivalent coordination.
12	REQUEST A. APPROVED B. DISAPPROVED	Indicates the approval or disapproval of the request.
13	BY	Indicates the individual who approved or disapproved the request.
14	REASON FOR DISAPPROVAL	Self-explanatory.
15	AIRSPACE COORDINATION PLAN A. IS NOT B. NUMBER	The ACA establishes airspace that is reasonably safe from friendly, surface-delivered, non-nuclear fires. The ACA provides a warning to aircraft of the parameters of surface-delivered fire in a specific area. A plan number or code name is issued, as appropriate.
16	IS IN EFFECT A. FROM TIME ____ B. TO TIME ______	Establishes the time period that the applicable ACA plan will be in effect.
17	LOCATION A. FROM COORDINATES B. TO COORDINATES	Grid coordinates of the start/end points of the ACA's centerline.
18	WIDTH (METERS)	Defines the ACA from either side of the centerline.
19	ALTITUDE/VERTEX A. MAXIMUM/VERTEX B. MINIMUM	ACA altitude given in feet above MSL. (Use A VERTEX only entry).

SECTION III. MISSION DATA

NOTE: Mission data information transmitted to the requesting agency may be limited to those items not included in the request.

Line	Title and Elements	Explanation
20	MISSION NUMBER	Indicates mission number.
21	CALL SIGN	Call sign of mission aircraft.
22	NO. AND TYPE AIRCRAFT	Self-explanatory.

23	ORDNANCE	Type of ordnance either by code number or actual nomenclature.
24	EST/ACT TAKEOFF	Estimated or actual time the mission aircraft will take off.
25	EST TOT	Estimated time on target.
26	CONT PT/RDNVS (COORD/NAVAID FIX)	The furthest limit of the attack aircraft's route of flight prior to control by the final controller. Same as Line 7, item D, when designated in the request.
27	INITIAL CONTACT	Indicates the initial control agency the flight is to contact.
28	FAC/TAC(A) CALL SIGN FREQ	Call sign and frequency of final control agency.
29	AIRSPACE COORDINATION AREA	Refer to lines 15 through 19 for this data.
30	TGT DESCRIPTION	Self-explanatory.
31	TGT COORD/ELEV	Self-explanatory.
32	BDA REPORT	This optional space is used to record BDA for each mission.
	LINE 1/CALL SIGN	Call sign of the reporting aircraft.
	LINE 2/MSN NUMBER	Mission number of the CAS mission for which results are being reported.
	LINE 3/REQ NUMBER	Requesting unit's request number.
	LINE 4/LOCATION	The location of the target when it was attacked.
	LINE 5/TOT	The time the aircraft began attack on the target/the time the aircraft completed the mission and departed the target.
	LINE 6/RESULTS	The specific results of the mission (e.g., "10 tanks destroyed, 150 KIAs, enemy unit neutralized, mission successful").
	REMARKS	Other information appropriate to the tactical situation or as requested.

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APPENDIX D
COMMUNICATIONS EQUIPMENT

NOTE: Data contained in this appendix is provided only for information. It is not authoritative and should be verified before being used operationally.

Aircraft Communication Equipment

Aircraft Type	Radios	Frequency Band(Note1)	Frequency Hopping	Secure Capability
AH-1W	2-AN/ARC-182	Note 2	No	KY-58
OH-58C	2-AN/ARC-114	VHF-FM	No	KY-58
	1-AN/ARC-115	VHF-AM	No	No
	1-AN/ARC-164 or AN/ARC-116	UHF	No	No
OH-58D (Kiowa Warrior)	1-AN/ARC-199	HF	No	KY-75
	1-AN/ARC-201	VHF	SINCGARS (FM)	KY-58
	1-AN/ARC-164	UHF	HAVEQUICK II	KY-58
	2-AN/ARC-201	UHF-FM	SINCGARS	KY-58
AH-64	1-AN/ARC-164	UHF	HAVEQUICK I	KY-58
	2-AN/ARC-186	VHF (Note 3)	SINCGARS (FM)	KY-58
AC-130	2-AN/ARC-164	UHF	HAVEQUICK II	KY-58
	1-AN/ARC-164	SATCOM	No	KY-58
	3-AN/ARC-186	VHF (Note 3)	No	KY-58
	2-AN/ARC-190	HF	No	KY-58 KY-75
A-6E	2-AN/ARC-154	UHF	No	KY-58
AV-8B	2-AN/ARC-182	Note 2	No	KY-58
A/OA-10	1-AN/ARC-164	UHF	HAVEQUICK II	KY-58
	1-AN/ARC-186	VHF-FM	SINCGARS	KY-58
	1-AN/ARC-186	VHF-AM	No	No

Figure D-1. Aircraft Communication Equipment

Aircraft Communication Equipment

Aircraft Type	Radios	Frequency Band(Note1)	Frequency Hopping	Secure Capability
B-1B	2-AN/ARC-171	UHF or SATCOM	No	Yes
	1-AN/ARC-190	HF	No	No
B-52H	1-AN/ARC-164	UHF	HAVEQUICK II	KY-58
	1-AN/ARC-171	UHF or SATCOM	No	No
	1-AN/ARC-190	HF	No	No
F-14	1-AN/ARC-182	Note 2	HAVEQUICK II	KY-58
	1-AN/ARC-59	UHF	No	KY-58
F-15E	2-AN/ARC-164	UHF	HAVEQUICK II	KY-58
F-16	1-AN/ARC-164	UHF	HAVEQUICK II	KY-58
	1-AN/ARC-186	VHF (Note 3)	No	
F/A-18 (Note 4)	2-AN/ARC-182	Note 2	No	KY-58
	2-AN/ARC-210	VHF UHF	HAVEQUICK II	KY-58
F-111	1-AN/ARC-164	UHF	HAVEQUICK II	No
	1-AN/ARC-190	HF	No	No

Note 1: Frequency bands are as follows:
HF = 2.000 to 29.999 mHz in 1 kHz increments.
VHF-FM = 29.950 to 87.975 mHz in 25 kHz increments.
VHF-AM = 108.000 to 151.975 mHz in 25 kHz increments.
UHF = 225.000 to 3999.975 mHz in 25 kHz increments.

Note 2: The AN/ARC-182 is a multiband radio that operates in any one of four bands: standard VHF-FM, VHF-AM, or UHF, or 156.0-173.975 mHz VHF-FM. It can monitor only one band at a time.

Note 3: The AN/ARC-186 operates either in the VHF-AM or VHF-FM band. Each radio can monitor only one band at a time.

Note 4: F/A-18s are fitted with either two AN/ARC-182 radios or two AN/ARC-210 radios.

Figure D-1. Aircraft Communication Equipment (continued)

Terminal Controller Communications Equipment				
Component	**Radios**	**Frequency Band (Note 1)**	**Frequency Hopping**	**Secure Capability**
US Army FIST	AN/PRC-77	VHF-FM		YES
	AN/PRC-119		YES	
	AN/VRC-12			
	AN/VRC-24			
US Air Force TACP	AN/GRC-206	HF		YES
		VHF-FM		YES
		VHF-AM		YES
		UHF	HAVEQUICK II	YES
	AN/PRC-77	VHF-FM		YES
	AN/PRC-119	VHF-FM	YES	
	AN/PRC-104	HF		YES
	AN/PRC-113	VHF-AM		YES
		UHF	HAVEQUICK II	YES
USMC TACP	AN/PRC-77	VHF-FM		YES
	AN/PRC-119	VHF-FM	YES	
	AN/PRC-104	HF		YES
	AN/PRC-113	VHF-AM		
		UHF	HAVEQUICK II	
	AN/VRC-12	VHF-FM		
SOF SOTAC	AN/PRC-117D	VHF-FM		YES
		VHF (Note 2)		YES
		UHF (Note 3)		YES
	AN/PRC-126	VHF-FM		YES
	LST-5	UHF SATCOM		YES

Note 1: Frequency bands for ground radios are as follows:
HF: 2.000 to 29.999 mHz in 1 kHz increments.
VHF-FM: 29.950 to 75.950 mHz in 50 kHz increments.
VHF-AM: 116.000 to 149.975 mHz in 25 kHz increments.
UHF: 225.000 to 399.975 mHz in 25 kHz increments.

Note 2: AN/PRC-117D VHF-AM/FM frequency range is 116.000-173.995 mHz.

Note 3: AN/PRC-117D UHF-AM/FM frequency range is 225.000-419.995 mHz.

Figure D-2. Terminal Controller Communications Equipment

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APPENDIX E
AIRCRAFT AND HELICOPTER WEAPONS AND CAPABILITIES GUIDE

NOTE: Data contained in this appendix is provided only for information. It is not authoritative and should be verified before being used operationally.

Aircraft M/D/S	Using Service	Ordnance	Laser Capability		Marking Capability	Beacon Capability	Other Systems
			LST	LTD			
A-6E	USN	Laser-guided bombs AGM-65 Maverick AGM-62 Walleye AGM-84 SLAM GP bombs CBUs Aerial mines 2.75" rockets 5.0" rockets LUU-2 flares	YES	YES	Laser WP rockets HE rockets	PPN-18 PPN-19 PPN-20	FLIR NVG Radar
AV-8B	USMC	Laser-guided bombs* AGM-65 Maverick GP bombs CBUs Napalm 2.75" rockets 5.0" rockets LUU-2 flares 25mm cannon AGM-122 Sidearm	YES	NO	rockets	None	TV NVG GPS
AV-8B "Plus"	USMC	As above	YES	NO	rockets	None	NVG FLIR Radar
A/OR-10A	USAF	Laser-guided bombs* AGM-65 Maverick GP bombs CBUs Aerial mines 2.75" rockets LUU-1/-2 flares LUU-5/-6 flares 30mm cannon	YES	NO	WP rockets 30mm HEI LUU-1 LUU-5 LUU-6	None	NVG
AC-130H	USAF (SOF)	10mm howitzer 40mm cannon 20mm cannon	NO	YES note 1	GLINT 105mm WP 105mm HE 40mm MISCH LTD (1688 only)	PPN-19 SST-181 SSB PLS	FLIR LLLTV Radar GPS

Figure E-1. Fixed-Wing Aircraft

Aircraft M/D/S	Using Service	Ordnance	Laser Capability		Marking Capability	Beacon Capability	Other Systems
			LST	LTD			
AC-130U	USAF (SOF)	105mm howitzer 40mm cannon 25mm cannon	NO	YES	GLINT 105mm WP 105mm HE 40mm MISCH codable LTD	SST-181 PPN-19	FLIR ALLTV Radar GPS
B-1B	USAF	GP bombs	NO	NO	None	PPN-19	Radar
B-52H	USAF	AGM-142 Have Nap GP bombs CBUs Aerial mines Laser-guided bombs	NO	NO	None	PPN-19 PPN-20	FLIR LLLTV Radar NVG GPS
F-14	USN	Laser-guided bombs* GP bombs 20mm cannon CBUs Aerial mines LUU-2 flares	NO	NO	None	None	
F-15E	USAF	Laser-guided bombs GP bombs CBUs 20mm cannon	NO	YES	Laser	PPN-19 PPN-20	FLIR Radar AAM
F-16 (less LANTIRN)	USAF	AGM-65 Maverick Laser-guided bombs* GP bombs CBUs 20mm cannon	NO	NO	WP rockets	PPN-19 PPN-20	Radar NVG GPS**
F-16C/D (with LANTIRN)	USAF	Laser-guided bombs AGM-65 Maverick GP bombs CBUs 20mm cannon	NO	YES	Laser	PPN-19 PPN-20	FLIR GPS NVG Radar

Figure E-1. Fixed-Wing Aircraft (continued)

Aircraft M/D/S	Using Service	Ordnance	Laser Capability		Marking Capability	Beacon Capability	Other Systems
			LST	LTD			
F/A-18	USN (A/C) USMC (A/C/D)	Laser-guided bombs AGM-65 Maverick AGM-62 Walleye AGM-84 SLAM AGM-88 HARM GP bombs CBUs Aerial mines LUU-2 flares 2.75" rockets 5.00" rockets Napalm/FAE 20mm cannon	YES	YES	Laser WP rockets HE rockets	None	FLIR GPS NVG Radar
F-111F	USAF	Laser-guided bombs GP bombs CBUs	NO	YES	Laser	PPN-19 PPN-20	Radar FLIR
S-3B	USN	GP bombs CBUs 2.75" rockets 5.00" rockets Aerial mines LUU-2 flares	NO	NO	WP rockets	None	FLIR Radar

LST: Laser Spot Tracker. LTD: Laser Target Designator.

Note 1: The AC-130H can only designate laser code 1688.

* Though these aircraft can carry and release LGBs, they require off-board designation for terminal guidance.

** GPS on some aircraft (Blocks 40/42; 50/52)

Figure E-1. Fixed-Wing Aircraft (continued)

Rotary-Wing Aircraft						
Aircraft M/D/S	Service	Ordnance	Laser Capability		Marking Capability	Other Systems
			LST	LTD		
AH-1F	USA	BGM-71 TOW missile 2.75" rockets 20mm cannon	NO	NO	Rockets	NVG
AH-1W	USMC	BGM-71 TOW missile AGM-114 Hellfire FAE 5" rockets 2.75" rockets 20mm cannon LUU-2 flares AGM-122 Sidearm ARM	NO	YES	Rockets	FLIR NVG GPS
AH-64A	USA	AGM-114 Hellfire 2.75" rockets 30mm cannon	YES	YES **	Laser Rockets	FLIR NVG
AH-64D (including Longbow)	USA	AGM-114L Hellfire 2.75" rockets 30mm cannon	YES	YES **	Laser Rockets	FLIR NVG Radar IDM GPS
OH-58D (Kiowa Warrior)	USA	AGM-114 Hellfire 2.75" rockets .50cal machine gun	YES	YES	Laser Rockets	FLIR NVG

** The AH-64 helicopters cannot designate laser codes 1711 to 1788.

Note: "IDM" = Improved Data Modem

Figure E-2. Rotary-Wing Aircraft

Aircraft Navigation Capabilities

Aircraft M/D/S	Preferred Reference System	MGRS/UTM Capability	Lat/Long Capability	Offset Data
AH-1W	UTM	None	None	None
OH-58C	UTM	None	None	None
OH-58D	UTM	8 digits	Degrees, minutes, tenths, hundredths	None
AH-64	UTM	8 digits; need grid zone and spheroid	Degrees, minutes, tenths	None
AC-130	UTM	8 digits; need grid zone and spheroid	Degrees, minutes, seconds; GPS on all aircraft	Magnetic/meters
A-6E	Lat/Long	6 digit UTM coordinates for use with beacon bombing.	Degrees, minutes, tenths	Feet or meters, in degrees true or magnetic from the aimpoint to target.
AV-8B	UTM	6 digits	Degrees, minutes, tenths	Degrees magnetic, meters
A/OA-10	UTM	6 digits; need grid zone and spheroid	Degrees, minutes, seconds	Degrees magnetic, nmi
B-1B	Lat/Long	None	Degrees, minutes, tenths, hundredths, thousandths	Need Target and Offset elevation
B-52H	Lat/Long	None	Degrees, minutes, tenths, hundredths, thousandths; GPS on some aircraft	Need Target and Offset elevation
F-4G	UTM	10 digits; conversion faults	Degrees, minutes, thousandths	A-10 or WRCS format
F-14	Lat/Long		Degrees, minutes, tenths	
F-15E	Lat/Long	10 digits; conversion faults	Degrees, minutes, thousandths	Degrees true and feet (target to offset)
F-16A	Lat/Long	6 digits; need lat/long of 0000 corner of UTM square; conversion faults	Degrees, minutes, tenths	Degrees true and feet (target to offset)
F-16C/D Blk 25/30	Lat/Long	6 digits; need lat/long of 0000 corner of UTM square; conversion faults	Degrees, minutes, tenths, hundredths	Degrees true and feet (target to offset)

Figure E-3. Aircraft Navigation Capabilities

Aircraft Navigation Capabilities				
Aircraft M/D/S	**Preferred Reference System**	**MGRS/UTM Capability**	**Lat/Long Capability**	**Offset Data**
F-16C/D Blk 40/50	Lat/Long	6 digits; need lat/long of 0000 corner of UTM square; conversion faults	GPS; Degrees, minutes, tenths, hundredths, thousandths	Degrees true and either feet, nm (to the hundredth) or kilometers (to the hundredth) measured from the target to the offset point
F/A-18	Lat/Long	6 digits; need grid zone and spheroid; degrees, minutes, seconds	Degrees, minutes, seconds	Range: feet, meter, nm or yards; Bearing: degrees true and Elevation: feet, meters
F-111	Lat/Long	None	Degrees, minutes, hundredths	Degrees true and feet (target to offset)
S-3B	Lat/Long		Degrees, minutes, seconds	

Figure E-3. Aircraft Navigation Capabilities (continued)

APPENDIX F
SAMPLE CAS AIRCREW MISSION PLANNING GUIDE

NOTE: This is a **notional** mission planning guide. It provides a generalized list of planning considerations and information to consider that have been found to be useful by various combat units. UNITS SHOULD ALWAYS PREPARE THEIR OWN CHECKLISTS AND GUIDELINES TAILORED TO THEIR MISSION, SITUATION, AND EQUIPMENT.

1. CAS Overview

a. Friendly Situation

• Forward Edge of the Battle Area (FEBA)/Forward Line of Own Troops (FLOT)

• Control Points/Initial Points

• Scheme of Maneuver

•• Target Area

•• Key Terrain

•• Terminal controller position and call sign

•• Supporting arms (1) Artillery positions (2) Mortars (3) Gun target lines

•• Control Measures (1) FSCL/CFL (2) No fire areas (3) Free fire areas (4) Airspace Control Areas (5) Missile Engagement Zone (MEZ)/Fighter Engagement Zone (FEZ) and status

b. Intelligence

• Enemy Position and Number

•• Projected Intent

•• Likely Avenues of Approach

•• Observed Tactics

• Supporting Elements

• Threats

•• Locations

•• Threat Guidance (1) RADAR (2) Optical (3) IR

•• Threat Capabilities

•• Indications and Warnings

•• Employment Doctrine

c. Weather: Takeoff/Target/Land

• Ceiling

• Visibility

• Temperature/Dew Point

• Winds

d. Environment

• Sun Azimuth

• Sun Elevation

• Sunrise/Sunset Time

• Moon Azimuth

• Moon Elevation

• Percent Illumination

• Lux Level

- Absolute Humidity
- Historical Temperature
- Predominant Albedos
- Urban Lighting

e. Mission/Objective

- Mission Statement
- Unit Supporting
- Target Precedence
- Priority of Fires
- Pre-Planned Missions
  - •• USMTF
  - •• Groups/Series
  - •• Search Sectors
- TOT/TOS
- Divert Authority
- Rules of Engagement

f. Control Procedures

- AOA Entry
  - •• Routing
  - •• Altitude/Airspeed
  - •• Available Control Agencies
  - •• Air Asset Deconfliction
- Communications-Electronics Operating Instructions (CEOI)
  - •• Authentication
  - •• HAVE QUICK
  - •• Secure Voice
  - •• Code/Pro Words
  - •• Changeover

2. Execution

a. Ground Procedures

- Alert Posture and Upgrades
- Mission Tape/Cartridge Load (e.g., DSU/DTUC)
- NVG Eye Lane
- AKAC Issue/checkout
- Step Time
- Weapons Preflight
- Aircraft Preflight
- Engine Start Time
  - •• INS Alignment Anomalies
  - •• Aircraft Lighting
  - •• FLIR Checks
  - •• BIT Checks
- Marshal
- Check-in
  - •• HAVE QUICK Checks
  - •• KY-58/Secure Voice Checks
- Taxi Plan
  - •• FOD Prevention

- •• NVD Checks
- Weapons Arming

b. Airborne Transition

- Take-off
  - •• Position
  - •• Arresting Gear
  - •• Take-off Type
  - •• Calls
- Climb out
  - •• Rendezvous
  - •• Profile (1) Altitudes (2) Airspeed (3) Power settings
  - •• Formation: Look-out/Scan Tasking
  - •• NVD Donning
  - •• Light Package

c. En Route

- Command and Control
  - •• Primary Check-In
  - •• Alternate Check-In
  - •• Terminology
- Combat Checks
  - •• Sensor Boresight
  - •• Weapon Boresight
  - •• Expendable Checks
  - •• Environmental Assessment
  - •• Radar altimeter Check
- Routing
  - •• Stack/Hold/Push Points
  - •• Time/Fuel Management
  - •• Emitter/Lights Management

d. Air Refueling

- Time
- Track
- Base Altitude/Altitude Blocks
- Tanker Call Sign
- Offloads
- Time on Boom/Cycle Sequence
- Formation Procedures
- Post-AR

e. Attack Phase

- Threat Zones
- Combat Checks
- CAS Brief
  - •• Holding (1) Profile (2) Formation (3) Tasking/Responsibility (4) Deconfliction
  - •• System Interface
  - •• Cadence
  - •• System Update

- Terminal Control

  - •• Communications (1) Required Calls (2) Reasonable Assurance
  - •• Restricted Run-Ins
  - •• Available Marks
  - •• Laser Code/Code Words
  - •• Minimum Capable Hack

- Attack Blueprint

  - •• Pre-Planned Missions: Changes to the Plan
  - •• Immediate Missions (1) Push profile (a) Formation (b) Tasking (2) Separation (a) Initiation (b) Geometry/Timing (3) Attack Parameters (a) Lead (b) Wingmen (4) Acquisition Predictions (a) Mark (b) Mil Size of Corrections (c) Target Scan Technique (d) Primary Sensor (e) System Aids (5) Release (a) Parameters (b) Mode (c) Weapons Allocation (d) Abort Criteria (6) Off-Target (a) Maneuver (b) Expendable (c) Cadence (d) Routing (e) Mutual Support (7) Rendezvous (a) Profile (b) Deconfliction (c) Cadence

- Attack Blueprint Variations

- Reattack Plan

  - •• Criteria
  - •• Minimum Disengagement (1) Time (2) Distance (3) Terrain
  - •• Communication Requirement (1) Inter-flight (2) Terminal Controller
  - •• Deconfliction

f. Return to Force

- Rendezvous

  - •• Position
  - •• Profile
  - •• Damage Assessment

- Dump Target Plan

- Combat Checklist

- Command and Control

  - •• Route
  - •• Profile
  - •• Tasking
  - •• Lame Duck/Wounded Bird Procedures
  - •• C2 Agencies
  - •• BDA/S-2 Push
  - •• IADS Penetration (1) IFF/Lights/other emitters (2) ADA monitors
  - •• Divert/Alternate/Emergency Airfields

g. Recovery

- Command and Control

- Recovery Type

  - •• Primary
  - •• Secondary

- NVD Stowage

- Formation Break-up

- Landing
  - Primary
  - Secondary
- Dearm/Safing Procedures

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APPENDIX G
RISK-ESTIMATE DISTANCES

1. General

Risk-estimate distances allow commanders to estimate the risk in terms of percent of friendly casualties that may result from an air strike against the enemy. Risk-estimate distances are based on fragmentation patterns. **Risk-estimate distances are for combat use and are not minimum safe distances for peacetime training. See Joint Munitions Effectiveness Manuals (JMEMs), appropriate Service or Command guidance, or FM 90-20/ FMFRP 2-72/ ACCP 50-28/USAFEP 50-9/PACAFP 50-28/CINCLANTFLTINST 3330.5 for peacetime restrictions.**

2. Computations

All attacks are parallel to the FLOT. Distances are computed from the intended impact point of the center of a stick of bombs or a pod of rockets. Deflection distance (from the aiming point toward friendly troops) is built into the risk-estimate distance. The deflection distance equals the distance from the aircraft centerline to the farthest outboard station plus the lateral distance that a weapon travels because of rack-ejection velocity.

3. Relationships Between Weapon Impact and Point of Intersection

For all determinations in Figure G-1, the position of a prone man was assumed to be on a line perpendicular to the line of flight (or line of weapon impacts) at the midpoint of the line (stick) of weapons. For all sticks of weapons, a weapon was assumed to impact at the point of intersection of these two lines. Thus, for the weapons evaluated, the following relationships between weapon impact and the point of intersection were assumed:

a. General purpose bombs. Center bomb of stick impacts at point of intersection.

b. Rockets. Center rocket.

c. Cluster weapons. Pattern center of the center dispenser.

d. Guns. Center of pattern.

e. Maverick. Single-weapon delivery impacting at point of intersection.

4. Weapon Reliability and Delivery Parameters

A weapon reliability of 1.0 was used for all weapons evaluated. Delivery parameters and considerations for specific weapons are in "Joint Munition Effectiveness Manual/Air-to-Surface (JMEM/AS): Risk Estimates for Friendly Troops (C)," FM 101-50-31/TH 61A1-3-9AVAIR OO-130ASR-9, 19 Dec 86.

5. Casualty Criterion

The casualty criterion is the 5-minute assault criterion for a prone soldier in winter clothing and helmet. The physical incapacitation means a soldier is physically unable to function in an assault within a 5-minute period after an attack. A PI value of less than 0.1% PI can be interpreted as being less than or equal to one chance in one thousand.

WARNING: RISK ESTIMATE DISTANCES DO NOT REPRESENT MAXIMUM FRAGMENTATION ENVELOPES OF THE WEAPONS LISTED.

6. Troops in Contact

Unless the ground commander determines otherwise, the terminal controller should regard friendlies within 1 kilometer of targets as a "troops in contact" situation and advise the ground commander accordingly. However, friendlies outside of 1 kilometer may still be subject to weapon effects. Terminal controllers and aircrews must carefully weigh the choice of ordnance and delivery profile in relation to the risk of fratricide. The ground commander must accept responsibility for the risk to friendly forces when targets are inside the 0.1% PI distance. When ground commanders pass their initials to terminal controllers they accept the risk inherent in ordnance delivery inside the 0.1% PI distance. Ordnance delivery inside 0.1% PI distances will be considered as "Danger Close."

Risk-Estimate Distances

WARNING: RISK-ESTIMATE DISTANCES ARE FOR COMBAT USE AND ARE NOT MINIMUM SAFE DISTANCES FOR PEACETIME TRAINING.

See JMEMS, appropriate Service or Command guidance, or FM 90-20/FMFRP 2-72/ACCP 50-28/USAFEP 50-9/PACAFP 50-28/CINCLANTFLTINST 3330.5 ("J-FIRE") for peacetime restrictions.

Item	Description	Risk-Estimate Distance (meters)	
		10% PI	0.1% PI
Mk-82 LD	500 lb bomb	250	425
Mk-82 HD	500 lb bomb (retarded)	100	375
Mk-82 LGB	500 lb bomb (GBU-12)	250*	425*
Mk-83 HD	1,000 lb bomb	275	475
Mk-83 LD	1,000 lb bomb	275	475
Mk-83 LGB	1,000 lb bomb (GBU-16)	275*	475*
Mk-84 HD/LD	2,000 lb bomb	325	500
Mk-84 LGB	2,000 lb bomb (GBU-10/24)	225*	500*
Mk-20**	Rockeye	150	225
Mk-77	500 lb napalm	100	150
CBU-55/77**	Fuel-air explosive	___*	___*
CBU-52**	CBU (all types)	275	450
CBU-58/71** ***	CBU (all types)	350	525
CBU-87**	CBU (all types)	175	275
CBU-89/78***	CBU (all types)	175	275
2.75" FFAR	Rocket with various warheads	160	200
5" ZUNI	Rocket with various warheads	150	200
SUU-11	7.62mm minigun	*	*
M-4, M-12, SUU-23, M-61	20mm Gatling gun	100	150
GAU-12	25mm gun	100	150

Figure G-1. Risk-Estimate Distances

Risk-Estimate Distances

Item	Description	Risk-Estimate Distance (meters)	
		10% PI	0.1% PI
GPU-5A, GAU-8	30mm Gatling gun	100	150
AGM-65*****	Maverick (TV, IIR, laser-guided)	25	100
Mk-1/Mk-21	Walleye II (1,000 lb TV-guided bomb)	275	500
Mk-5/Mk-23	Walleye II (2,400 lb TV-guided bomb)	___*	___*
AC-130	105mm cannon 40/25/20mm	80**** 35	200** 125

* Risk-estimate distances are to be determined. For LGBs, the values shown are for weapons that do not guide and that follow a ballistic trajectory similar to GP bombs. This does not apply to GBU-24 bombs, because GBU-24s do not follow a ballistic trajectory.

** Not recommended for use near troops in contact.

*** CBU-71/CBU-84 bombs contain time-delay fuzes which detonate at random times after impact. CBU-89 bombs are antitank and antipersonnel mines and are not recommended for use near troops in contact.

**** AC-130 estimates are based on worst-case scenarios. The 105mm round described is the M-1 high-explosive round with M-732 proximity fuze. Other fuzing would result in smaller distances. These figures are accurate throughout the firing orbit. The use of no-fire headings has no benefits for reducing risk estimate distances and should not be used in contingency situations.

***** The data listed applies only to AGM-65 A, B, C, and D models. AGM-65 E and G models contain a larger warhead and risk-estimate distances are not currently available.

Figure G-1. Risk-Estimate Distances (continued)

APPENDIX H
PLANNING CONSIDERATIONS FOR CAS USING NVGs AND IR POINTERS

PREPLANNED/SCHEDULED (PLANNED LOCATION AND TIME)

1. Can a night vision device acquire the target well enough to mark it with an IR marker?

2. What will the light conditions be at TOT?

a. Moon Phase/Rise/Set/Angle

b. Overall LUX Level

c. What ambient light sources will interfere with both the pilot's and my ability to acquire the target?

d. Are any actions planned on my part that will change the light conditions prior to TOT?

e. Are there any actions anticipated by the enemy that will change the light conditions prior to TOT?

3. Will anticipated periods of low visibility negate the use of IR pointers?

4. Are the pilots NVG qualified and have they worked with IR pointers? Do they require a face-to-face pre-mission brief?

5. What profile must the aircraft fly to acquire the IR beam?

6. Is the background sufficient for the pilot to acquire the beam?

7. Is there a run-in heading or final attack heading that optimizes the ability of the pilot to acquire the pointer's location, the beam, and the target?

8. Self-mark location with an IR source, and/or acquire the aircraft with NVGs? (Does aircraft have IR lights?)

9. Will other activities (attack Helos) using IR pointers confuse the CAS pilot?

10. Can the strike be conducted under EMCON?

11. After this TOT, can IR pointers still be used as a primary mark or utilize an alternate marking means?

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APPENDIX J

REFERENCES

The development of Joint Pub 3-09.3 is based on the following sources:

1. "A Doctrinal Statement of Selected Joint Operational Concepts."

2. Joint Pub 1, "Joint Warfare of the Armed Forces of the United States."

3. Joint Pub 1-02, "DOD Dictionary of Military and Associated Terms."

4. Joint Pub 3-0, "Doctrine for Joint Operations."

5. Joint Pub 3-01.4, "Joint Tactics, Techniques, and Procedures for Joint Suppression of Enemy Air Defenses (J-SEAD)."

6. Joint Pub 3-02, "Joint Doctrine for Amphibious Operations."

7. Joint Pub 3-02.1, "Joint Doctrine for Landing Force Operations." (In Development)

8. Joint Pub 3-05, "Doctrine for Joint Special Operations."

9. Joint Pub 3-05.3, "Joint Special Operations Operational Procedures."

10. Joint Pub 3-09.1, "Joint Laser Designation Procedures."

11. Joint Pub 3-09.2, "JTTP for Ground Radar Beacon Operations (J-BEACON)."

12. Joint Pub 3-52, "Doctrine for Joint Airspace Control in the Combat Zone."

13. Joint Pub 3-56, "Tactical Command and Control Planning Guidance and Procedures for Joint Operations."

14. Joint Pub 3-56.1, "Command and Control for Joint Air Operations."

15. Joint Pub 6-04, "United States Message Text Formatting Program."

16. FM 90-20/FMFRP 2-72/ACCP 50-28/USAFEP 50-9/PACAFP 50-28/ CINCLANTFLTINST 3300.5, "Multi-Service Procedures for the Joint Application of Firepower (J-FIRE)."

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18. AFM 1-1, "Basic Aerospace Doctrine of the United States Air Force."

19. AFM 2-10, "Aerospace Operational Doctrine - Special Operations."

20. AFSOC Regulation 55-130, Vol. 10, "Operations, AC-130A/H Gunship Employment."

21. AFSOC Regulation 55-130, Vol. 14, "Operations, AC-130U Gunship Employment."

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23. MCM 3-1, Vol. V, "Mission Employment Tactics Tactical Employment F-16."

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25. FM 1-100, "Doctrinal Principles for Army Aviation in Combat Operations."

26. FM 1-112, "Tactics, Techniques, and Procedures for the Attack Helicopter Battalion."

27. FM 1-114, "Tactics, Techniques, and Procedures for the Regimental Aviation Squadron."

28. FM 6-20, "Fire Support in the AirLand Battle."

29. FM 6-20-30, "Fire Support in Corps and Divisions."

30. FM 6-20-40, "Fire Support for Brigade Operations (Heavy)."

31. FM 17-95, "Cavalry."

32. FM 100-5, "Operations."

33. FM 100-103, "Army Airspace Command and Control in a Combat Zone."

34. FM 100-26, "The Air Ground Operations System."

35. FM 101-5-1, "Operational Terms and Symbols."

36. TC 90-7, "Tactical Air Control Party/Fire Support Team (TACP/FIST) Close Air Support Operations."

37. TRADOC Pam 525-5B, "Airland Operations."

38. FMFM 5-40, "Offensive Air Support."

39. FMFM 5-41, "Close Air Support."

40. FMFM 5-60, "Control of Aircraft and Missiles."

41. FMFM 6-18, "Techniques and Procedures for Fire Support Coordination."

APPENDIX K
ADMINISTRATIVE INSTRUCTIONS

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Users in the field are highly encouraged to submit comments on this publication to the Joint Warfighting Center, Attn: Doctrine Division, Fenwick Road, Bldg 96, Fort Monroe, VA 23651-5000. These comments should address content (accuracy, usefulness, consistency, and organization), writing, and appearance.

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GLOSSARY
PART I—ABBREVIATIONS AND ACRONYMS

A2C2	Army airspace command and control
AAA	antiaircraft artillery
AAGS	Army air-ground system
AAWC	antiair warfare commander
ABCCC	airborne battlefield command and control center
ACA	airspace coordination area
ACE	aviation combat element
AFARN	Air Force air request net
AFCC	Air Force component commander
AFFOR	Air Force forces
AFLNO	Air Force liaison officer
AFSOC	Air Force special operations component
AFSOF	Air Force special operations forces
AGL	above ground level
AIRSUPREQ	air support request
ALO	air liaison officer
ANGLICO	air/naval gunfire liaison company
AO	air officer
AOA	amphibious objective area
AOC	air operations center (USAF)
AREC	air resource element coordinator
ARFOR	Army forces
ARSOA	Army special operations aviation
ARSOC	Army special operations component
ASCS	air support control section
ASOC	air support operations center
ASRT	air support radar team
ATACS	amphibious tactical air control system
ATCS	air traffic control section
ATO	air tasking order
AWACS	airborne warning and control system
BP	battle position
BCE	battlefield coordination element
BDA	battle damage assessment
BN	battalion
C2	command and control
CAS	close air support
CASREQ	close air support request
CATF	commander, amphibious task force
CEOI	communications electronics operating instructions
CFL	coordinated fire line
COMAFFOR	Commander, Air Force Forces

COMARFOR	Commander, Army Forces
CP	contact point
CRC	control and reporting center
CRE	control reporting element
CSSE	combat service support element (MAGTF)
CTF	combined task force
CTOC	corps tactical operations center
DASC	direct air support center
DIV	division
EEI	essential elements of information
EMCON	emission control
EO/IR	electro-optical/infrared
ETAC	enlisted terminal attack controller
EW	electronic warfare
FAC	forward air controller
FAC(A)	forward air controller (airborne)
FARP	forward arming and refueling point
FCT	firepower control team
FDC	fire direction center
FEBA	forward edge of the battle area
FFA	free-fire area
FIST	fire support team
FLIR	forward looking infrared
FLOT	forward line of own troops
FOB	forward operating base
FP	firing point
FSC	fire support coordinator
FSCC	fire support coordination center
FSCL	fire support coordination line
FSCOORD	fire support coordinator
FSE	fire support element
FSO	fire support officer
GCE	ground combat element
GCI	ground controlled intercept/interception
GLINT	gated laser intensifier
GPS	global positioning system
HA	holding area
HF	high frequency
HF/SSB	high frequency/single side band
HIDACZ	high-density airspace control zone
INFLTREP	inflight report
INS	inertial navigation system

IP	initial point
IR	infrared
JAAT	joint air attack team
JAOC	joint air operations center
JFACC	joint force air component commander
JFC	joint force commander
JFSOCC	joint force special operations component commander
JMEM	Joint Munitions Effectiveness Manual
JOC	Joint Operations Center
JSOAC	joint special operations air component
JSOACC	joint special operations air component commander
JTAR	joint tactical air strike request
JTTP	joint tactics, techniques, and procedures
LANTIRN	low-altitude navigation and targeting infrared for night
LCC	land component commander
LGB	laser-guided bomb
LGM	laser-guided missile
LGW	laser-guided weapon
LLLTV	low light level television
LOAL	lock-on after launch
LOBL	lock-on before launch
LST	laser spot tracker
LTD	laser target designator
MACCS	Marine air command and control system
MAG	Marine air group
MAGTF	Marine air-ground task force
MARFOR	Marine Corps forces
MARLO	Marine liaison officer
MEF	Marine expeditionary force
METT-T	mission, enemy, terrain and weather, troops and support available - time available
MGRS	military grid reference system
MISREP	mission report
MRR	minimum-risk route
MSL	mean sea level
NALE	naval and amphibious liaison element
NAVFOR	Navy forces
NAVSOC	Naval special warfare special operations component
NFA	no-fire area
NOE	nap-of-the-earth
NSFS	naval surface fire support
NTACS	Navy tactical air control system
NVD	night vision device
NVG	night vision goggle

ODA	operational detachment-Alpha
OPCON	operational control
OSC	on-scene commander
OTC	officer in tactical command
PGM	precision-guided munitions
PI	probability of incapacitation
PRF	pulse repetition frequency
PUP	pull-up point
RABFAC	radar beacon forward air controller
RFA	restrictive fire area
RFL	Restrictive Fire Line
RGT	regiment
ROA	restricted operations area
ROZ	restricted operations zone
RP	rendezvous point
SAAFR	standard use Army aircraft flight route
SACC	supporting arms coordination center
SAM	surface-to-air missile
SAW	surface-to-air weapon
SEAD	suppression of enemy air defenses
SFOB	special forces operations base
SIC	subject identification code
SOCCE	special operations command and control element
SOF	special operations forces
SOI	signal operating instructions
SOLE	special operations liaison element
SOTAC	special operations terminal attack controller
TAC(A)	tactical air coordinator (airborne)
TACC	tactical air command center (USMC) tactical air control center (USN)
TACON	tactical control
TACP	tactical air control party
TACS	theater air control system
TAD	tactical air direction
TADC	tactical air direction center
TAOC	tactical air operations center
TATC	tactical air traffic control
TERF	terrain flight
TOT	time on target
TOS	time on station
TP	turn point
TTP	tactics, techniques, and procedures
TTT	time to target

UHF	ultra-high frequency
USA	United States Army
USAF	United States Air Force
USMC	United States Marine Corps
USMTF	US message text formatting
USN	United States Navy
UTM	universal transverse mercator
VHF	very high frequency
VHF-AM	very high frequency-amplitude modulation
VHF-FM	very high frequency-frequency modulation
WOC	wing operations center
WP	white phosphorous

PART II—TERMS AND DEFINITIONS

airborne battlefield command and control center. A United States Air Force aircraft equipped with communications, data link, and display equipment; it may be employed as an airborne command post or a communications and intelligence relay facility. Also called ABCCC. (Joint Pub 1-02)

air liaison officer. An officer (aviator/pilot) attached to a ground unit who functions as the primary advisor to the ground commander on air operation matters. (Joint Pub 1-02)

air operations center. The principal air operations installation from which aircraft and air warning functions of combat air operations are directed, controlled, and executed. It is the senior agency of the Air Force Component Commander from which command and control of air operations are coordinated with other components and Services. Also called AOC. (Joint Pub 1-02)

airspace control authority. The commander designated to assume overall responsibility for the operation of the airspace control system in the airspace control area. (Joint Pub 1-02)

airspace control order. An order implementing the airspace control plan that provides the details of the approved requests for airspace control measures. It is published either as part of the air tasking order or as a separate document. Also called ACO. (Joint Pub 1-02)

airspace control plan. The document approved by the joint force commander that provides specific planning guidance and procedures for the airspace control system for the joint force area of responsibility/joint operations area. Also called ACP. (Upon approval of this publication, this term and its definition will modify the existing term and its definition and will be included in Joint Pub 1-02)

airspace coordination area. A three-dimensional block of airspace in a target area, established by the appropriate ground commander, in which friendly aircraft are reasonably safe from friendly surface fires. The airspace coordination area may be formal or informal. (Upon approval of this publication, this term and its definition will modify the existing term and its definition and will be included in Joint Pub 1-02)

air superiority. That degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea and air forces at a given time and place without prohibitive interference by the opposing force. (Joint Pub 1-02)

air support operations center. An agency of a tactical air control system collocated with a corps headquarters or an appropriate land force headquarters, which coordinates and directs close air support and other tactical air support. (Joint Pub 1-02)

area air defense commander. Within a unified command, subordinate unified command, or joint task force, the commander will assign overall responsibility for air defense to a single commander. Normally this will be the component commander with the preponderance of air defense capability and the command, control, and communication capability to plan and execute integrated air defense operations. Representation from the other components involved will be provided, as appropriate, to the area air defense commander's headquarters. Also called AADC. (Joint Pub 1-02)

Army air-ground system. The Army system which provides for interface between Army and tactical air support agencies of other Services in the planning, evaluating, processing, and coordinating of air support requirements and operations. It is composed of appropriate staff members, including G-2 air and G-3 air personnel, and necessary communication equipment. (Joint Pub 1-02)

battle damage assessment. The timely and accurate estimate of damage resulting from the application of military force, either lethal or non-lethal, against a predetermined objective. Battle damage assessment can be applied to the employment of all types of weapon systems (air, ground, naval, and special forces weapon systems) throughout the range of military operations. Battle damage assessment is primarily an intelligence responsibility with required inputs and coordination from the operators. Battle damage assessment is composed of physical damage assessment, functional damage assessment, and target system assessment. Also called BDA. (Joint Pub 1-02)

boundary. A line which delineates surface areas for the purpose of facilitating coordination and deconfliction of operations between adjacent units, formations, or areas. (Joint Pub 1-02)

close air support. Air action by fixed- and rotary-wing aircraft against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces. Also called CAS. (Joint Pub 1-02)

command and control. The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. (Joint Pub 1-02)

concept of operations. A verbal or graphic statement, in broad outline, of a commander's assumptions or intent in regard to an operation or series of operations. The concept of operations frequently is embodied in campaign plans and operation plans; in the latter case, particularly when the plans cover a series of connected operations to be carried out simultaneously or in succession. The concept is designed to give an overall picture of the operation. It is included primarily for additional clarity of purpose. Also called commander's concept. (Joint Pub 1-02)

control and reporting center. A mobile, command, control, and communications radar element of the US Air Force theater air control system subordinate to the air operations center. The control and reporting center possesses four Modular Control Equipment operations modules and integrates a comprehensive air picture via multiple data links from air-, sea-, and land-based sensors as well as from its surveillance and control radars. It performs decentralized command and control of joint operations by conducting threat warning, battle management, theater missile defense, weapons control, combat identification, and strategic communications. Also called CRC. (Upon approval of this publication, this term and its definition will modify the existing term and its definition and will be included in Joint Pub 1-02)

direct air support center. The principal air control agency of the US Marine air command and control system responsible for the direction and control of air operations directly supporting the ground combat element. It processes and coordinates requests for immediate air support and coordinates air missions requiring integration with ground forces and other supporting arms. It normally collocates with the senior fire support coordination center within the ground combat element and is subordinate to the tactical air command center. Also called DASC. (Upon approval of this publication, this term and its definition will modify the existing term and its definition and will be included in Joint Pub 1-02)

direct support. A mission requiring a force to support another specific force and authorizing it to answer directly the supported force's request for assistance. (Joint Pub 1-02)

electronic warfare. Any military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. Also called EW. The three major subdivisions within electronic warfare are electronic attack, electronic protection, and electronic warfare support. a. electronic attack. That division of electronic warfare involving the use of electromagnetic or directed energy to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy combat capability. Also called EA. EA includes: 1) actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum, such as jamming and electromagnetic deception, and 2) employment of weapons that use either electromagnetic or directed energy as their primary destructive mechanism (lasers, radio frequency weapons, particle beams). b. electronic protection. That division of electronic warfare involving actions taken to protect personnel, facilities, and equipment from any effects of friendly or enemy employment of electronic warfare that degrade, neutralize, or destroy friendly combat capability. Also called EP. c. electronic warfare support. That division of electronic warfare involving actions tasked by, or under direct control of, an operational commander to search for, intercept, identify, and locate sources of intentional and unintentional radiated electromagnetic energy for the purpose of immediate threat recognition. Thus, electronic warfare support provides information required for immediate decisions involving electronic warfare operations and other tactical actions such as threat avoidance, targeting, and homing. Also called ES. Electronic warfare support data can be used to produce signals intelligence (SIGINT) and both communications intelligence (COMINT) and electronics intelligence (ELINT). (Joint Pub 1-02)

emission control. The selective and controlled use of electromagnetic, acoustic, or other emitters to optimize command and control capabilities while minimizing, for operations security, a. detection by enemy sensors; b. minimize mutual interference among friendly systems; or c. execute a military deception plan. Also called EMCON. (Joint Pub 1-02)

fire support coordinating measure. A measure employed by land or amphibious commanders to facilitate the rapid engagement of targets and simultaneously provide safeguards for friendly forces. (Joint Pub 1-02)

fire support coordination center. A single location in which are centralized communications facilities and personnel incident to the coordination of all forms of fire support. (Joint Pub 1-02)

fire support coordination line. A line established by the appropriate land or amphibious force commander to ensure coordination of fire not under the commander's control but which may affect current tactical operations. The fire support coordination line is used to coordinate fires of air, ground, or sea weapons systems using any type of ammunition against surface targets. The fire support coordination line should follow well-defined terrain features. The establishment of the fire support coordination line must be coordinated with the appropriate tactical air commander and other supporting elements. Supporting elements may attack targets forward of the fire support coordination line without prior coordination with the land or amphibious force commander provided the attack will not produce adverse surface effects on or to the rear of the line. Attacks against surface targets behind this line must be coordinated with the appropriate land or amphibious force commander. Also called FSCL. (Joint Pub 1-02)

forward air controller. An officer (aviator/pilot) member of the tactical air control party who, from a forward ground or airborne position, controls aircraft in close air support of ground troops. (Joint Pub 1-02)

forward air controller (airborne). A specifically trained and qualified aviation officer who exercises control from the air of aircraft engaged in close air support of ground troops. The forward air controller (airborne) is normally an airborne extension of the tactical air control party. Also called FAC(A). (Upon approval of this publication, this term and its definition will be included in Joint Pub 1-02)

forward arming and refueling point. A temporary facility, organized, equipped, and deployed by an aviation commander, and normally located in the main battle area closer to the area of operation than the aviation unit's combat service area, to provide fuel and ammunition necessary for the employment of aviation maneuver units in combat. The forward arming and refueling point permits combat aircraft to rapidly refuel and rearm simultaneously. Also called FARP. (Joint Pub 1-02)

forward edge of the battle area. The foremost limits of a series of areas in which ground combat units are deployed, excluding the areas in which the covering or screening forces are operating, designated to coordinate fire support, the positioning of forces, or the maneuver of units. Also called FEBA. (Joint Pub 1-02)

forward line of own troops. A line which indicates the most forward positions of friendly forces in any kind of military operation at a specific time. The forward line of own troops normally identifies the forward location of covering and screening forces. Also called FLOT. (Joint Pub 1-02)

forward looking infrared. An airborne, electro-optical thermal imaging device that detects far-infrared energy, converts the energy into an electronic signal, and provides a visible image for day or night viewing. Also called FLIR. (Upon approval of this publication, this term and its definition will be included in Joint Pub 1-02)

forward operating base. An airfield used to support tactical operations without establishing full support facilities. The base may be used for an extended time period. Support by a main operating base will be required to provide backup support for a forward operating base. Also called FOB. (Upon approval of this publication, this term and its definition will be included in Joint Pub 1-02)

general support. That support which is given to the supported force as a whole and not to any particular subdivision thereof. (Joint Pub 1-02)

immediate air support. Air support to meet specific requests which arise during the course of a battle and which by their nature cannot be planned in advance. (Joint Pub 1-02)

immediate mission request. A request for an air strike on a target which, by its nature, could not be identified sufficiently in advance to permit detailed mission coordination and planning. (Joint Pub 1-02)

infrared pointer. A low power laser device operating in the near infrared light spectrum that is visible with light amplifying night vision devices. Also called IR pointer. (Upon approval of this publication, this term and its definition will be included in Joint Pub 1-02)

joint air operations. Air operations performed with air capabilities/forces made available by components in support of the joint force commander's operation or campaign objectives, or in support of other components of the joint force. (Joint Pub 1-02)

joint force air component commander. The joint force air component commander derives authority from the joint force commander who has the authority to exercise operational control, assign missions, direct coordination among subordinate commanders, redirect and organize forces to ensure unity of effort in the accomplishment of the overall mission. The joint force commander will normally designate a joint force air component commander. The joint force air component commander's responsibilities will be assigned by the joint force commander (normally these would include, but not be limited to, planning, coordination, allocation, and tasking based on the joint force commander's apportionment decision). Using the joint force commander's guidance and authority, and in coordination with other Service component commanders and other assigned or supporting commanders, the joint force air component commander will recommend to the joint force commander apportionment of air sorties to various missions or geographic areas. Also called JFACC. (Joint Pub 1-02)

joint force commander. A general term applied to a combatant commander, subunified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a joint force. Also called JFC. (Joint Pub 1-02)

Marine air command and control system. A system which provides the aviation combat element commander with the means to command, coordinate, and control all air operations within an assigned sector and to coordinate air operations with other Services. It is composed of command and control agencies with communications-electronics equipment that incorporates a capability from manual through semiautomatic control. Also called MACCS. (Upon approval of this publication, this term and its definition will modify the existing term and its definition and will be included in Joint Pub 1-02)

mission report. A standard report containing the results of a mission and significant sightings along the flight route. (Joint Pub 1-02)

naval surface fire support. Fire provided by Navy surface gun, missile, and electronic warfare systems in support of a unit or units tasked with achieving the commander's objectives. Also called NSFS. (Joint Pub 1-02)

night vision device. Any electro-optical device that is used to detect visible and infrared energy and provide a visible image. Night vision goggles, forward-looking infrared, thermal sights, and low light level television are night vision devices. Also called NVD. (Upon approval of this publication, this term and its definition will be included in Joint Pub 1-02)

night vision goggle(s). An electro-optical image intensifying device that detects visible and near-infrared energy, intensifies the energy, and provides a visible image for night viewing. Night vision goggles can be either hand-held or helmet-mounted. Also called NVG. (Upon approval of this publication, this term and its definition will be included in Joint Pub 1-02)

preplanned air support. Air support in accordance with a program, planned in advance of operations. (Joint Pub 1-02)

preplanned mission request. A request for an air strike on a target which can be anticipated sufficiently in advance to permit detailed mission coordination and planning. (Joint Pub 1-02)

rules of engagement. Directives issued by competent military authority which delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered. Also called ROE. (Joint Pub 1-02)

supporting arms coordination center. A single location on board an amphibious command ship in which all communication facilities incident to the coordination of fire support of the artillery, air, and naval gunfire are centralized. This is the naval counterpart to the fire support coordination center utilized by the landing force. (Joint Pub 1-02)

suppression of enemy air defenses. That activity which neutralizes, destroys, or temporarily degrades surface-based enemy air defenses by destructive and/or disruptive means. Also called SEAD. (Joint Pub 1-02)

surface-to-air weapon. A surface-launched weapon for use against airborne targets. Future developments in air defense systems may lead to the employment of weapons other than missiles. Examples include rockets, directed-energy weapons, and air defense guns. (Upon approval of this publication, this term and its definition will be included in Joint Pub 1-02)

synchronized clock. A technique of timing the delivery of fires by placing all units on a common time. The synchronized clock uses a specific hour/minute based on either local or universal time. Local time is established using the local time zone. (Upon approval of this publication, this term and its definition will be included in Joint Pub 1-02)

tactical air command center. The principal US Marine Corps air command and control agency from which air operations and air defense warning functions are directed. It is the senior agency of the US Marine air command and control system which serves as the operational command post of the aviation combat element commander. It provides the facility from which the aviation combat element commander and his battle staff plan, supervise, coordinate, and execute all current and future air operations in support of the Marine air-ground task force. The tactical air command center can provide integration, coordination, and direction of joint and combined air operations. Also called Marine TACC. (Upon approval of this publication, this term and its definition will modify the existing term and its definition and will be included in Joint Pub 1-02)

tactical air control center. The principal air operations installation (ship-based) from which all aircraft and air warning functions of tactical air operations are controlled. Also called Navy TACC. (Upon approval of this publication, this term and its definition will modify the existing term and its definition and will be included in Joint Pub 1-02)

tactical air control party. A subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft. (Joint Pub 1-02)

tactical air coordinator (airborne). An officer who coordinates, from an aircraft, the action of combat aircraft engaged in close support of ground or sea forces. (Joint Pub 1-02)

tactical air direction center. An air operations installation under the overall control of the tactical air control center (afloat)/tactical air command center, from which aircraft and air warning Service functions of tactical air operations in an area of responsibility are directed. (Joint Pub 1-02)

tactical air operations center. The principal air control agency of the US Marine air command and control system responsible for airspace control and management. It provides real time surveillance, direction, positive control, and navigational assistance for friendly aircraft. It performs real time direction and control of all antiair warfare operations, to include manned interceptors and surface-to-air weapons. It is subordinate to the tactical air command center. Also called TAOC. (Upon approval of this publication, this term and its definition will modify the existing term and its definition and will be included in Joint Pub 1-02)

terminal control. 1. The authority to direct the maneuver of aircraft which are delivering ordnance, passengers, or cargo to a specific location or target. Terminal control is a type of air control. 2. Any electronic, mechanical, or visual control given to aircraft to facilitate target acquisition and resolution. (Upon approval of this publication, this term and its definition will be included in Joint Pub 1-02)

thermal crossover. The natural phenomenon which normally occurs twice daily when temperature conditions are such that there is a loss of contrast between two adjacent objects on infrared imagery. (Joint Pub 1-02)

time on target. 1. Time at which aircraft are scheduled to attack/photograph the target. 2. The actual time at which aircraft attack/photograph the target. 3. The time at which a nuclear detonation as planned at a specified desired ground zero. Also called TOT. (Joint Pub 1-02)

time to target. The number of minutes and seconds to elapse before aircraft ordnance impacts on target. (Upon approval of this publication, this term and its definition will be included in Joint Pub 1-02)

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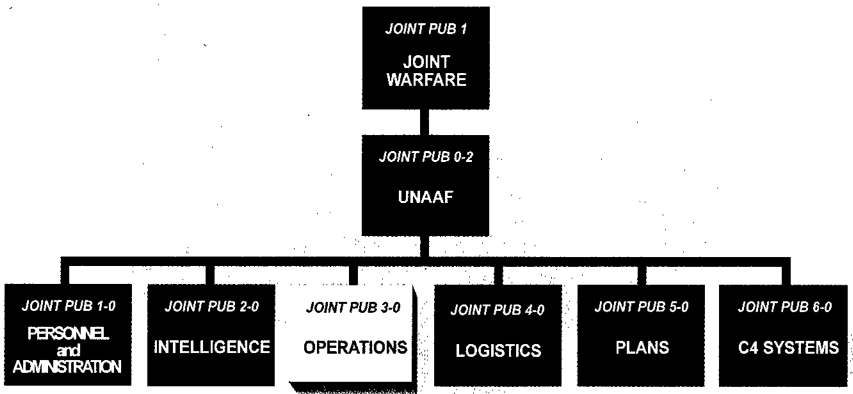

All joint doctrine and tactics, techniques, and procedures are organized into a comprehensive hierarchy as shown in the chart above. **Joint Pub 3-09.3** is located in the **Operations** series of joint doctrine publications. The diagram below illustrates an overview of the development process: