Joint Publication 3-09.3

Close Air Support

25 November 2014

PREFACE

1. Scope

This publication provides fundamental principles and guidance to plan, coordinate, and execute close air support during joint operations.

2. Purpose

This publication has been prepared under the direction of the Chairman of the Joint Chiefs of Staff (CJCS). It sets forth joint doctrine to govern the activities and performance of the Armed Forces of the United States in joint operations and provides the doctrinal basis for interagency coordination and for US military involvement in multinational operations. It provides military guidance for the exercise of authority by combatant commanders and other joint force commanders (JFCs) and prescribes joint doctrine for operations, education, 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 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 objective.

3. Application

a. Joint doctrine established in this publication applies to the Joint Staff, commanders of combatant commands, subunified commands, joint task forces, and subordinate components of these commands, the Services, and combat support agencies.

b. The guidance in this publication is authoritative; as such, this doctrine 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 unless the CJCS, 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 and consistent with US law, regulations, and doctrine.

For the Chairman of the Joint Chiefs of Staff:

Dave Goldfein

DAVID L. GOLDFEIN, Lt Gen, USAF
Director, Joint Staff

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SUMMARY OF CHANGES
REVISION OF JOINT PUBLICATION 3-09.3
DATED 8 JULY 2009

- **Changed Chapter I, Introduction, Organization, and Fundamentals, organization.**
- **Added discussion on post launch abort considerations.**
- **Added discussion on game plan.**
- **Added discussion on method of attack.**
- **Expanded the format options for situation update.**
- **Explained when Lines 1-3 of the close air support (CAS) brief can be abbreviated.**
- **Added multiple target procedures to Line 6 of the CAS brief.**
- **Modified definition of Line 7 in the CAS brief to include terminal guidance.**
- **Added discussion on digital aided CAS operations.**
- **Added discussion on keyhole procedures.**
- **Modified discussion of types of control (1, 2, and 3).**
- **Modified discussion of bomb on target and bomb on coordinate.**
- **Modified definition of safety zone, optimal attack zones, and hellfire designator safety zone.**
- **Added rotary-wing CAS 5-Line brief.**
- **Updated brevity terms, airspace coordinating measures, and fire support coordination measures.**
- **Modified definitions of air liaison officer, airspace coordination area, air support operations center, begin morning nautical twilight, brevity code, command net, danger close, direct air support center, fire direction center, forward air controller (airborne), forward arming and refueling point, forward operating base, general support reinforcing, joint air attack team, joint air ground integration center, joint terminal attack controller, lead aircraft, Marine air command and control system, maximum altitude, night vision device, night vision goggle, release altitude, supporting arms coordination center, tactical air**

command center, tactical air operations center, target location error, target reference point, terminal control, terrain flight, and wing.

- **Deleted definitions for begin morning civil twilight, contour flight, immediate mission request, infrared pointer, low level flight, nap-of-the-earth flight, Navy tactical air control center, preplanned mission request, proword, surface-to-air weapon, synchronized clock, and vertex height.**

- **Modified discussion and added updated examples of gridded reference graphic.**

- **Modified discussion of collateral damage estimation.**

- **Added joint fires observer planning considerations.**

- **Added discussion on the techniques to use in the event of correlation prior to the CAS brief.**

- **Added Appendix E, "Examples of Close Air Support Missions."**

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EXECUTIVE SUMMARY
COMMANDER'S OVERVIEW

- **Provides tactics, techniques, and procedures to synchronize close air support (CAS) in time, space, and purpose with supported ground forces.**

- **Outlines the joint and component airspace control agencies involved and joint force connectivity required for integrated CAS.**

- **Describes a CAS-related decision-making process that supports joint operation planning, identifies specific CAS-related staff responsibilities, outlines basic CAS planning considerations, and identifies procedures for requesting CAS and CAS-related air support.**

- **Outlines standard procedures for CAS execution and provides the standard formats used in passing key information between CAS participants.**

Introduction, Organization, and Fundamentals

Close air support (CAS) is air action by fixed-wing and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and requires detailed integration of each air mission with the fire and movement of those forces.

Close air support (CAS) is a critical element of joint fire support that requires detailed planning, coordination, and training of ground and supporting air forces for safe and effective execution.

The supported commander establishes the target priority, effects, and timing of CAS fires within the boundaries of the land or maritime areas of operations, joint special operations areas, or amphibious objective areas. CAS is a key capability for each of these components to employ fires that destroy, suppress, or neutralize enemy forces and in turn permit movement, maneuver, and control of territory, populations, and key waters.

CAS is planned and executed to support ground tactical units. CAS execution is tightly integrated at the tactical level with the fire and maneuver of supported ground forces. The air apportionment and allocation process for CAS occurs at the operational level. CAS planning focuses on providing timely and accurate fires in support of friendly forces in close proximity to the enemy.

Each Service organizes, trains, and equips to employ CAS within its roles as part of the joint force. As a result, a **variety of aircraft are capable of performing CAS.**

The joint force commander (JFC) and staff are responsible for integrating CAS capabilities into the concept of operations.

Terminal Attack Control

Terminal attack control (TAC) is the authority to control the maneuver of and grant weapons release clearance to attacking aircraft.

Terminal Guidance Operations

Terminal guidance is different than TAC. Terminal guidance operations (TGO) are those actions that provide electronic, mechanical, voice, or visual communications that provide approaching aircraft and/or weapons additional information regarding a specific target location.

Unless certified and qualified as a joint terminal air controller (JTAC) or forward air controller (airborne) (FAC[A]), **personnel conducting TGO do not have the authority to control the maneuver of, or grant weapons release clearance to, attacking aircraft.**

Battlefield Utility

CAS provides commanders with flexible and responsive fire support. Using CAS, commanders can take full advantage of battlefield opportunities by massing firepower to maintain the momentum of an offensive action or reduce operational and tactical risks. The mobility and speed of aircraft provide commanders with a means to strike the enemy swiftly and unexpectedly.

CAS Integration

For joint air operations, the integration of CAS starts at the operational level during the joint air tasking cycle. The joint force air component commander (JFACC) provides the JFC an air apportionment recommendation, after consultation with other affected component commanders. Each component has the opportunity to influence the JFC air apportionment decision that impacts aircraft allocation for various joint air missions (e.g., CAS, air interdiction) and sorties for a given period of time. The JFC's air apportionment decision aligns the use of joint air assets with targeting priorities, guidance, and objectives.

Conditions for Effective CAS

The conditions for effective CAS are: thoroughly trained personnel with well-developed skills, effective planning and integration, effective command and control (C2), air superiority (especially suppression of enemy air defense [SEAD]), target marking and/or acquisition, streamlined and flexible procedures, and appropriate ordnance. Although not a requirement for CAS employment, favorable environmental conditions improve CAS effectiveness.

Minimizing Friendly Fire

All participants in CAS are responsible for effective and safe planning and execution. Each participant must make every effort to identify friendly units, enemy forces, and civilians prior to targeting, clearing fires, and weapons release. Combat identification (CID) is the process of attaining an accurate characterization of detected objects in the operational environment sufficient to support an engagement decision.

CID characterizations, when applied with rules of engagement, enable engagement decisions to use or prohibit lethal and nonlethal weaponry to accomplish military objectives.

Minimizing Civilian Casualties

The law of war requires commanders to take all practicable precautions to minimize civilian casualties and collateral damage, consistent with mission accomplishment and the security of the force. In addition, the US military's operating environment is increasingly open to scrutiny. This is particularly true for incidents of civilian casualties. These events are tragic and can have lasting negative operational and strategic effects, such as decisions to restrict future operations.

Command and Control

CAS requires an integrated, flexible, and responsive C2 structure to process CAS requirements and dependable, interoperable, and secure communications architecture to exercise control.

The JFC normally exercises operational control (OPCON) through component commanders. Most CAS in support of joint operations is allocated and tasked via the JFACC staff located in the joint air operations center (JAOC), using host component organic C2 architecture.

Air Force Command and Control (C2)

The theater air control system (TACS) is the commander, Air Force forces' (COMAFFOR's) mechanism for commanding and controlling component air and space power. **The TACS provides the COMAFFOR the capability to plan and conduct joint air operations.** The COMAFFOR's focal point for tasking and exercising OPCON over Air Force forces at the operational level is the Air Force air operations center, which is the senior element of the TACS. Subordinate TACS agencies perform the decentralized tasks of planning, coordinating, monitoring, surveilling, controlling, reporting, and executing CAS at the tactical level.

Army Air-Ground System

The Army's control system for synchronizing, coordinating, and integrating air operations with the commander's scheme of maneuver is the Army air-ground system (AAGS). The AAGS initiates, receives, processes, and executes requests for air support and disseminates information and intelligence produced by aerial assets. The AAGS begins at the field army level, and extends down through all echelons to the maneuver battalion. Although some elements within AAGS, such as the tactical air party (TACP), belong to different Services or other nations, they function as a single entity in planning, coordinating, deconflicting, and integrating air support operations with ground operations. The AAGS consists of airspace element, fires cell (FC), air and missile defense, and aviation elements and coordination/liaison elements. Teamed with the Air Force air support operations center (ASOC) and TACP, they form the joint air ground integration center for coordination and deconfliction of joint fires in the division operational area and assigned airspace. **AAGS is used to coordinate and integrate both Army component aviation support and joint air support with Army ground maneuver.**

Air Force and Army C2 in Land Operations

Air-ground integration is achieved through the operations processes to coordinate with each echelon of command, with other components and with multinational partners. When appropriate, United States Air Force TACS may be clearly interconnected with the AAGS. At the division level, this interconnection of TACS/AAGS is found within the joint air ground integration center (JAGIC). The JAGIC is a mix of Army and Air Force personnel within the current operations integration cell.

Navy C2

The Navy tactical air control center (TACC) is the primary air control agency within the operational area from which all air operations supporting the amphibious task force are controlled. When the commander, Navy forces is also the JFACC, he will augment the Navy TACC with elements from other components to create a JAOC.

Marine Corps C2

The Marine air C2 system consists of various air C2 agencies designed to provide the Marine air-ground task force aviation combat element commander with the ability to monitor, supervise, and influence the application of Marine aviation's six functions (antiair warfare, offensive air support, electronic warfare [EW], air reconnaissance, control of aircraft and missiles, and assault support).

Navy and Marine Corps C2 in Amphibious Operations

Both the Navy and the Marine Corps air control systems are capable of independent operations; however, in the conduct of an amphibious operation, elements of both systems are used to different degrees from the beginning of the operation until the C2 of aircraft and missiles is phased ashore.

Special Operations C2

Theater special operations are normally under the control of the joint force special operations component commander (JFSOCC). Control of special operations forces (SOF) air is normally exercised by a joint special operations air component (JSOAC), if designated by the JFSOCC. If a JSOAC has not been designated, then the SOF air is controlled by its Service component within the joint force special operations command.

Communications Systems

CAS missions require a high degree of control exercised through effective communications. Communications must be flexible and responsive to ensure that links between aircraft and ground units are maintained, reducing the chance of friendly fire and enhancing mission effectiveness. The flexibility and responsiveness of joint force CAS communications are made possible using a variety of techniques including electromagnetic spectrum management, countermeasures and emission control, and through the interoperable communications nets of the components.

Intelligence

Optimum intelligence, surveillance, and reconnaissance (ISR) support to CAS begins early in the planning process to include joint intelligence preparation of the operational environment and the targeting process. While it is impossible to account for every conceivable possibility, this early integration can assist in better target selection, intelligence collection requirements, force allocation, and follow-on assessment.

Planning and Requesting

CAS in the Decision-Making Process

The CAS decision-making process assists the commander and staff in developing the CAS portion of a fire support plan.

CAS planners actively participate with the ground commander to provide CAS-related input to the plan or operation order (OPORD). **The planning phase ends in a published order to subordinate units.**

CAS Planning Considerations—Mission

CAS can support shaping, close combat, and joint security area operations.

- **Shaping Operations.** Commanders may employ CAS to support operations deep within the operational area, which may include SOF or conventional forces with a deep operation mission. Shaping operations involving CAS may require additional coordination to deconflict with other missions such as air interdiction (refer to the joint air tasking order [ATO]).
- **Close Combat Operations.** A commander generally assigns the preponderance of available CAS to the unit designated as the main effort. CAS aircraft and fire support assets can mass with surface forces to support the commander's objectives. The speed, range, and firepower of CAS also make it a valuable asset for exploiting friendly success, disrupting rapid adversary maneuver, and attacking a retreating enemy.
- **Joint Security Area Operations.** CAS is effective for countering enemy penetrations. The potential for friendly fire, however, is high in a joint security area because of the larger number of support personnel and activities located there.

CAS Planning Considerations—Enemy

CAS planners anticipate the enemy's ability to affect the mission, and the potential influence enemy actions may have on flight tactics. As the threat level increases, prebriefing of aircrews and detailed mission planning become more important. The potential for the threat situation to change during the course of the mission makes communications and close coordination between the aircrews, control agencies, and the supported ground force crucial.

CAS Planning Considerations—Troops (CAS Assets)

CAS planners must consider available C2, ISR, EW, and CAS aircraft assets.

Airborne C2 support systems may alleviate some of the challenges in C2, but each of the platforms has inherent capabilities and limitations that must be considered in planning. Unique or high-demand C2 assets in support of the mission may generate specific requirements that, in turn, end up as formal requests for air support.

Use all sources of ISR—assets that may be used, including unmanned aircraft system and Joint Surveillance Target Attack Radar System (JSTARS) feeds, JSTARS voice link, electronic intelligence sources, scout reconnaissance troop reports, FAC(A) and JTAC observations, operations and intelligence reports, feeds from elements of the TACS/AAGS, and strike aircraft with targeting pods are all viable sources of information.

CAS Planning Considerations—Terrain

Terrain can affect communications and visual line-of-sight (LOS) for identifying the target and/or aircraft. Rotary wing attack assets are extremely vulnerable to LOS limitations. Planners must overcome this shortfall by leveraging other C2 capabilities or accept this condition as part of the mission environment. Situational awareness-enhancing systems (e.g., synthetic aperture radar and data link type systems) and coordinate-seeking weapons improve the ability to execute CAS in certain tactical situations despite weather limitations.

CAS Planning Considerations—Time

The specific theater or joint operations area supporting JAOC will establish cut-off times to receive preplanned air support requests for inclusion in the ATO. CAS requirements that do not meet the established cut off times are treated as immediate air support requests and processed by the ASOC.

Planning Concepts Essential for Effective CAS

Key issues such as battle tracking, target nomination, tactical risk assessment, weapons release authority, methods of attack, types of TAC, airspace deconfliction and coordination, synchronization, and which JTAC/FAC(A) will provide TAC must be clearly understood and carefully planned.

Supported/Supporting Relationship. In a CAS engagement, the ground commander is the supported commander inside the boundaries of an assigned operational area. CAS aircraft, the TACP, FAC(A)s, JTACs, and joint fires observer (JFOs) are supporting elements. By definition, the ground commander is the on-scene commander (OSC). CAS aircraft cannot be an OSC; however, the aircraft with the highest situational awareness may be delegated tactical lead for coordinated attacks.

Types of Control and Methods of Attack

Types of TAC are tools that give the ground commander the greatest chance of accomplishing the mission while mitigating friendly fire and collateral damage.
There are three types of control (Types 1, 2, and 3). The type of control conveys the JTAC's/FAC(A)'s intent on how

best to mitigate risk and the need to control individual attacks: Type 1, accomplished by visually acquiring the attacking aircraft, assessing the attack geometry and maintaining control of individual attacks; Type 2, accomplished by paying particular attention to other measures in place to reduce risk and maintaining control of individual attacks; or Type 3, accomplished by paying particular attention to other measures in place to reduce risk and the measures in place allowing for multiple attacks within a single engagement.

The method of attack and type of control are separate and independent constructs. The method of attack is an agreement between the supported commander, the JTAC/FAC(A), and the aircraft, regarding the aircrew's correlation requirement, and is completely independent of the type of control. In CAS, correlation is the process by which the JTAC/FAC(A) coordinates and confirms that the attacking aircrew, and/or a third-party contributor, have acquired the correct target or mark. Correlation is required on each and every CAS attack. Method of attack conveys the JTAC's/FAC(A)'s intent for the aircraft prosecution of the target; either the aircraft will be required to acquire the target or not. The method of attack is broken down into two categories, bomb on target (BOT) and bomb on coordinate (BOC). These two categories define how the aircraft will acquire the target or mark. Any type of control can be utilized with either method of attack and no type of control is attached to one particular method of attack.

Considerations for Planning with Laser Guided and Inertial Aided Munitions

There are five basic considerations for using laser spot trackers (LSTs) or laser-guided weapons (LGWs):

- **LOS** must exist between the designator and the target and between the target and the LST/LGW.
- **Pulse repetition frequency (PRF) codes** of the laser designator and the LST/LGW must be compatible.
- **The direction of attack** must allow the LST/LGW to sense enough reflected laser energy from the target for the seeker to acquire and lock onto the target.
- **The laser target designator** must designate the target at the correct time, and for the correct length of time. If the length of time is insufficient, the seeker head could break lock and the flight pattern of the LGW becomes unpredictable.
- **The delivery system** must release the LGW

within the specific LGW delivery envelope to ensure the weapon can physically reach the target. There is an **increased hazard to friendly forces** when aircrews release weapons behind friendly positions. The final decision to release standoff LGWs from behind friendly positions in a CAS environment rests with the ground commander.

Integrating CAS Planning Considerations

Fire Support Coordination Measures (FSCMs). Within their operational areas, land and maritime commanders employ permissive and restrictive FSCMs to expedite attack of targets; protect forces, populations, critical infrastructure, and sites of religious or cultural significance; clear joint fires; deconflict joint fire support operations; and establish conditions for future operations. Along with other control measures, FSCMs and their associated procedures help ensure that joint fire support does not jeopardize troop safety, interfere with other attack means, or disrupt operations of adjacent units. The primary purpose of permissive measures is to facilitate the attack of targets, while the primary purpose of restrictive measures is to safeguard friendly forces.

Airspace Coordinating Measures (ACMs). ACMs are measures employed to facilitate the efficient use of airspace to accomplish missions and simultaneously provide safeguards for friendly forces. The JFC uses the airspace control authority to establish formal ACMs. 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 (ACO).

Coordination. Once a target has been approved, the JTAC/FAC(A) and combat operations center/tactical operations center (or command post) coordinate the CAS attack with affected ground forces. Cross-boundary clearance of fires, friendly air defense artillery, and CAS aircraft ingress/egress routing must be deconflicted and coordinated.

One of the most difficult functions performed by a FC/FSCC is synchronizing CAS with surface fires. The intent is to coordinate the timing of air support, supporting arms, and maneuver to achieve the mass of a combined-arms attack. **The goal is to accomplish this without suspending the use of any of the supporting arms or affecting the scheme of maneuver.** An additional goal is to offer a reasonable measure of protection to aircraft from the effects of friendly surface fires.

CAS Aircraft Tactics Planning

Standardized procedures and tactics provide a baseline for further refinement and improvement. Tactics are ever changing and must be adapted to the specific situation. JTACs/FAC(A)s must be familiar with these as well as advanced CAS tactics. Aircrew will ultimately decide aircraft tactics but must ensure the tactics used fall within any constraints issued by the JTAC/FAC(A).

Forward Air Controller (Airborne)(FAC[A]) Planning

FAC(A)s can serve as an additional controller for the TACP/JTAC, support a maneuver element without a TACP/JTAC, or supplement the capability of a TACP/JTAC.

Tactical Air Coordinator (Airborne) Planning

The TAC(A) is an airborne extension of the ASOC or direct air support center (DASC). The TAC(A)'s authority is determined by the CRC, ASOC, DASC, Navy TACC, or Marine tactical air command center. The TAC(A)'s authority and responsibility can range from simple radio relay, all the way to having launch, delay, and divert authority over other assets.

Joint Fires Observer Planning

The JTAC and JFO should be employed as a team, with the JFO acting as an extension of the JTAC. While JFOs provide timely and accurate targeting data for controls to the JTAC, the JTAC maintains TAC authority. The JFO or the JTAC can issue an abort at any time, to prevent friendly fire or for safety of flight.

Planning for Multinational Operations

The North Atlantic Treaty Organization and partner nations have and continue to use Joint Publication 3-09.3, *Close Air Support*, as a basis for conducting CAS. See also Allied Joint Publication-3.3.2, *Air Interdiction and Close Air Support*, and Allied Tactical Publication-3.3.2.1(C), *TTP for Close Air Support and Air Interdiction*. Some differences still remain between US joint doctrine and US-ratified allied joint doctrine, but these differences are being addressed routinely.

Requesting CAS

Air support requests are used to identify the supported commander's requirements for CAS and other supporting air missions. **There are two types of CAS requests: preplanned and immediate. Preplanned air support requests may be resourced with either scheduled or on-**

call air missions. Immediate air support requests are supported with on-call missions or by redirecting scheduled air missions that are already on the ATO.

Preparation

Preparation includes concept of employment (COE) briefs, COE mission rehearsals, OPORDs, brief-backs, equipment and communications checks, standard operating procedure (SOP) reviews, load plan verification, pre-combat checks/pre-combat inspections, and weapons test-fire.

Rehearsals

The rehearsal is one of the most overlooked aspects of maneuver and fire support planning. It provides attendees the opportunity to visualize the battle, ensure total comprehension of the plan, promote responsiveness, and identify areas of confusion, friction or conflict that may have been overlooked. The types of rehearsals include combined arms rehearsal and fire support rehearsal.

Pre-Combat Preparations

Pre-combat checks and pre-combat inspections allow personnel to prepare for a mission and provide the leader/supervisor an opportunity to ensure the operational readiness of personnel and equipment.
Pre-combat checks can be broken down into the following areas: mission essential knowledge, mission essential equipment, and mission essential coordination.

Communications

During the preparation phase, and often in conjunction with the pre-combat inspections, communication links are checked and verified. This ensures that primary and backup voice and digital systems are checked, crypto material is current, time is synchronized, and code words, brevity codes, authenticators, passwords, and call signs are available and current. Ensure systems are fully operational and connectivity is established. Often unit SOPs will delineate connectivity checks.

Digitally Aided CAS Preparation

The following documents provide information to plan and digitally aided CAS:

- Operation tasks link with combat net radio segment, via joint interface control officers.
- Special instructions (SPINS). Changes or additions to the ATO and ACO will be covered in

the SPINS.
- ATO. This contains what aircraft missions are being supported.
- ACO. This contains all planned airspace coordination measures in effect.
- Respective Service Unit Reference Numbers.
- Digital communication plan with digital TACP local network information.

Movement and Positioning

Movement. The air officer (AO)/ air liaison officer (ALO) ensures TACP movement is in accordance with the maneuver unit's observation plan. Most TACP operations require movement to forward assembly areas, observation posts, or battle positions during the preparation phase of an operation. The maneuver unit OPORD will normally specify formations and techniques of movement.

Positioning. The AO/ALO recommends initial observation positions of TACPs to the commander. The AO/ALO and the commander must consider three aspects in the TACP positioning decision: security, observation, and communications.

Execution

CAS execution begins with a target nomination from the supported commander and involves two processes that are continuous and overlapping: JTAC/operations center coordination and CAS target engagement.

CAS Target Engagement

While theaters or specific commands may have unique requirements, JTACs, FAC(A)s, CAS aircrews, and fire supporters should be familiar with the standard formats used in passing key information between CAS participants.

Once a ground commander has nominated a CAS target, the JTAC should accomplish the following tasks to prepare for CAS engagement:

- **Develop Targeting Data.** Planning for a CAS attack should begin with the target and work backwards. There are five main pieces of information a JTAC needs to begin the CAS attack planning: target elevation, target description, target location, friendly location, and commander's desired effects on the target.
- **Request Air Support.** Once a rough location for

the target has been determined and commander's desired effects are known, JTACs should request air support at the earliest possible opportunity due to the transit time required for CAS aircraft to arrive on station.

- **Develop Game Plan.** The game plan, at a minimum, will contain the type of control and method of attack. In addition, the following can be part of the game plan or passed in remarks: the ground commander's intent, the ordnance effects desired, or the ordnance and fuze combination required, if known. Aircraft interval can also be specified by the JTAC.
- **Determine/Coordinate Mark/Aid to Correlation.**
  - BOC—No mark required for attacking aircraft. Line 7 is "no mark."
  - If terminal guidance is used for LGWs, Line 7 will state the call sign of the entity providing terminal guidance with laser with the associated PRF code (e.g., 10 "Blackjack laser, code 1688").
  - BOT—Line 7, the mark is specific to the attacking aircraft.
- **Develop Attack Geometry.** JTACs must consider many factors when determining attack geometry and make an educated compromise among these factors.
- **Determine SEAD Requirements/SEAD Plan.** Plan for SEAD when attacking aircraft cannot avoid exposure to a threat, based on expected aircraft delivery profile and the threat's maximum effective range. Depending on the threat system, SEAD planning may be extremely complicated and require detailed integration with EW systems and fires agencies.

CAS Execution Template

The execution template is a technique used to organize the flow of events from when an aircraft first checks in with a JTAC, through a CAS brief and attack, to when the aircraft checks out.

Multisensor Imagery Reconnaissance and Intelligence, Surveillance,

When aircraft are tasked to conduct multisensor imagery reconnaissance or ISR, and there is not an immediate need to conduct CAS attacks, the following caveat to the

and Reconnaissance in CAS

execution template may be used: routing/safety of flight, CAS aircraft check-in, and situation update/reconnaissance/surveillance briefing.

CAS Execution with Non-Joint Terminal Attack Controller Personnel

In certain circumstances, the ground commander might require air support when a JTAC or FAC(A) is not available or is no longer able to provide assistance, but detailed integration with friendly forces fire and movement is still required. Aircrew executing CAS under these circumstances bear increased responsibility for the detailed integration required to minimize friendly fire and collateral damage, tasks normally done by a JTAC/FAC(A).

FAC(A) Integration

Check-In. The FAC(A) is an extension of the TACP, and should communicate "FAC(A) capable/qualified" at check-in, providing the JTAC knowledge of the capability resident within the asset.

FAC(A) Duties and Responsibilities. It is important for the JTAC and FAC(A) to rapidly determine responsibilities for execution and expedite CAS procedures in a tactically safe manner. The three objectives of the FAC(A) are: to achieve the ground commander's intent, maximize and integrate fires on the battlefield, and mitigate friendly fire.

JFO Integration

Once established in the assigned location/area, the JFO will contact the JTAC/FAC(A) on the briefed communications net. Upon initial contact, the JFO should communicate the situation to the JTAC/FAC(A) using the observer lineup brief. The JFO should periodically update the JTAC/FAC(A) as the battlefield situation changes.

Depending on the tactical situation, the JFO situation update brief should use the same format as the CAS situation update brief, only including those items that are applicable.

CONCLUSION

This publication provides fundamental principles and guidance to plan, coordinate, and execute CAS during joint operations.

CHAPTER I
INTRODUCTION, ORGANIZATION, AND FUNDAMENTALS

"Among military men it is 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
Office of Air Force History, 1990

1. Introduction

a. Close air support (CAS) is a critical element of joint fire support that requires detailed planning, coordination, and training of ground and supporting air forces for safe and effective execution. Based on threats and the availability of other means of fire support or supporting arms, synchronizing CAS in time, space, and purpose with supported ground forces may be the most detailed and continuous integration task performed by the joint force, component commanders, and staffs. The supported commander establishes the target priority, effects, and timing of CAS fires within the boundaries of the land or maritime areas of operations, joint special operations areas, or amphibious objective areas (AOAs). CAS is a key capability for each of these components to employ fires that destroy, suppress, or neutralize enemy forces and in turn permit movement and maneuver, and enable control of territory, populations, and key waters.

b. While the focus of this publication is on CAS operations, these tactics, techniques, and procedures (TTP) may be used for non-CAS missions that require terminal attack control (TAC) but do not require detailed integration with the fire and movement of ground force assets.

2. Close Air Support Overview

a. CAS is air action by fixed-wing (FW) and rotary-wing (RW) aircraft against hostile targets that are **in close proximity to** friendly forces and **requires detailed integration** of each air mission with the fire and movement of those forces. All fires should support the joint force commander's (JFC's) objectives, guidance, and priorities.

b. CAS is planned and executed to support ground tactical units. CAS execution is tightly integrated at the tactical level with the fire and maneuver of supported ground forces. The air apportionment and allocation process for CAS occurs at the operational level. CAS planning focuses on providing timely and accurate fires in support of friendly forces in close proximity to the enemy.

c. **CAS can be conducted at any place and time friendly 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.** At times, CAS may be the best means to exploit tactical opportunities in the offense or defense. CAS provides fires to destroy, disrupt, suppress, fix, harass, neutralize, or delay enemy forces.

d. **Each Service organizes, trains, and equips to employ CAS** within its roles as part of the joint force. As a result, a **variety of aircraft are capable of performing CAS.** The JFC and staff are responsible for integrating CAS capabilities into the concept of operations (CONOPS).

e. **TAC. TAC is the authority to control the maneuver of and grant weapons release clearance to attacking aircraft.** A certified and qualified joint terminal attack controller (JTAC) or forward air controller (airborne) (FAC[A]) will be recognized across the Department of Defense as capable and authorized to perform TAC. There are three types of control (Types 1, 2, and 3).

(1) **Type 1 Control.** Type 1 control is used when the JTAC/FAC(A) requires control of individual attacks and the situation requires the JTAC/FAC(A) to visually acquire the attacking aircraft and visually acquire the target for each attack.

(2) **Type 2 Control.** Type 2 control is used when the JTAC/FAC(A) requires control of individual attacks and is unable to visually acquire the attacking aircraft at weapons release or is unable to visually acquire the target.

(3) **Type 3 Control.** Type 3 control is used when the JTAC/FAC(A) requires the ability to provide clearance for **multiple attacks** within a single engagement subject to specific attack restrictions.

For additional information, see Chapter III, "Planning and Requesting," Paragraph 12, "Types of Control and Methods of Attack."

f. **Terminal Guidance Operations (TGO).** Terminal guidance is different than TAC. TGO are those actions that provide electronic, mechanical, voice, or visual communications that provide approaching aircraft and/or weapons additional information regarding a specific target location. Various ground elements or aircrews conducting a wide variety of missions can search for, identify, and provide the location of targets using systems like Global Positioning System (GPS), laser designators/range finders, and aircraft targeting pods. Unless certified and qualified as a JTAC or FAC(A), **personnel conducting TGO do not have the authority to control the maneuver of, or grant weapons release clearance to, attacking aircraft.** Terminal guidance is guidance applied to a weapon between midcourse guidance and arrival in the vicinity of the target and may be a function of CAS, interdiction, or other missions.

3. Use of Close Air Support

CAS is used to attack the enemy in support of the commander's CONOPS, in a variety of environmental conditions, during day or night, and to augment other supporting fires. The **speed, range, and maneuverability of aircraft allow them to attack targets that other supporting arms may not be able to effectively engage** due to limiting factors such as target type, range, terrain, or the ground scheme of maneuver. **Ground commanders are the ultimate authority for the use of all supporting fires in their respective operational area.** The ground commander at the lowest level is responsible for the employment of CAS assets unless specifically retained by a higher level commander in the ground force chain of command. Responsible ground force commanders decide the target priority, effects, and timing of CAS fires within an operational area and optimally make decisions with the advice and guidance of specially trained personnel.

a. **Battlefield Utility. CAS provides commanders with flexible and responsive fire support.** Using CAS, commanders can take full advantage of battlefield opportunities by massing firepower to maintain the momentum of an offensive action or reduce operational and tactical risks. The mobility and speed of aircraft provide commanders with a means to strike the enemy swiftly and unexpectedly.

b. **Usage Criteria.** Commanders consider the following criteria in planning for CAS:

(1) Mission and CONOPS.

(2) Enemy disposition, composition, and strength.

(3) Capabilities and limitations of available aircraft and available ordnance (i.e., on-station time, onboard precision targeting, precision ordnance circular error [CE], and net explosive weight).

(4) Locations, communications, and special equipment available to JTACs (i.e., mounted/dismounted, very high frequency [VHF]/ultrahigh frequency [UHF]/satellite communications [SATCOM], laser designators, infrared [IR] pointers, and laser range finders [LRFs]).

(5) Rules of engagement (ROE).

(6) Special instructions (SPINS).

(7) Enemy air defenses and the joint force's ability to counter them.

(8) Location of friendly troops, requirements necessary to integrate CAS with the fire and maneuver schemes.

(9) Apportionment decision and allocation of CAS sorties.

(10) Location of civilians, collateral damage estimate.

c. **Targeting.** Targeting is the process of selecting and prioritizing targets and matching the appropriate response to them, considering commander's objectives, operational requirements, and capabilities. While conducting CAS, this may equate to the JTAC selecting a particular target in a target array. When selecting targets, JTACs begin with the supported ground commander's guidance for conducting a CAS attack, and then should consider details such as target type, mission, enemy air defenses, terrain and weather, available armament, and response time. Other considerations include attack geometry, proximity of friendly forces, potential for collateral damage, capability of available sensors, and other fire support available. Aircrews retain the primary responsibility for developing weaponeering recommendations and aircraft employment tactics, while the JTAC or FAC(A) focuses on target effects. (See Chapter III, "Planning and Requesting," for aircraft employment tactics). Additionally, JTACs, FAC(A)s, and CAS aircrew should expeditiously obtain and report battle damage assessment (BDA) information. Commanders, JTACs, FAC(A)s, and CAS aircrew can use BDA to determine if objectives have been met, or whether a reattack is necessary.

4. Close Air Support Integration

For joint air operations, the integration of CAS starts at the operational level during the joint air tasking cycle. The joint force air component commander (JFACC) (if established) provides the JFC an air apportionment recommendation, after consultation with other affected component commanders. Each component has the opportunity to influence the JFC air apportionment decision that impacts aircraft allocation for various joint air missions (e.g., CAS, air interdiction [AI]) and sorties for a given period of time. The JFC's air apportionment decision aligns the use of joint air assets with targeting priorities, guidance, and objectives. The JFACC allocates and tasks air capabilities/forces made available based on the JFC's air apportionment decision. Commensurate with mission requirements, the JFACC positions joint air capabilities/forces to optimize CAS to requesting units. The JFC's CONOPS and the supported component's joint air requirements provide the framework to integrate joint air operations (CAS, AI, etc.) in the JFC's operation order (OPORD), the JFACC's air operations directive, air tasking order (ATO), airspace control order (ACO), and SPINS.

5. Manned Fixed-Wing and Rotary-Wing Close Air Support Employment Considerations

The organizational structure, primary missions, and capabilities of CAS-capable aircraft determine CAS employment methods. In a joint force, the integration of CAS-capable aircraft allows commanders to take advantage of the distinctly different, but complementary, capabilities of each platform. **Although FW and RW aircraft can both conduct CAS, the employment considerations of each differ and** may vary among the Services.

a. **Generic Considerations.** Commanders and planners typically measure **FW and RW aircraft employment in sorties.** A sortie is one flight by one aircraft. **Normally, CAS fighter/attack aircraft fly in groups of two to four aircraft, thus equaling two to four sorties.** Bombers normally fly as single aircraft or two-ship formations, thus one or two sorties. The United States Air Force (USAF) calls these groupings of aircraft flights, while the United States Navy (USN) and United States Marine Corps (USMC) call them either sections (two aircraft) or divisions (three-to-four aircraft).

b. **FW Considerations.** Due to inherent speed and range, FW aircraft offer the JFC enhanced versatility and flexibility in delivering combat power when and where directed. Additionally, FW assets are trained and equipped to employ the full range of unguided gravity weapons, precision guided munitions (PGMs), area denial munitions, and forward firing ordnance, which can be optimized to effectively attack any tactical CAS target in any terrain and under almost any conditions of weather and light, especially when equipped with advanced sensors.

c. **RW Considerations.** RW attack assets provide the ability to maneuver and reposition firepower in response to changing situations. They carry a wide variety of forward firing and off-axis firing munitions, are equipped with advanced sensors, have excellent response and loiter times, can conduct low altitude or nap of the earth ingress, attacks, and egress, and have an excellent capability to conduct CAS in diverse terrain and when accompanying other transport, medical evacuation, or personnel recovery assets.

(1) Army RW assets are organic to combat aviation brigades organized and trained to be employed in unit operations, maneuvering independently or in support of ground forces as part of the Army combined arms team. Army RW attack assets use close combat attack (CCA) procedures. **CCA is not synonymous with CAS, and the Army does not consider its attack helicopters a CAS system.** Although some Army aircrews may be proficient in CAS TTP, JTACs should not expect Army attack aviation assets to perform CAS TTP without further coordination and training, since they are normally employed using CCA as the standard attack method.

(2) **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). Marine Corps RW attack assets are trained and equipped for CAS missions to support the ground commander's objectives and may be tasked accordingly. Sections normally fly in mixed configuration with attack helicopter (AH)/UH [utility helicopter] assets. Mixed sections provide the RW CAS element with the most flexible mix of sensors, communications capabilities, maneuverability, firepower, and mutual support.

d. **Special Operations FW and RW Considerations.** United States Special Operations Command operates both FW and RW special operations aircraft which employ CAS, CCA, gunship, and FAC(A) procedures in support of special operations forces (SOF). Non-SOF aircraft will also routinely support SOF with CAS and CCA capabilities.

e. The joint air attack team (JAAT) includes a combination of FW CAS aircraft and RW aircraft operating together to locate and attack high-priority targets and other targets of opportunity. A JAAT normally operates as a coordinated effort supported by fire support, air defense artillery (ADA), naval surface fire support (NSFS), intelligence, surveillance, and reconnaissance (ISR) systems, electronic warfare (EW) systems, and ground maneuver forces against enemy forces. JTACs may perform duties as directed by the air mission commander in support of the ground commander's scheme of maneuver. JAAT planning, execution, and communications are discussed in Army Tactical Publication 3-09.32/Marine Corps Reference Publication (MCRP) 3-16.6A/Navy Tactics, Techniques, and Procedures (NTTP) 3-09.2/Air Force Tactics, Techniques, and Procedures (AFTTP 3-2.6, *JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower.*

6. Unmanned Aircraft Close Air Support Employment Considerations

a. The Services operate a variety of FW and RW unmanned aircraft systems (UASs) with weapons and sensor capabilities similar to manned aircraft. Unmanned aircraft (UA) in this joint publication (JP) applies to tactical assets typically organic to lower echelons. UA offer the ground commander additional joint fire support assets that complement FW/RW assets. Some UA have very long on-station times and can offer increased reachback capability to ground command and control (C2) personnel. UA normally fly single ship and at relatively slow speeds, so some UA may take longer than FW CAS aircraft to reposition in response to changing situations. In the simplest scenario of UA integration into CAS, the UA aircrew and the JTAC use UA sensor data to build situational awareness (SA) of the target area and to locate targets. Once a target has been found (see Chapter III, "Planning and Requesting," paragraph 11, "Planning Concepts Essential for Effective Close Air Support"), the JTAC can direct an armed UA to engage the target using CAS procedures; use the UA sensor data to talk a CAS aircraft onto the target and give corrections to follow-on CAS aircraft; or direct the UA aircrew to conduct the target talk-on, laser spot handoff, or use their laser target designator (LTD) to designate the target for laser-guided munitions from other CAS aircraft, as appropriate. When available, JTACs can use UA communications relay and multiple intelligence sensors.

b. Planning is critical to the integration of UA into CAS operations and requires a thorough understanding of specific UA capabilities in order to make sound tactical decisions. **UA operators must understand the tactical situation and be integrated into mission planning.** Liaison officers (LNOs) operating between the UAS element and the supported unit are critical to effective mission planning and execution.

For further information on UAS employment, refer to Army Tactics, Techniques, and Procedures 3-04.15/MCRP, 3-42.1A/NTTP, 3-55.14/AFTTP, 3-2.64, UAS Multi-Service Tactics, Techniques, and Procedures for Unmanned Aircraft Systems.

7. Conditions for Effective Close Air Support

The conditions for effective CAS are: thoroughly trained personnel with well-developed skills, effective planning and integration, effective C2, air superiority (especially suppression of enemy air defenses [SEAD]), target marking and/or acquisition, streamlined and flexible procedures, and appropriate ordnance. Although not a requirement for CAS employment, favorable environmental conditions improve CAS effectiveness.

a. **Effective Training and Proficiency.** CAS training should integrate all maneuver and fire support elements involved in executing CAS. Maintaining proficiency allows aircrew and JTACs to adapt to rapidly changing conditions in the operational environment.

b. **Planning and Integration.** Effective CAS relies on thorough, coherent planning and detailed integration of air support into ground operations. The ability to mass joint fire support at a decisive point and to provide the supporting fires needed to achieve the commander's objectives is made possible through detailed integration with ground forces. From a planner's perspective, the preferred use of a CAS asset is to have it preplanned and prebriefed. Rehearsals provide participants an opportunity to walk through the scheme of maneuver; gain familiarity with terrain, airspace restrictions, and procedures; and identify shortfalls.

c. **C2.** CAS requires an integrated, flexible C2 structure to identify requirements, request support, prioritize competing requirements, task units, move CAS forces to the target area, provide threat warning updates, and enhance combat identification (CID) procedures. Accordingly, C2 requires dependable and interoperable communications between aircrews, air control agencies, JTACs, ground forces, supported commander, and fire support agencies. Proper planning and C2 of CAS mission aircraft is essential to achieve air-ground integration. Through the balanced use of maneuver and movement control, airspace coordinating measures (ACMs), and fire support coordination measures (FSCMs), commanders can facilitate effective and timely use of joint military assets employed in a CAS role in support of ground forces.

For further guidance on ACMs, see JP 3-52, Joint Airspace Control. *For further guidance on FSCMs, see JP 3-09,* Joint Fire Support. *For further guidance on the C2 of joint air operations, see JP 3-30,* Command and Control for Joint Air Operations.

d. **Air Superiority.** Air superiority permits CAS to function without prohibitive interference by the adversary. SEAD is an integral part of air superiority and may be required during CAS attacks.

e. **Target Marking.** Providing timely and accurate target marks can improve CAS effectiveness. Target marking builds SA, identifies specific targets in an array, reduces the possibility of friendly fire and collateral damage, and facilitates TAC. When the commander employing CAS foresees a shortfall in ability to mark for CAS, the commander should request that capability during the planning phase. See Chapter III, "Planning and Requesting," for further details.

f. **Streamlined and Flexible Procedures.** Responsive fire support allows a commander to respond to rapid changes on the battlefield and exploit fleeting opportunities. Because the modern battlefield can be extremely dynamic, CAS procedures should also be flexible enough to change targets, tactics, or weapons rapidly. The requester is usually in the best position to determine fire support requirements, and like all fire support, CAS must be responsive to be effective. Techniques to improve responsiveness include:

(1) Place CAS assets (aircraft and aircrews) at forward operating bases (FOBs) or forward operating locations near the operational area. Place CAS holding points/orbits at optimum locations near the operational area that facilitate rapid responses to immediate needs.

(2) Place aircrews in a designated ground or airborne alert status. Airborne alert aircraft will normally be more responsive.

(3) Delegate launch authority to subordinate units.

(4) Retask aircraft in response to target updates and higher priority emerging targets.

(5) Authorize the role revision of scheduled aircraft on the ATO in response to a higher priority aircraft mission type.

(6) Redirect aircraft on scheduled CAS missions in response to higher priority mission requirements.

(7) Delegate authorities to the lowest tactical level feasible.

(8) Place JTACs and air officers (AOs), or air liaison officers (ALOs) with ground units to facilitate continuous coordination, communication with aircraft, and observation of enemy locations.

g. **Appropriate Ordnance.** To create the desired effects, planners, JTACs, FAC(A)s, and aircrews must match the weapons and fuze settings to the target. For example, cluster and general purpose munitions are effective against area targets such as troops and vehicles in the open, but not against hardened targets, or when friendly troops may be affected by the immediate strike or by unexploded ordnance. In all cases, the supported commander needs to know the type of ordnance expended, if it will create the weapon effects desired, the probability for collateral damage, and the possible impact on the unit's current or subsequent mission.

h. **Environmental Conditions.** Favorable environmental conditions improve aircrew effectiveness regardless of aircraft or weapon capability. Tactical decision aids (i.e., target acquisition weather software, night vision device [NVD] planning software, IR target/scene simulation software, and integrated weather analysis aid) assist planners and operators by providing target and background detection data. **Before CAS missions are executed, minimum weather conditions must be considered.** Targets located solely by radar or geographic coordinates may not offer the aircrew or JTAC adequate information to ensure positive target identification (ID) or to mitigate the risk of friendly fire. Environmental conditions may also limit the operations of one type of platform without affecting another. For example, RW aircraft can often operate effectively under low ceilings that might render some FW CAS aircraft ineffective. Conversely, FW aircraft can operate above blowing surface dust that might keep helicopters grounded. Environmental conditions also significantly impact the ability to use target marking devices. In addition to the terrestrial environment, the space environment should be taken into account, as it can affect the

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, Royal Flying Corps De Havilland 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 Colonel 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 on the basis of intelligence information available to the pilots before the commencement of the mission. The "on-call" and "divert" close air support 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*, 1989

accuracy of systems that rely on position, navigation, and timing signals such as GPS guided/aided weapons, aircraft navigation systems, and ground targeting equipment. Communication assets can also be affected by any space environment anomalies.

8. Responsibilities

a. **JFC.** The JFC establishes the guidance and priorities for CAS in CONOPS, operation or campaign plans, the air apportionment decision, and when assigning capabilities and forces to the components.

b. **JFACC.** The JFACC is given the authority necessary to accomplish missions and tasks assigned by the establishing commander. For CAS, these responsibilities are to recommend air apportionment decisions, allocate forces/capabilities made available from the

JFC and components, create and execute the ATO, and other applicable actions associated with CAS execution. The JFACC maintains close coordination with the other component commanders to ensure CAS requirements are being met in accordance with JFC guidance.

c. **Service Component Commanders.** These commanders ensure that their assets are capable of executing CAS missions within Service roles and as directed by the JFC.

9. Minimizing Friendly Fire

a. **General.** Casualties to friendly forces caused by friendly fire incidents are the occasional tragic consequence of warfare. However, these unwanted incidents can be significantly reduced when all parties involved in the planning and execution of CAS missions make every effort to mitigate the associated risks.

b. **Causes.** Although occasionally the result of malfunctioning weapons, friendly fire has often been the result of confusion on the battlefield. Causes include misidentification of targets, inaccurate target locations or descriptions, target locations incorrectly transmitted or received, and loss of SA by JTACs, CAS aircrews, requestors, battle staff, or commanders. Items such as detailed mission planning; standardized procedures for supporting immediate air requests; realistic training/mission rehearsal; use of friendly tagging or tracking devices (such as blue force tracker and tactical data links); effective staff, forward air controller (FAC), and/or AO and ALO coordination; and sound clearance of fires procedures can significantly reduce the likelihood of friendly fire.

c. **Responsibility.** All participants in CAS are responsible for effective and safe planning and execution. Each participant must make every effort to identify friendly units, enemy forces, and civilians prior to targeting, clearing fires, and weapons release. CID is the process of attaining an accurate characterization of detected objects in the operational environment sufficient to support an engagement decision. Depending on the situation and the needed operational decisions, this characterization may be limited to friend, enemy, neutral, or noncombatant, or include additional characterizations such as class, type, nationality, or mission configuration. CID characterizations, when applied with ROE, enable engagement decisions to use or prohibit lethal and nonlethal weaponry to accomplish military objectives. CID is also used for force posturing, C2, SA, and shoot/no-shoot employment decisions.

d. **Training. The joint force, components, and units must conduct regular joint training and rehearsals** that simulate situations joint forces will encounter in the operational environment, in order to develop the skill sets and familiarity required for success.

10. Minimizing Civilian Casualties

a. **General.** The law of war requires commanders to take all practicable precautions to minimize civilian casualties and collateral damage, consistent with mission accomplishment and the security of the force. In addition, the US military's operating environment is increasingly open to scrutiny. This is particularly true for incidents of civilian casualties.

These events are tragic and can have lasting negative operational and strategic effects, such as decisions to restrict future operations.

b. **Causes.** Understanding and selecting alternative choices for fires application may offer the best opportunity for reducing the likelihood and impact of civilian casualties.

c. **Responsibility.** All participants in the CAS employment process are responsible for the effective and safe planning and execution of CAS, including positive identification (PID). CAS must comply with the law of war and applicable theater ROE.

d. **Training.** Predeployment preparation and review of current CAS ROE, vignettes, scenarios, and lessons learned from theater can help minimize civilian casualties.

11. Personnel Recovery

The various CAS controllers occupy a unique location in the operational area, which may allow them to be the first asset to realize that a personnel recovery isolating event has occurred. They should be prepared to assume on-scene commander (OSC) duties to report the event to higher authorities, locate the isolated personnel, and support them as necessary until relieved by another OSC or a rescue mission commander.

See JP 3-50, Personnel Recovery, *for additional instructions and guidance.*

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CHAPTER II
COMMAND AND CONTROL

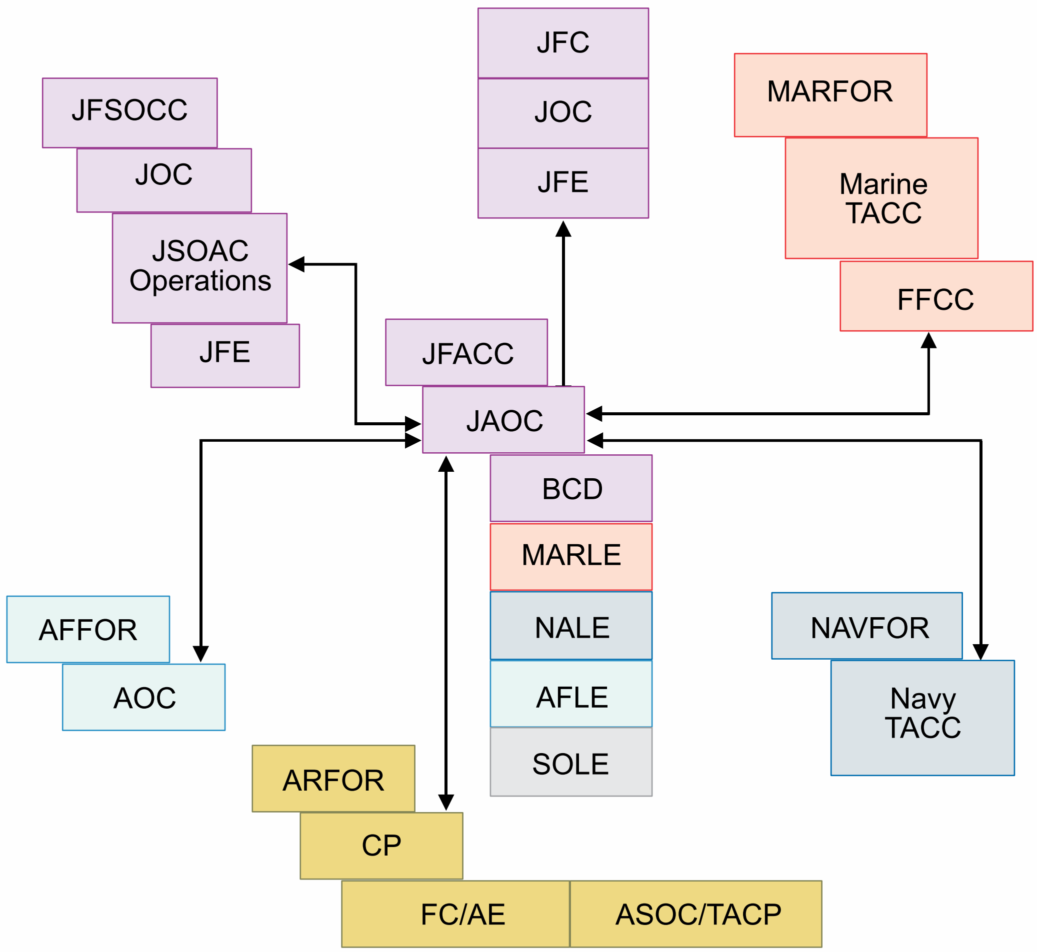
> *"C2 [command and control] is the means by which a JFC [joint force commander] synchronizes and/or integrates joint force activities."*
>
> **Joint Publication 1, *Doctrine for the Armed Forces of the United States***

1. Introduction

a. CAS requires an integrated, flexible, and responsive C2 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.

b. The JFC normally exercises operational control (OPCON) through component commanders. Most CAS in support of joint operations is allocated and tasked via the JFACC staff located in the joint air operations center (JAOC), using host component organic C2 architecture. Figure II-1 graphically illustrates joint force CAS connectivity. Reliable, secure communications are required to exchange information among all participants. In joint operations, components provide and operate the C2 systems, which have similar functions at each level of command. The JFACC tasks capabilities/forces made available for joint tasking through the JAOC and appropriate Service component C2 systems. Figure II-2 depicts functional equivalents among the 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 air-ground system (SOAGS). When elements of the TACS, AAGS, MACCS, NTACS, and SOAGS integrate, the entire system is labeled the theater air-ground system (TAGS).

Notional Joint Force Close Air Support Connectivity



Legend

AE	airspace element
AFFOR	Air Force forces
AFLE	Air Force liaison element
AOC	air operations center
ARFOR	Army forces
ASOC	air support operations center
BCD	battlefield coordination detachment
CP	command post
FC	fires cell
FFCC	force fires coordination center
JAOC	joint air operations center
JFACC	joint force air component commander
JFC	joint force commander
JFE	joint fires element

JFSOCC	joint force special operations component
JOC	joint operations center
JSOAC	joint special operations air component
	Marine Corps forces
MARFOR	Marine liaison element
MARLE	naval and amphibious liaison element
NALE	Navy forces
NAVFOR	special operations liaison element
SOLE	Marine tactical air command center (USMC)
TACC	Navy tactical air control center (USN)
TACC	tactical air control party
TACP	

↔ communication and coordination

Figure II-1. Notional Joint Force Close Air Support Connectivity

Component Air Command and Control Agencies for Close Air Support

Component Agency	United States Air Force	United States Army	United States Navy	United States Marine Corps	Special Operations Forces
TAGS Element	Theater air control system	Army air-ground system	Navy tactical air control system	Marine air command and control system	Special operations air-ground system
Air Control Center	Air Force air operations center Airborne warning and control system	Airspace element	Tactical air control center/ tactical air direction center	Tactical air command center/tactical air direction center	Joint special operations air component
	Joint surveillance and target attack radar system			Tactical air coordinator (airborne)	
	Control and reporting center		Fleet air warfare coordinator	Tactical air operations center	Special operations command and control element
Liaisons to the JFACC	Air Force liaison element	Battlefield coordination detachment	Naval and amphibious liaison element	Marine liaison element	Special operations liaison element
Air Support Control Agency	Air support operations center		Air support coordination section	Force fires coordination center/ fire support coordination center	Joint special operations air component
	Tactical air coordinator (airborne)		Tactical air coordinator (airborne)	Tactical air coordinator (airborne) Tactical air control party	
Fire Support Coordinating Element		Fires cell	Supporting arms coordination center	Direct air support center	Joint fires element
Tactical Air Support Control Agency	Tactical air control party				
Terminal Attack Element	Forward air controller (airborne)		Forward air controller (airborne)	Forward air controller (airborne)	
	Joint terminal attack controller		Joint terminal attack controller	Forward air controller/ joint terminal attack controller	Joint terminal attack controller

Legend

JFACC joint force air component commander TAGS theater air-ground system

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

2. Close Air Support for Joint Force and Multinational Operations

a. **If a command relationship is established between elements of two components, the supporting component uses the CAS C2 system of the supported component.** For example, if an Army brigade is OPCON to a MAGTF, the Army brigade submits CAS requests through the brigade fires cell (FC) to the Marine Corps force fires coordination center (FFCC) or fire support coordination center (FSCC) in the MAGTF's combat operations center (COC). 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 elements of two components (and the commander of one component does not have sufficient organic CAS available), each component forwards CAS requests utilizing its respective CAS process to the JAOC for consideration.** For example, if a MAGTF and an Army division are operating as adjacent units under the JFC, each component would direct CAS requests through its respective CAS process to the JAOC.

c. There is no single C2 structure for CAS operations when engaged in multinational operations. US joint doctrine should be the basis for CAS actions, but modifications due to multinational operations will need to be identified early and promulgated clearly to all US participants. When the Armed Forces of the United States participate in multinational operations, US commanders should follow multinational doctrine and procedures that were ratified by the US. For multinational doctrine and procedures not ratified by the US, commanders should evaluate and follow the multinational command's doctrine and procedures, where applicable and consistent with US law, policy, and doctrine.

3. Air Force Command and Control

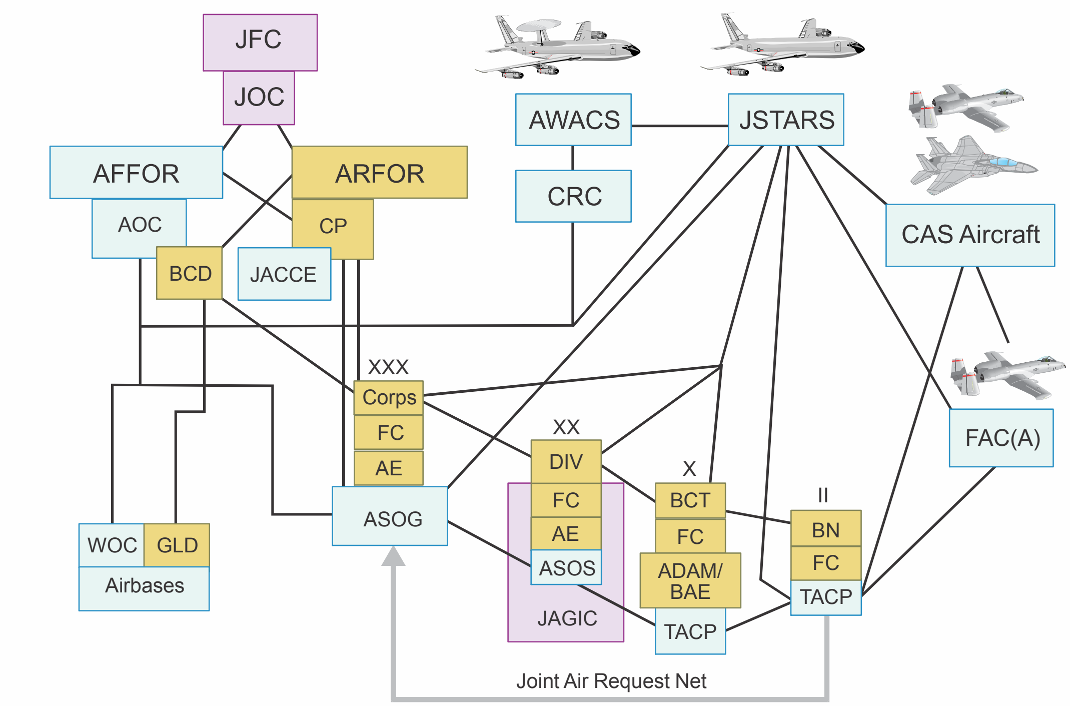
a. **TACS.** The TACS is the commander, Air Force forces' (COMAFFOR's) mechanism for commanding and controlling component air and space power. **The TACS provides the COMAFFOR the capability to plan and conduct joint air operations.** The COMAFFOR's focal point for tasking and exercising OPCON over Air Force forces at the operational level is the Air Force air operations center (AOC), which is the senior element of the TACS. Subordinate TACS agencies (described below), perform the decentralized tasks of planning, coordinating, monitoring, surveilling, controlling, reporting, and executing CAS at the tactical level. Figure II-3 depicts the TACS/AAGS systems.

b. **Entities within the TACS**

(1) **Air Force AOC. The AOC is the COMAFFOR's** senior agency that provides C2 of Air Force air and space operations and coordinates with other components and Services. It develops an air operations plan to meet the JFC's guidance. It allocates resources and tasks forces through ATOs. When the COMAFFOR is also designated the JFACC, they will request that the JFC provide staff augmentees to the AOC, with elements from other components, to create a JAOC.

For further information on a JAOC, see JP 3-30, Command and Control for Joint Air Operations.

Theater Air Control System/Army Air-Ground System



Legend

ADAM/BAE	air defense airspace management/ brigade aviation element	CRC	control and reporting center
AE	airspace element	DIV	division
AFFOR	Air Force forces	FAC(A)	forward air controller (airborne)
AOC	air operations center	FC	fires cell
ARFOR	Army forces	GLD	ground liaison detachment
ASOG	air support operations group	JACCE	joint air component coordination element
ASOS	air support operation system	JAGIC	joint air ground integration center
AWACS	Airborne Warning and Control System	JFC	joint force commander
BCD	battlefield coordination detachment	JOC	joint operations center
BCT	brigade combat team	JSTARS	Joint Surveillance Target Attack Radar System
BN	battalion	TACP	tactical air control party
CAS	close air support	WOC	wing operations center
CP	command post		

Figure II-3. Theater Air Control System/Army Air-Ground System

(2) **Wing Operations Center (WOC).** The WOC is the air expeditionary wing's operations center. It provides C2 of unit forces and ensures sorties are generated to accomplish CAS missions as directed by the ATO. The WOC may recommend weapons load changes based on factors including weapons availability and desired effects.

(3) **Control and Reporting Center (CRC).** CRCs are **ground-based airspace control/air defense, battle management centers that provide the COMAFFOR with a decentralized C2 execution capability.** Critical core competencies of the CRC include air battle execution, surveillance, CID, data link management, and theater air defense. The CRC provides a robust systems/communications hub capability that connects lateral and subordinate joint and TACS C2 nodes to the JAOC. CRCs provide safe passage and radar

control and surveillance for CAS aircraft transiting to and from target areas. CRC supports the CAS mission by providing coordination with the JAOC, air support operations center (ASOC), direct air support center (DASC), Airborne Warning and Control System (AWACS), and the Joint Surveillance Target Attack Radar System (JSTARS). This includes airspace and fires integration.

(4) **ASOC.** The ASOC is the principal air control agency within the TACS, responsible for controlling joint air operations that directly support ground forces. Utilizing the procedural method of airspace control, the ASOC functions as an extension of the JFACC's JAOC. As such, the ASOC is directly subordinate to the JAOC and is responsible for the coordination and control of air component missions within division assigned airspace, which require integration with other supporting arms and ground forces. The ASOC processes include the following: handling immediate air support requests, coordinating the execution of scheduled and on-call CAS sorties, and coordinating manned/UA transiting through airspace over the ground force commander's operational area. When delegated the authority, the ASOC retargets/re-roles/redirects airborne assets, provides target updates, and launches ground alert aircraft on call for the ground maneuver commander, as required. The ASOC's configuration is flexible and can be task-organized to support a variety of tactical control requirements. ASOC assigns and directs attack aircraft to JTACs; serves as the net control station (NCS) for the joint air request net (JARN), and tactical air direction (TAD) net; and performs other functions to facilitate air-ground operations. Within division assigned airspace, the ASOC coordinates other mission areas: AI, ISR, SEAD, and personnel recovery. The ASOC, as a tactical level element, normally collocates with the Army's senior tactical FC, airspace, air and missile defense, and aviation elements to form the joint air ground integration center (JAGIC), at the division level or at the operational/corps level, as required. Synchronization among the ASOC, FC, and the airspace control element is vital to effective air-ground integration.

(5) **Tactical Air Control Party (TACP).** The TACP is the principal air liaison unit collocated with ground maneuver units. TACPs are organized into expeditionary air support operations groups or squadrons that are aligned with their respective Army corps, divisions, or brigades. The TACP has two primary missions: advise ground commanders on the capabilities and limitations of air operations and provide the primary TAC of CAS. TACPs coordinate ACMs and deconflict the aircraft with other fire support. TACPs may employ JTACs at any echelon, but will most often place them in a forward position (i.e., the company/team level). The following are members of a TACP:

(a) **ALO.** The ALO is the senior TACP member attached to a ground unit who functions as the primary advisor to the ground commander on air operations. An ALO is an expert in the capabilities and limitations of air operations. The ALO plans and executes CAS in accordance with the ground commander's guidance and intent. At battalion (BN) level, the senior member of the TACP is called a battalion air liaison officer—a specially trained and experienced noncommissioned officer or officer.

(b) **JTAC.** The JTAC is a qualified and certified Service member, who, most often from a forward position, directs the action of combat aircraft engaged in CAS and other air operations. The JTAC provides the ground commander recommendations on the use of CAS and its integration with ground maneuver. The JTAC must:

1. Know the enemy situation and location of friendly units and civilians.

2. Know the supported commander's target priority, desired effects, and timing of fires.

3. Know the commander's intent and applicable ROE.

4. Validate targets of opportunity.

5. Advise the commander on proper employment of air assets.

6. Submit immediate requests for CAS.

7. Provide TAC with supported commander's approval.

8. Deconflict aircraft and fires from CAS sorties.

9. Provide initial BDA report.

(c) **Intelligence Surveillance and Reconnaissance Liaison Officer (ISRLO).** The ISRLO is an Air Force intelligence professional assigned to an air support operations group or air support operations squadron to advise, assist, and educate the aligned supported unit and TACP on USAF ISR, both in garrison and deployed.

(d) **SPACE Liaison Officer.** The space liaison officer is an Air Force space professional assigned to an air support operations group or air support operations squadron to advise, assist and educate the aligned supported unit and TACP on the integration and employment of space assets.

(6) **Airborne C2 Elements.** Airborne C2 platforms supporting CAS include the E-3 AWACS, and the E-8C JSTARS.

(a) **AWACS.** AWACS provides safe passage information and radar control and surveillance for aircraft transiting from bases/ships to the target area and back. The E-3 AWACS provides the COMAFFOR with a decentralized execution capability. AWACS supports the CAS mission by providing the coordination link with the JAOC, ASOC, DASC, and JSTARS. AWACS provides imminent threat warning for assets under its control, via voice or links. The AWACS air weapon officers have the ability to provide stacking of aircraft for the working area.

(b) **JSTARS.** JSTARS provides ground and air commanders with situation development, targeting, attack planning and limited post-attack assessment information. JSTARS supports CAS by providing targeting information to the ASOC, FSCC/FC, tactical operations centers (TOCs), and DASC. When requested, JSTARS provides ground surveillance SA and targeting information directly to CAS aircraft, the FAC(A), TACPs, or individual JTACs. As part of its airborne C2 mission, JSTARS provides tactical air coordinator (airborne) (TAC[A]) functions including ASOC/DASC extension, ground moving target indicator support, and CAS battle management for a brigade-sized operation when no ASOC/DASC is available.

(c) **FAC(A).** A FAC(A) is authorized to perform TAC and is normally an airborne extension of the TACP. FAC(A)s can serve as another TAC for the TACP or augment and extend the acquisition range to work with joint fires observers (JFOs). USAF FAC(A)s operate from FW (fighter or attack) aircraft in either single ship or two ship formations. FAC(A) aircraft carry equipment and munitions to aid in their roles. Targeting pods can aid in finding and fixing potential targets, an IR pointer for night operations, laser spot search (LSS)/track capability, and the ability to transmit full motion video (FMV)/video downlink (VDL) to the ground-based VDL systems. Targeting pods aid the FAC(A) with target coordinate generation for the JTAC. Target location error (TLE) for FAC(A) derived coordinates will vary based on platform, software suite, sensors employed, and aircraft position in relation to the target, but is generally category (CAT) II or better (less than 50 feet [ft]/15 meters of TLE). Munitions include white phosphorus (WP) rockets, red phosphorus and high explosives incendiary rounds as gun ammunition. These munitions aid the FAC(A) in the marking of targets for CAS aircraft. For night missions, FAC(A) platforms can carry overt or IR illumination rockets, and LUU-series flares (LUU 2/19) [LUU is a military designation for flares released from aircraft]. FAC(A)s are capable of performing radio relay, reconnaissance, indirect fires (IDFs) call-for-fire, asset coordination and deconfliction, BDA, target marking, designation and coordinate generation, SEAD coordination and deconfliction, and TAC.

(d) **TAC(A).** The TAC(A) is an extension of air support control agencies. In the TACS, TAC(A) provides communications relay between the TACP and attack aircraft, as well as other agencies of the TACS, in the absence of JSTARS, or a FAC(A). Air Force two-ship FAC(A) flights, especially in higher threat environments, may divide responsibilities so one aircraft fills the normal FAC(A) role while the second becomes a TAC(A). The TAC(A) expedites CAS aircraft-to-JTAC handoff during "heavy traffic" CAS operations. TAC(A) tasks may include coordination of CAS briefs and attack times; CAS and FAC(A) hand-offs to terminal attack controllers; relay of threat updates and BDA to C2 agencies; coordination of aircraft and surface fire support; coordination of FW and RW operations; visual reconnaissance; coordination of IDF support, to include NSFS; and strike coordination and reconnaissance.

(7) **Joint Air Component Coordination Element (JACCE).** When the COMAFFOR is designated as the JFACC, a JACCE may be established to interface and provide liaison with a functional component commander, e.g., the joint force land component commander, other component commanders, or other Service commanders (e.g., commander, Army forces or commander, Navy forces [COMNAVFOR]). The JACCE is the senior joint air operations element assisting a supported commander's staff in planning air component supporting and supported requirements. Normally, the JACCE is composed primarily of personnel who have an ongoing working relationship with the component commanders or Service commanders. Additional manning should include personnel who have a working relationship/understanding of the associated JAOC. The JACCE facilitates integration by

exchanging operational data and support requirements and by coordinating the integration of JFACC requirements for ACMs, joint FSCMs, CAS, air mobility, and space requirements, as well as COMAFFOR requirements of force protection, logistics, sustainment, and personnel. It must be emphasized, the JACCE is a liaison element, not a C2 node; nor is the JACCE director a commander (unless designated), thus the JACCE normally has no authority to direct or employ forces.

(8) **Air Force Liaison Element (AFLE).** The AFLE provides an interface between the COMAFFOR and the JFACC for coordinating and synchronizing Air Force units in support of joint air operations if the JFACC is not also the COMAFFOR. Normally, the AFLE is composed of personnel and equipment for a general purpose, numbered Air Force's staff and component organizations. AFLE manning is based on a cadre concept with personnel selected for their battle management expertise and knowledge of C2 concepts and procedures. The cadres are augmented by additional personnel who are specialists knowledgeable in the capabilities and tactics of the aircraft, intelligence, or weapons systems being employed. The AFLE can be tailored to perform a variety of missions and management functions to match the contingency or operation.

4. Army Air-Ground System

a. The Army's control system for synchronizing, coordinating, and integrating air operations with the commander's scheme of maneuver is the AAGS. The AAGS initiates, receives, processes, and executes requests for air support and disseminates information and intelligence produced by aerial assets. The AAGS (see Figure II-3) begins at the field army level, and extends down through all echelons to the maneuver BN. Although some elements within AAGS, such as the TACP, belong to different Services or other nations, they function as a single entity in planning, coordinating, deconflicting, and integrating air support operations with ground operations. The AAGS consists of airspace element, FC, air and missile defense, and aviation elements and coordination/liaison elements. Teamed with the Air Force ASOC and TACP, they form the JAGIC for coordination and deconfliction of joint fires in the division operational area and assigned airspace. Division assigned airspace is assigned by the airspace control authority and is normally that airspace between the rear boundary and the fire support coordination line (FSCL), between the lateral boundaries up to the coordinating altitude. **AAGS is used to coordinate and integrate both Army component aviation support and joint air support with Army ground maneuver.**

b. **Entities within the AAGS.** Army commanders cross-functionally organize elements of staff sections in command posts for effective C2 through mission command. In operations, the command post promotes effective mission command that requires continuous, close coordination, synchronization, and information sharing across staff sections.

(1) **Command Post.** A command post is a unit headquarters (HQ) where the commander and staff perform their activities. The HQ's design of the modular force, combined with robust communications, gives commanders a flexible mission command structure consisting of a main command post, a tactical command post, and a command group for brigades, divisions, and corps. Combined arms BNs are also resourced with a

combat trains command post and a field trains command post. Theater army HQ are resourced with a main command post and a contingency command post.

(2) **Main Command Post.** The main command post is the unit's principal command post that contains the majority of the staff. The main command post is designed to control current operations, conduct detailed analysis, and plan future operations. It includes representatives of all staff sections and a full suite of information systems to plan, prepare, execute, and assess operations. Functions of the main command post include, but are not limited to:

(a) Providing a facility for the commander to control operations, issue orders, and conduct rehearsals.

(b) Controlling and synchronizing operations.

(c) Monitoring and assessing operations for their impact on future operations.

(d) Planning operations, including branches and sequels.

(e) Issuing directives and orders.

(f) Allocating resources.

(3) **Tactical Command Post.** The tactical command post is a facility containing a tailored portion of a unit HQ designed to control portions of an operation for a limited time. Commanders employ the tactical command post as an extension of the main command post to help control the execution of an operation, direct the operations of units close to each other, or a specific complex task. The tactical command post is fully mobile and includes only essential soldiers and equipment. The tactical command post relies on the main command post for planning, detailed analysis, and coordination.

(4) **Fire Support Team (FIST).** A FIST is a field artillery team with a habitual relationship to a maneuver company and selected units to plan and coordinate all available company supporting fires, including mortars, field artillery, NSFS, and CAS integration. FISTs employed at company/troop level provide maneuver companies and reconnaissance troops with fire support coordination, targeting, input for TAC, and assessment capabilities. The BN commander can task-organize within the BN and employ according to the observation plan. Each FIST vehicle possesses a target acquisition/communications suite with the capability to designate for laser-guided munitions.

(5) **JFO.** A JFO is a qualified and certified Service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 CAS TACs, and perform TGO in conjunction with a JTAC/FAC(A). JTACs cannot be in a position to see every target on the battlefield. Trained JFOs, in conjunction with JTACs, will assist maneuver commanders with the timely planning, synchronization, and responsive execution of CAS.

(6) **Army Aviation Liaison. Army aviation commanders establish liaison with supported** brigade combat teams (BCTs) during specified operations. The aviation LNO team will normally work for the brigade aviation officer as a functioning addition to the brigade aviation element (BAE) staff section. Often aviation LNO teams will coordinate with the BAE and then embed in a lower echelon during mission execution.

(7) **Battlefield Coordination Detachment (BCD).** The BCD is an Army liaison provided by the Army component or force commander to the COMAFFOR for duties with the AOC or to the JFACC for duties in the JAOC based on the scenario. The BCD processes Army requests for air support and monitors and interprets the land battle situation. This interface includes exchanging current intelligence and operational data, support requirements, coordinating the integration of Army forces requirements for ACMs, FSCMs, and theater airlift. The BCD is not an FC; however, it can perform many fire support functions.

(8) **Airspace Elements.** Corps/division airspace element oversees airspace control for the entire division operational area, regardless of whether the operational area has been further assigned to the BCT. When a division allocates part of its operational area to a BCT, it delegates some airspace control responsibilities to the BCT. As the airspace functional lead for the corps and division staff, the airspace element develops standard operating procedures (SOPs) and airspace control annexes that help standardize airspace control operations among subordinate units. These procedures and annexes ensure consistency with joint airspace procedures and associated plans and orders. The airspace element coordinates with the TACP and the ASOC at the Army command post, and may coordinate with CRCs, AWACS, Marine Corps DASC/Tactical Air Operations Center (TAOC), and other airspace control entities for rapid resolution of airspace issues. Air defense airspace management (ADAM)/BAE) supports the brigade commander by providing situational understanding of the airspace and early warning via connectivity with airspace users and with multinational partner's sensors and command networks. The ADAM /BAE coordinates closely with the brigade TACP to identify CAS airspace requirements and facilitate air-ground integration. The ADAM/BAE is responsible for integrating airspace requirements in the BCT unit airspace plan and submits airspace requirements to the division airspace element.

5. Air Force and Army Command and Control in Land Operations

a. Air-ground integration is achieved through the operations processes to coordinate with each echelon of command, with other components and with multinational partners. When appropriate, USAF TACS may be clearly interconnected with the Army air-ground system (AAGS). At the division level, this interconnection of TACS/AAGS is found within the JAGIC. The JAGIC is a mix of Army and Air Force personnel within the current operations integration cell. The JAGIC may contain participants such as the fire support coordinator (FSCOORD-Army; fire support coordinator [FSC]-USMC) and Army or Marine Corps component operations staff officer (Army division or higher staff, Marine Corps brigade or higher staff) (G-3)/BN or brigade operations staff officer (Army; Marine Corps BN or regiment) (S-3). If Navy or Marine Corps CAS is available, the air-naval gunfire liaison company (ANGLICO) may provide the division, brigade, and BN FCs with supporting arms liaison. The TACP is essential to integrating CAS during the Army's operations process and military decision-making process. The ASOC is essential to the conduct of CAS during the execution of operations and resourcing immediate air support requests. The collocation of the appropriate personnel from the FC, the Army aviation element, TACP, and the ASOC in the current operations integration cell facilitates joint air and ground integration.

b. **FC and ASOC/TACP Interface within the JAGIC.** The FC is the link for the CAS mission area between the Army unit and the ASOC/TACP. The FC is responsible for fire support planning, coordination, integration, and synchronization of fires delivered on surface targets by all fire-support assets under the control, or in support, of the ground maneuver commander. As part of this responsibility, the FC, Army AMD cell, and airspace and aviation elements teamed with ASOC/TACP, coordinate the airspace use within the JAGIC. The JAGIC synchronizes and integrates CAS for the unit. CAS coordination occurs through the ASOC and the unit's ALO/ASOC director.

c. **Figure II-4 depicts** US Air Force and US Army agencies and communications nets provide supporting components normal control agencies and frequency band connectivity requirements for CAS.

6. Navy Command and Control

a. The NTACS is the principal air control system afloat. Figure II-5 shows typical Navy and Marine Corps CAS connectivity.

b. **Entities within NTACS**

(1) **Navy Tactical Air Control Center (Navy TACC).** The Navy TACC is the primary air control agency within the operational area from which all air operations supporting the amphibious task force are controlled. When the COMNAVFOR is also the JFACC, he will augment the Navy TACC with elements from other components to create a JAOC. A key function of the Navy TACC is to provide CAS and other air support as requested by the landing force (LF). Ideally the Navy TACC is collocated with the supporting arms coordination center (SACC) onboard amphibious warfare command ships. The SACC is the naval counterpart to the LF's FSCC. The SACC is generally in control until the LF is firmly established ashore, at which time some or all coordination may be shifted to the FSCC ashore. Two sections within the Navy TACC specifically support the CAS function:

(a) **Air Traffic Control Section (ATCS).** The ATCS provides initial safe passage, radar control, and surveillance for aircraft in the AOA. The ATCS can also provide early detection, ID, and warning of enemy aircraft.

United States Air Force and United States Army Communications Nets

Net	Frequency	AOC	ASOC	CRC	WOC	FAC(A)	TACP	CAS A/C	AWACS	JSTARS
Command and Control Net	HF SATCOM	X	X	X	X				X	X
Joint Air Request Net	HF SATCOM		X	X			X		#	# X
Air Control Net	UHF VHF/AM			X		X		#	X	X
Tactical Air Direction Net	UHF		X			X	X	X		X
Inflight Report Net	UHF VHF/AM	#	X	X	#	X		#	X	#
Guard	UHF VHF	X	X	X	X	X	X	X	X	X
Tactical Air Control Party Administration Net	HF VHF/FM		X				X			#
Voice Product Net		X	X	X					X	X
High Value Asset Net	UHF		X	X					X	X

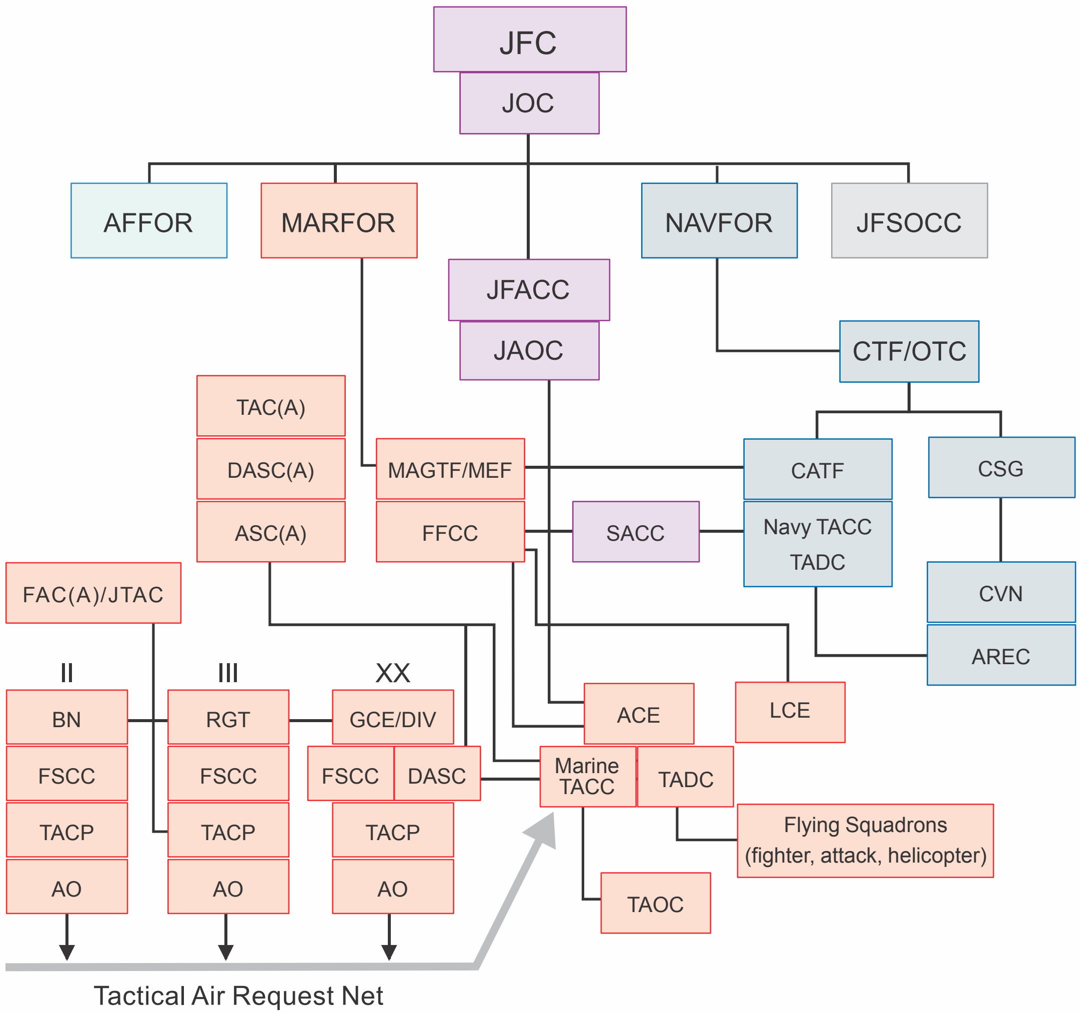
“X” indicates normal participation in the specified net.
“#” indicates participation when directed, or as required.

Legend

A/C	aircraft	FM	frequency modulation
AM	amplitude modulation	HF	high frequency
AOC	air operations center	JSTARS	Joint Surveillance Target Attack Radar System
ASOC	air support operations center	SATCOM	satellite communication
AWACS	Airborne Warning and Control System	TACP	tactical air control party
CAS	close air support	UHF	ultrahigh frequency
CRC	control and reporting center	VHF	very high frequency
FAC(A)	forward air controller (airborne)	WOC	wing operations center (USAF)

Figure II-4. United States Air Force and United States Army Communications Nets

Navy and Marine Corps Close Air Support Connectivity



Legend

ACE	aviation combat element
AFFOR	Air Force forces
AO	air officer
AREC	air resource element coordinator
ASC(A)	assault support coordinator (airborne)
BN	battalion
CATF	commander, amphibious task force
CSG	carrier strike group
CTF	combined task force
CVN	aircraft carrier, nuclear
DASC	direct air support center
DASC(A)	direct air support center (airborne)
DIV	division
FAC(A)	forward air controller (airborne)
FFCC	force fires coordination center
FSCC	fires support coordination center
GCE	ground combat element (MAGTF)
JAOC	joint air operations center
JFACC	joint force air component commander
JFC	joint force commander
JFSOCC	joint force special operations component commander
JOC	joint operations center
JTAC	joint terminal attack controller
LCE	logistics combat element (Marine)
MAGTF	Marine air-ground task force
MARFOR	Marine Corps forces
Marine TACC	Marine tactical air command center
MEF	Marine expeditionary force
NAVFOR	Navy forces
Navy TACC	Navy tactical air control center
OTC	officer in tactical command
RGT	regiment
SACC	supporting arms coordination center
TAC(A)	tactical air coordinator (airborne)
TACP	tactical air control party
TADC	tactical air direction center
TAOC	tactical air operations center (USMC)

Figure II-5. Navy and Marine Corps Close Air Support Connectivity

(b) **Air Support Control Section (ASCS).** The ASCS is designed to coordinate and control overall CAS employment. The primary task of the ASCS is to provide fast reaction to CAS requests from the LF. The ASCS coordinates with the SACC to integrate CAS and other supporting arms, provide aircrews with the most current intelligence and target briefings, pass CAS control to the JTAC, execute the CAS portion of the ATO, and act as the agency for immediate CAS requests.

(2) **Tactical Air Direction Center (TADC).** The TADC is a control agency subordinate to either the Navy TACC or Marine tactical air command center (Marine TACC), smaller in area of control, seen during advance force or sector operations. Once the Navy passes control of aviation assets ashore to the commander, LF, the Marine TADC becomes the Marine TACC, and the Navy TACC reverts to a Navy TADC.

(3) **Helicopter Direction Center (HDC).** The HDC is an air operations installation under the overall control of the Navy TACC, TADC, or DASC (ashore), as appropriate, from which control and direction of helicopter operations are exercised. Onboard the large-deck amphibious warfare ships, the control center for helicopters is the amphibious air traffic control center; however, HDC will be used throughout this publication.

(4) **SACC.** Although not part of the NTACS, the SACC is integral to supporting arms C2. The SACC is a single location onboard an amphibious warfare ship in which all communications facilities incident to the coordination of fire support of the artillery, air, and naval gunfire are centralized. 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 (TAR) nets with TACP to coordinate CAS requests. The SACC is the naval counterpart to the LF's FSCC. The SACC is generally in control until the LF is firmly established ashore, at which time some or all coordination may be shifted to the FSCC ashore.

(5) **JTAC.** The Navy has JTACs assigned to riverine and Navy special warfare units.

(6) **Airborne C2 Elements**

(a) The E-2C Hawkeye is the Navy's carrier-based tactical battle management airborne early warning and C2 aircraft. When executing an airborne battlefield C2 mission, the E-2C functions as an extension of the JAOC, Marine TACC, ASOC, DASC, or Navy TACC. In this overland mission, the E-2C provides battle management in the area of ISR integration, electronic attack, tanking, airspace control, and communication relay. Because airborne battlefield C2 is a dedicated mission for the E-2C, it should not be assigned to perform additional missions simultaneously.

(b) **FAC(A).** The Navy has FAC(A)s assigned to operational fighter squadrons attached to carrier air groups. Navy FAC(A)s are also trained as JTACs.

(c) **TAC(A).** The TAC(A) can serve as a communications relay between the terminal attack controller and the supporting assets, deconflict aircraft at the direction of the JTAC/FAC(A), and serve as the tactical lead for coordinated attacks.

(7) **The Naval and Amphibious Liaison Element (NALE).** The COMNAVFOR provides the NALE to the JFACC's JAOC. The NALE is responsive to the JAOC on matters pertaining to Navy and Marine amphibious operations. The NALE processes COMNAVFOR requests for air support and monitors and interprets the maritime battle situation for the JAOC. An expeditionary strike group or amphibious task force representative at the JAOC will greatly facilitate the following:

(a) Processing of ACM requests.

(b) Integration of expeditionary strike force, expeditionary strike group, or MAGTF air missions into the ATO.

(c) Resolution of current operations issues such as ATO change requests, ACM activation, and rerole of existing ATO missions.

(d) Coordination of air defense requirements with the area air defense commander.

7. Marine Corps Command and Control

a. The MACCS consists of various air C2 agencies designed to provide the MAGTF aviation combat element (ACE) commander with the ability to monitor, supervise, and influence the application of Marine aviation's six functions (antiair warfare, offensive air support, EW, air reconnaissance, control of aircraft and missiles, and assault support). The Marine air control group is responsible for providing, operating, and maintaining principal MACCS agencies. Marine aviation's philosophy is one of centralized command and decentralized control. The commander, Marine Corps forces focal point for tasking and exercising OPCON over Marine Corps air assets is the Marine TACC.

b. Entities within the MACCS

(1) **Marine TACC.** The Marine TACC is the senior agency of the MACCS. It provides the facilities for the ACE commander and the battlestaff to command, supervise, and direct MAGTF air operations. When the commander, Marine Corps forces is also the JFACC, he will augment the Marine TACC with elements from other components to create a JAOC. Other Services' comparable agencies include the AOC and the Navy TACC.

(2) **TADC.** The Marine TADC is an air operations agency subordinate to the Navy TACC. The Marine TADC is normally utilized during the phasing of the MACCS ashore.

(3) **TAOC.** The TAOC is subordinate to the Marine TACC and performs three primary functions within the MACCS. These functions include air surveillance, air direction, and air control. As the MAGTF's primary air surveillance agency, the TAOC uses its organic radars and tactical data links to create a recognized air picture within its assigned

sector. That air picture, which is shared through various data links to a wide variety of C2 systems, is managed through detailed coordination with higher and adjacent MAGTF and joint surveillance platforms. The TAOC can also perform a variety of delegated air direction functions, including coordination and deconfliction of airspace, tanker management, antiair warfare asset management, and coordination and control of fires in the deep area. The TAOC utilizes positive and procedural air control to ensure mission-tasked aircraft and itinerant aircraft are routed and deconflicted.

(4) **DASC.** The DASC is the principal air control agency responsible for the procedural control and direction of air operations that directly support ground forces. It functions in a decentralized mode of operation, but is directly supervised by the Marine TACC. The DASC processes immediate air support requests, coordinates the execution of preplanned and immediate CAS, directs assigned and itinerant aircraft, and controls UA transiting through DASC-controlled airspace. When delegated authority, the DASC adjusts preplanned schedules, diverts airborne assets, and launches aircraft, as required. The DASC's configuration is flexible and can be task-organized to meet a variety of requirements. The DASC normally collocates with the senior FSCC. When there are multiple ground combat elements (GCEs), the DASC may collocate with the MAGTF's FFCC. Synchronization between the DASC and the FFCC/FSCC is vital to the effective coordination of direct air support missions and the employment of other supporting arms. An airborne DASC can also be operated from KC-130 aircraft providing the functions of the DASC on a limited scale.

(a) **TACP (USMC).** Marine TACPs are organic to Marine infantry divisions, regiments, and BNs. The TACP provides a way for ground commanders to access the MACCS to satisfy their direct air support requirements. It provides the ground commander with aviation advisory personnel and the means to integrate tactical air operations with supporting arms. TACPs provide TAC capability down to the company level.

(b) **FAC.** In the Marine Corps, the FAC is an aviation officer certified and qualified as a JTAC who coordinates, integrates, and directs actions of combat aircraft engaged in support of ground combat operations.

(c) **JTAC.** The JTAC is an individual, usually with a ground combat arms background, who is certified and qualified as a JTAC.

(d) **JFO.** The JFO is an individual, usually with a ground combat arms background, who is a certified and qualified JFO.

(e) **AO.** The AO serves as the primary advisor to the ground commander for integration of all functions of aviation with ground combat operations. Marine AOs are fully integrated at the division, regimental, and BN staff levels, as well as within the MAGTF.

(5) **Air support element** is a task organized element employed by the Marine air support squadron to perform various air support control functions. Employment options can range from Marine expeditionary unit-level operations typically characterized by limited assets and endurance, to a multi-division operation where the echelon is almost, if not

completely, identical in capability, but set apart in responsibilities and subordinate to the DASC. The echelon can function as an extension of the Navy TACC or HDC, in conjunction with the BN TACP. In support of a major subordinate command scenario, the echelon may be augmented with assets and personnel to support continuous control of direct air support over an extended period.

(6) **Air Support Liaison Team (ASLT).** An ASLT is employed to conduct face-to-face coordination with the GCE's senior FSCC when the DASC is not able to physically collocate. An ASLT can also be employed at a lower echelon FSCC or to joint or multinational forces. The ASLT facilitates information flow concerning direct support air requests and fires between the DASC and the supported element. The DASC is task organized by the Marine air support squadron commander, based on information requirements.

(7) **Airborne C2 Entities**

(a) **Forward Air Controller (Airborne).** The FAC(A) is a specifically trained and qualified aviation officer who exercises control from the air of aircraft engaged in CAS of ground troops. The FAC(A) is normally an airborne extension of the TACP.

1. The FAC(A) can serve as another terminal attack controller for the TACP and extend the acquisition range of a TACP. FAC(A) tasks include detecting and destroying enemy targets, coordinating target marking, providing TAC of CAS missions, conducting air reconnaissance, providing artillery and naval gunfire air spotting, providing radio relay for the TACP or JTAC, and passing BDA.

2. A FAC(A) must be able to coordinate supporting arms missions and CAS missions. The FAC(A) will execute the commander's intent in all weather conditions. To accomplish this, the FAC(A) must conduct detailed planning and integrate with the supported maneuver element.

3. The FAC(A)'s mission is different from the TAC(A)'s mission. The FAC(A) provides TAC of CAS aircraft, while a TAC(A) aids in the coordination of available supporting arms. FAC(A) and TAC(A) missions are not normally conducted simultaneously by the same aircrew.

(b) **TAC(A).** The TAC(A) is an airborne coordinator that can manage supporting arms such as CAS, FAC(A), and other assets to include assault support. The TAC(A) is an airborne extension of the DASC or Marine TACC. The DASC or Marine TACC will identify and delegate specific TAC(A) authority. The TAC(A) coordinates with TACPs, FSCCs, subordinate FAC(A)s, artillery units, and NSFS ships. TAC(A) duties include coordinating CAS briefs and timing, providing CAS aircraft hand-off to terminal attack controllers, relaying threat updates and BDA, integrating CAS with other supporting arms, and coordinating FW and RW operations.

1. The relationship between the TAC(A), direct air support center (airborne) (DASC[A]), and the assault support coordination (airborne), if employed, should be established by the ACE commander. While the TAC(A) usually works directly for the

DASC, they must also coordinate and work closely with the senior FSCC. The TAC(A) facilitates information flow and solves problems that arise during execution. This information is used by the ACE commander to make timely and informed decisions.

2. Planning a TAC(A) mission has some similarities to planning a FAC(A) mission. The primary difference is the FAC(A) is an extension of the TACP while the TAC(A) is an extension of the DASC or Marine TACC. Many of the C2 and communication and information planning considerations are the same but the focus and scope of what the TAC(A) must know is generally broader with much less emphasis on target area tactics and more emphasis on information management and flow.

(8) **FFCC/FSCC.** In order to conduct CAS, detailed coordination is required between the MACCS and the FFCC/FSCC. The MAGTF FFCC plans, coordinates, and executes lethal and nonlethal fires in support of the MAGTF commander's CONOPS. The FFCC is the senior fire support coordination agency. The FSCC is a single location in which there are centralized communications facilities and personnel incident to the coordination of all forms of fire support. An FSCC exists from division to BN levels. The overarching goal is integrating fire support assets and maneuver to achieve the desired results from the air attack without suspending the use of the other supporting arms or unnecessarily delaying the scheme of maneuver. An additional goal is to offer a reasonable measure of protection to the aircraft from our own surface fires and enemy fires.

(9) **ANGLICO.** ANGLICO is a BN-level command which provides the MAGTF commander with a liaison capability to plan, coordinate, employ, and conduct terminal control of fires in support of joint, allied, and multinational forces. Each echelon of the ANGLICO command structure provides the same fire support and terminal control services found in organic Marine Corps maneuver units, but provides those services to joint and multinational forces. ANGLICO support is normally broken down as follows:

(a) **Company HQ.** Company HQ provides a fire support cell to a division. This cell contains approximately 50 personnel to coordinate ANGLICO operations and support in the supported division's area of operations.

(b) **Brigade Platoon.** The brigade platoon provides fire support coordination to a brigade/regiment. Normally led by an artillery officer (O-4) with a staff that includes an AO and naval gunfire liaison officer (NGLO), who are also qualified JTACs. There are two brigade platoons per ANGLICO.

(c) **Supporting Arms Liaison Team (SALT).** The SALT provides fire support coordination to a BN. A SALT contains ten members and is normally led by a FAC (O-3). A SALT is capable of providing a 24 hour FSCC for a limited amount of time. The SALT chief is also a designated JTAC. There are two SALTs per brigade platoon.

(d) **Firepower Control Team (FCT).** The FCT provides terminal control of fires for a joint/combined company. An FCT contains up to five members, which include at a minimum, one JTAC (O-3), a forward observer/JFO, and two field radio operators. FCT leaders are usually ground combat officers who have earned the JTAC qualification. There are two FCTs in each SALT.

(10) **Marine Liaison Element (MARLE).** The MARLE is responsive to the JFACC on matters pertaining to Marine Corps operations. The MARLE provides feedback to organizations in the JAOC on current and future joint air operations concerning integration of force requirements.

8. Navy and Marine Corps Command and Control in Amphibious Operations

a. Both the Navy and the Marine Corps air control systems are capable of independent operations; however, in the conduct of an amphibious operation, elements of both systems are used to different degrees from the beginning of the operation until the C2 of aircraft and missiles is phased ashore. Figure II-6 depicts Navy and Marine Corps air C2 agencies and the amphibious tactical air control system communications network.

b. Under the commander, amphibious task force, the Navy TACC, typically onboard the amphibious warfare command ship, will normally be established as the agency responsible for controlling all air operations within the allocated airspace regardless of mission or origin, to include supporting arms. As the amphibious operation proceeds, C2 of aviation operations is phased ashore as MACCS agencies are established on the ground. Air C2 functions are traditionally sequenced ashore in five phases:

(1) **Phase one** is characterized by the arrival of various "supporting arms controllers" ashore; namely the TACP, forward observers, air support liaison teams, and naval surface fire spot teams.

(2) In **phase two,** the DASC is normally the first principal air control agency ashore during amphibious operations. When control is afloat, the Navy TACC supervises the DASC's operations.

(3) The movement of the TAOC ashore, although not directly related to CAS, is the principal event in **phase three.**

(4) In **phase four,** the senior organization of the Marine air control group is established ashore and functions as the Marine TADC under control of the Navy TACC.

(5) **Phase five** is characterized by the passage of command responsibility ashore. The Marine Corps TADC assumes the role of the tactical air command center and once the Marine TACC receives control of all LF air operations, the Navy TACC becomes a TADC supporting the land-based air control agency.

For more information, see JP 3-02, Amphibious Operations.

Amphibious Tactical Air Control System Communications Network

Net	Frequency	TACC USN	TACC USMC	TADC	TAOC	DASC	MAG	TACP	A/C
Tactical Air Request/ Helicopter Request Net	HF VHF	X				X		X	X
Group Common	UHF						X		#
Guard	UHF VHF	X	X		X	X			X
Squadron Common	UHF								#
Tactical Air Command	HF UHF								
Tactical Air Control Party Local and Tactical Air Direction	VHF					#		X	#
Tactical Air Direction	UHF VHF	X	X	#	#	X		#	#
Tactical	HF	N	N	#	#	X		X	

"X" indicates normal participation in the specified net.
"N" indicates participation by Naval Tactical Air Control System agencies.
"#" Indicates participation when directed, or as required.

Legend

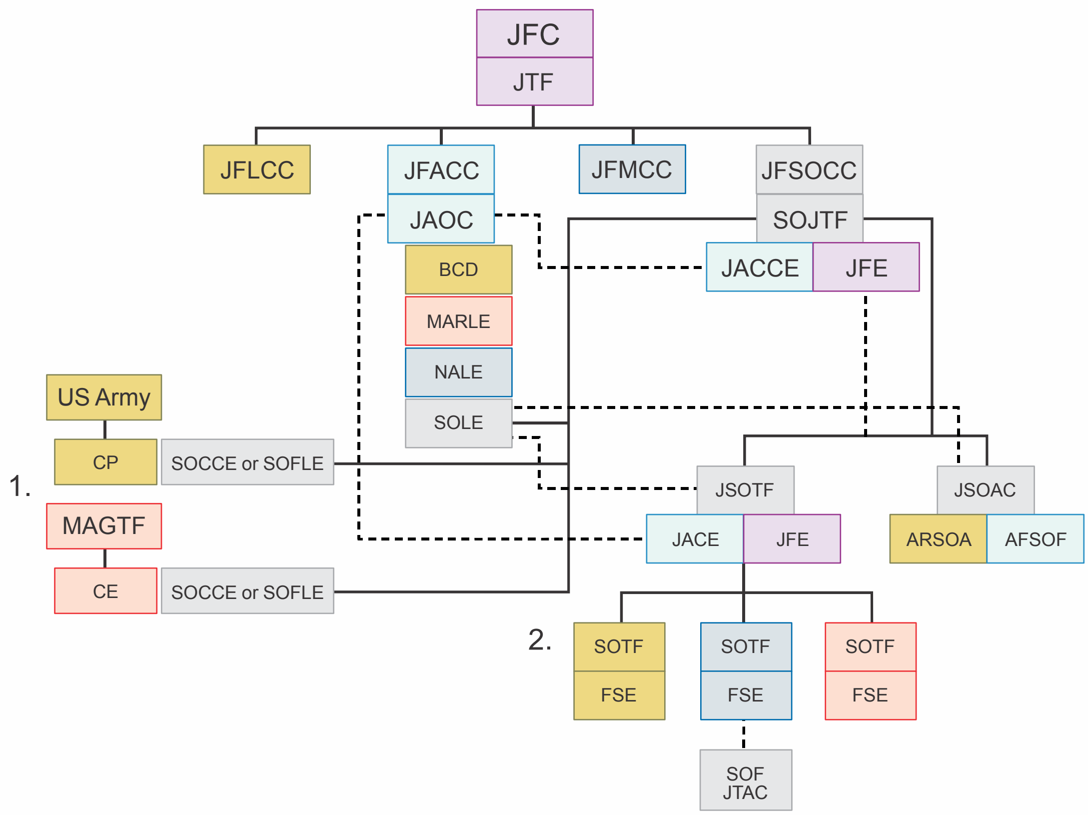
A/C aircraft
DASC direct air support center
HF high frequency
MAG Marine aircraft group
TACC tactical air control center (USN)/ tactical air command center (USMC)
TADC tactical air direction center
TACP tactical air control party
TAOC tactical air operations center
UHF ultrahigh frequency
USMC US Marine Corps
USN US Navy
VHF very high frequency

Figure II-6. Amphibious Tactical Air Control System Communications Network

9. Special Operations Command and Control

a. **SOAGS.** Theater special operations are normally under the control of the joint force special operations component commander (JFSOCC). Control of SOF air is normally exercised by a joint special operations air component (JSOAC), if designated by the JFSOCC. If a JSOAC has not been designated, then the SOF air is controlled by its Service component within the joint force special operations command. Principal organizations and personnel that support coordination of CAS for SOF are the special operations liaison element (SOLE), the special operations C2 element, and JTAC-certified and qualified SOF personnel (see Figure II-7).

Special Operations Air Ground System



1. Depending on the size of the MAGTF or US Army unit, the JFSOCC will provide SOCCE or SOFLE.
2. A SOTF can range in size from a SOF team to a SOF BN and be manned by ARSOF, NAVSOF, or MARSOF. For more information on SOF C2, see JP 3-05, *Special Operations*.

Legend

AFSOF	Air Force special operations forces
ARSOA	Army special operations aviation
BCD	battlefield coordination detachment
CE	command element
CP	command post
FSE	fire support element
JACCE	joint air component coordination element
JACE	joint air coordination element
JAOC	joint air operations center
JFACC	joint force air component commander
JFC	joint force commander
JFE	joint fires element
JFLCC	joint force land component commander
JFMCC	joint force maritime component commander
JFSOCC	joint force special operations component commander
JSOAC	joint special operations air component
JSOTF	joint special operations task force
JTAC	joint terminal attack controller
JTF	joint task force
MAGTF	Marine air-ground task force
MARLE	Marine liaison element
NALE	naval and amphibious liaison element
SOCCE	special operations command and control element
SOF	special operations forces
SOFLE	special operations forces liaison element
SOJTF	special operations joint task force
SOLE	special operations liaison element
SOTF	special operations task force

———— command relationship
- - - - - coordination

Figure II-7. Special Operations Close Air Support Connectivity

b. **Entities within SOAGS**

(1) **Joint Air Coordination Element (JACE).** The JACE typically locates with the joint fires element at the joint special operations task force (JSOTF). The JACE provides the JSOTF with air operations expertise. The JSOAC and JACE will exchange the necessary liaisons and information to maintain a common operational picture. The JACE functions as the focal point for preplanned air support requests and advises the commander, JSOTF on effective use of air operations.

(2) **JTAC.** All four Service components of United States Special Operations Command have JTACs.

(3) **Forward Air Controller (Airborne).** A specifically trained and qualified SOF aviator who exercises control from the air of aircraft engaged in CAS in support of ground troops.

(4) **SOLE.** A SOLE is a team provided by the JFSOCC that is attached to the JFACC to coordinate, deconflict, and integrate special operations air and surface operations with conventional air operations. The SOLE is the focal point in the JAOC for all air support requests for SOF, to include CAS.

(5) **Special Operations Command and Control Element.** A special operations command and control element performs C2 or liaison functions according to mission requirements and as directed by the JFSOCC. Its level of authority and responsibility may vary widely. It is the C2 focal point for CAS requests for SOF units in support of a conventional joint or Service force.

10. Communications Systems

a. **Control and Flexibility.** CAS missions require a high degree of control exercised through effective communications. 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 friendly fire and enhancing mission effectiveness. The flexibility and responsiveness of joint force CAS communications are made possible using a variety of techniques including electromagnetic spectrum management, countermeasures and emission control (EMCON), and through the interoperable communications nets of the components.

b. **Secure Voice/Frequency-Agile Communications.** The preferred means of communication during CAS missions is either using secure voice or frequency-agile radio systems (e.g., HAVE QUICK, single-channel ground and airborne radio system [SINCGARS]). Data link should also be used to transmit information whenever possible. However, **do not allow the nonavailability 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 C2 system and can 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, chattermarks, 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. **EMCON.** Emphasize EMCON throughout the planning and training cycles. **As the enemy increases the use of 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 JTAC/FAC(A) and CAS assets.** The DASC, ASOC, Marine TACC, Navy TACC, or TAC(A) transmits the CAS brief to the aircrew as early as possible and prior to initial contact with the JTAC. The aircrew contacts the JTAC, transmits the abort code, the required readback items, and receives the time to target (TTT) or time on target (TOT).

e. **Joint Communications Requirements**

(1) CAS participants will use the communications nets and architecture of the requesting component.

(2) When CAS is executed in joint operations, **all participants involved must have the appropriate signal operating instructions/joint communications-electronics operating instructions data** to communicate effectively and successfully. The JFACC (or the JFC staff if a JFACC is not established) identifies the communications requirements associated with CAS. The communications system directorate of a joint staff satisfies these requirements (e.g., providing frequencies, call signs, cryptographic key information) and produces the signal operating instructions/joint communications electronics operating instructions. It is the responsibility of the JFACC to ensure that required communications data for CAS is published in the joint ATO/SPINS.

(3) **Specifically, CAS-capable units and aircrews will need radio frequencies and call signs for airspace control agencies, ground forces, and the JTACs** 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 communications system directorate to coordinate the necessary CAS communications data to all elements in the CAS process.

f. **Component Communications Nets.** This subparagraph 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 others within the C2 systems that could be used in extreme situations. These nets are designed to provide communications redundancy. See Figures II-4 and II-6 for a listing of the communications nets associated with CAS.

(1) **Air Force and Army Communications Nets**

(a) **Army Interface.** The ASOC and TACPs are key liaison points between Air Force and Army elements. They have communications equipment for entry into Army voice and digital communications nets.

(b) **Army Command/Operations Net (voice).** This net is used for C2 of all maneuver elements within the maneuver force. TACPs may access this net to obtain commander's final release authority or to coordinate with key staff agencies for information such as the disposition and location of forward friendly units or elements.

(c) **Fire Support Net (voice).** The primary purpose of this net is to request calls for fire and facilitate coordination between maneuver, FCs, field artillery, mortars, and non-field artillery observers. Army aviation may also use this net to coordinate fires. TACPs may access this net to activate or deactivate airspace coordination areas (ACAs), or for coordinating target marks and/or suppression fire missions. This net may also be used to contact forward observers or facilitate control of CAS missions.

(d) **Operations and Intelligence (O&I) Net (voice).** Various human sources, such as scouts, advanced liaison, multinational force LNOs, reconnaissance elements, and other human operations or intelligence gathering entities use this net to pass routine operational and intelligence information. The O&I net connects observers with their corresponding C2 nodes. Additionally, this net may be used to determine if specific triggers for CAS have been met in order to synchronize CAS with ground fire and maneuver. TACPs may access this net to report or obtain forward operational environment information or facilitate TAC.

(e) **C2 Net.** Interfaces with other TACS units (AOC, CRC, AWACS, JSTARS, and WOC) are accomplished via high frequency (HF)/single sideband, tropo-microwave links, and SATCOM 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.

(f) **Digital Means for JTAR.** Digital is a method for transmitting/receiving JTAR/air support requests. The two authorized formats used to submit air support requests are Department of Defense Form (DD) 1972 (JTAR) and an Air Support Request United States Message Text Format (USMTF) D670. The DD 1972 can be transmitted digitally via SECRET Internet Protocol Router Network, Tactical Air Control Party Close Air Support System and the Advanced Field Artillery Tactical Data System (AFATDS).

(g) **JARN.** The JARN is the link between the ASOC and subordinate TACPs for aircraft coordination and sending immediate air support requests. The ASOC is the NCS. The ASOC will activate and operate as many nets as necessary, contingent with needs, equipment available, and frequencies allocated. The primary means for requesting immediate air support requests is the digital DD 1972, *Joint Tactical Air Strike Request*. The primary JARN may be a tactical SATCOM net or HF/single sideband.

(h) **Air Control Net.** The purpose of this net is to coordinate mission direction of airborne aircraft under control of the CRC. The ASOC interfaces with the tactical air control net through the US Army/USAF C2 net.

(i) **TAD Net.** The TAD net provides a means for the control of aircraft. TAD nets are used by all of the C2 nodes. The TACPs/FACs use their UHF-AM [amplitude modulation] net for the direction and control of aircraft engaged in CAS. The TACP and JTAC are the prime users of this net and are allocated specific frequencies to conduct tactical operations. The ASOC is also authorized to enter this net to pass time sensitive information. Due to the extremely time sensitive information passed on this net, the TAD net assigned to the JTAC or FAC(A) should be reserved for TAC only.

(j) **Inflight Report Net (INFLTREPS).** This UHF-AM net is for the airborne transmission of INFLTREPs to the elements of the TACS. Reports are normally passed to the CRC, AWACS, or JSTARS and relayed to the AOC and/or ASOC. The ASOC and AOC monitor this net when in range.

(k) **Guard Net.** The 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. If able, all aircraft continuously monitor guard.

(l) **TACP Administrative Net.** This net is used to pass urgent administrative, logistic, and command information between the ASOC and TACP elements.

(m) **Squadron Common Net.** The squadron common net provides a means of communication between squadron aircraft and/or with the squadron HQ. Each aircraft squadron has its own common net.

(n) **Secure Internet Relay Chat (IRC).** Secure IRC provides a means of communication between intelligence activities, selected aircraft, ASOC, and IRC equipped TACPs and JTACS.

(o) **Data-link nets** provide digital communications, increased SA, targeting, and deconfliction. The joint interface control officer (JICO) is responsible for establishing the network architecture in the operations task link.

(2) **Navy and Marine Corps Communications Nets**

(a) **USMC Command Net.** This net is used for C2 of all maneuver elements within the maneuver force. AOs and JTACs may access this net to obtain commander's final release authority or to coordinate with key staff agencies for information such as the disposition and location of forward friendly units or elements.

(b) **USMC Fire Support Coordination Net.** This net provides a means for overall fire support coordination. TACPs and JTACs may access this net to request activation or deactivation of ACAs, or for coordinating target marks and/or suppression fire missions.

(c) **USMC Artillery Conduct of Fire (COF) Net.** This net provides a means to directly request and adjust artillery fire.

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

(e) **Group Common Net.** The group common net provides a means of communication between inflight group aircraft and/or with the aircraft group HQ. Each aircraft group has its own common net.

(f) **Guard Net.** The 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.

(g) **Helicopter Direction Net.** The helicopter direction net provides positive control of helicopters in the AOA or area of operations with a high-density airspace control zone (HIDACZ) inbound to and outbound from USN ships. It is a backup net available to coordinate RW CAS.

(h) **Squadron Common Net.** The squadron common net provides a means of communication between squadron aircraft and/or with the squadron HQ. Each aircraft squadron has its own common net.

(i) **Tactical Air Command Net.** The tactical air command net is the primary means by which the tactical air commander provides operational tasking to subordinate units/agencies, to include tasking to aviation groups/squadrons to provide aircraft for missions.

(j) **TACP Local Net.** The TACP local net provides a means for coordination between the AO and the JTACs. Coordination with TAC(A)s and FAC(A)s may also be conducted over this net.

(k) **TAD Net.** The TAD net provides a means for the control of aircraft conducting CAS and for the Navy TACC/Marine TACC, TADC, and 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 afloat and ashore. This net is primarily secure UHF, with a secondary VHF capability available in some cases. Due to the extremely time sensitive information passed on this net, the TAD net assigned to the FAC or FAC(A) should be reserved for TAC only.

(l) **TAR Net.** The TAR net provides a means for ground maneuver units to request immediate air support from the DASC or Marine TACC/Navy 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 TAR nets may be required depending on the scope of CAS operations. A secondary VHF capability may be available.

(m) **Tactical Air Traffic Control (TATC) Net.** The TATC net provides a means for the Navy TACC/Marine TACC/TAOC and DASC to exercise control of all tactical and itinerant aircraft in the AOA or area of operations with a HIDACZ. Types of information passed over the tactical TATC net include reporting aircraft launches by mission number, clearing aircraft to their assigned control agencies, diverting aircraft as necessary, and relaying in-flight reports and BDA. Multiple TATC nets are often required.

(n) **Naval Gunfire Ground Spot Net.** The Naval gunfire ground spot net provides a means for shore fire control parties to directly request and adjust naval surface fires.

(o) **Naval Gunfire Air Spot Net.** The Naval gunfire air spot net provides a means for aircraft to directly request and adjust naval surface fires.

(p) **Shore Fire Control Party, Local Net.** The shore fire control party, local net, provides a means for coordination between the NGLO and the shore fire control party.

(3) **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.

(a) **SOF Air.** Communications between the aircraft and the JSOAC commander will be used to coordinate preplanned/immediate CAS requests. For preplanned CAS missions in support of another component, SOF air will access the established network of the requesting component. For immediate CAS (after JFSOCC approval), SOF air will access the requesting Service communications net to provide the requested CAS.

(b) **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 (by means of the JSOAC) 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 (again, by means of the JSOAC). The requesting unit will communicate with the CAS aircraft via the established providing component net.

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 Army Tactical Publication 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP 3-2.6, *JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower,* publication for a listing of radios found on CAS-capable aircraft and ground units. The figures and tables in that publication describe communication frequency ranges and capabilities.

i. **Digital Call-for Fire.** Systems that enable the TACP/JTAC or forward observers to communicate with the FSC and to aid in the speed and accuracy of information flow may be used. All agencies involved with the COF should have the capability to receive and disseminate digital requests for fires if digital means are to be used. See also Chapter V, "Execution," paragraph 9, "Digital Information Systems and Video Downlink Considerations."

11. Intelligence

a. **Joint intelligence preparation of the operational environment (JIPOE)** is the analytical process used by joint intelligence organizations to produce intelligence assessments, estimates, and other intelligence products in support of the JFC's decision-making process. It is a continuous process that involves four major steps: defining the total operational environment, describing the impact of the operational environment, evaluating the adversary, and determining and describing adversary potential courses of action (COAs), particularly the adversary's most likely COA and the COA most dangerous to friendly forces and mission accomplishment. The JIPOE process assists JFCs and their staffs in achieving information superiority by identifying adversary centers of gravity, focusing intelligence collection at the right time and place, and analyzing the impact of the operational environment on military operations.

The JIPOE process is described in detail in JP 2-01.3, Joint Intelligence Preparation of the Operational Environment.

b. **Intelligence preparation for CAS at all levels in the CAS process is largely dependent on mission and planning time available.** Optimum ISR support to CAS begins early in the planning process to include JIPOE and the targeting process. While it is impossible to account for every conceivable possibility, this early integration can assist in better target selection, intelligence collection requirements, force allocation, and follow-on assessment. In turn, this will assist in preparing for immediate retaskings. While preplanned CAS benefits most from advanced planning, immediate CAS can still realize the same benefits. At a minimum, tactical level forces should analyze the operational environment in terms of military objectives; air, land, and maritime avenues of approach; and the effects of weather and geography on personnel, CAS operations and weapons systems. The tactical level evaluation for CAS should concentrate on standard order of battle factors such as composition, strength, morale, tactics, and training status of specific tactical units that can interfere with mission accomplishment.

c. **Human Intelligence (HUMINT).** Tactical information of potential intelligence or targeting value can be derived from many different types of human sources. Aside from dedicated HUMINT collectors, teams like the TACP, precision weapons teams (PWTs), LNOs, reconnaissance teams, SOF, and FISTs may have the most current disposition of the enemy. All have the capability to relay critical information such as post attack BDA that will aid in the effectiveness of CAS. CAS aircrews are often in a position to provide and pass critical reconnaissance information.

d. **CAS-Related ISR Systems**

(1) UASs and JSTARS discussed previously.

(2) A variety of ISR platforms (e.g., **USAF RC-135 Rivet Joint, RQ-4 Global Hawk, EC-130, USN EP-3 Aries, US Army RC-12 Guardrail, MC-12W Liberty)**

provide classified communications intelligence and electronic intelligence (ELINT) information which may be used independently or cross-cued with other ISR platforms to augment or complete the overall intelligence picture.

(3) **Tactical Reconnaissance Systems.** Some aircraft are equipped with sensors and targeting pods that enable tactical airborne reconnaissance.

For more information, see Army Tactical Publication 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP 3-2.6, JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower.

(4) **Ground Surveillance Systems.** Ground surveillance radar provides a mobile, near all-weather ability to detect objects and provide target locations. The radar is capable of performing a variety of tasks, including searching avenues of approach, possible enemy attack positions, assembly areas, or other sectors or areas on a time schedule, at random, or continuously, to report location, size composition, and nature of enemy activity. Counterfire radars can also provide targeting information on enemy artillery, mortar, and rocket systems locations.

For additional information on intelligence support to military operations, intelligence processes (planning, collection, etc.), and federated intelligence support, see JP 2-01, Joint and National Intelligence Support to Military Operations.

(5) **Distributed Common Ground/Surface System (DCGS).** One of the Services' key responsibilities is to analyze data collected by airborne ISR sensors. This is accomplished through the DCGS ISR family of systems. Through synchronization and control of organic sensors, DCGS intelligence analysts process, exploit, and disseminate data generated by airborne and national collection sensors of imagery, FMV, signals, and measurement and signature intelligence. DCGS provides real-time sensor data fusion, corroboration, and visualization through the common operational picture for planners and decision makers. DCGS can provide reachback support to any military operation and is a valuable contributor supporting CAS missions.

CHAPTER III
PLANNING AND REQUESTING

> *"Planning is everything—Plans are nothing."*
>
> **Field Marshal Helmuth Graf von Moltke**
> **Chief of the Prussian General Staff (1800-1891)**

1. Introduction

This chapter outlines a CAS-related decision-making process that supports joint operation planning, identifies specific CAS-related staff responsibilities, outlines basic CAS planning considerations, and identifies procedures for requesting CAS and CAS-related air support. Focus will be at the brigade level and below with the concept of a joint fires team consisting of TACP personnel and the FC/FSCC. The FC is the US Army representative to the team and the FSCC is the USMC representative. The joint fires team is the primary tactical staff agency responsible for CAS planning. The planning phase begins when the unit receives the order from higher headquarters (HHQ). This chapter also discusses the methods of attack, types of control, and specific platform and weapon considerations that form the baseline of understanding that underpins the preparation and execution phases of CAS. Finally, while the chapter focuses on the tasks that planners must perform during major ground operations, the same tasks may apply to CAS performed in support of tactical recovery of aircraft and personnel, combat search and rescue missions, joint security area (JSA) activities, etc., that may not have the formal staff agencies discussed in the chapter.

2. Deliberate Planning

Commanders and planners must effectively incorporate their knowledge of CAS capabilities and limitations. Apportionment and allocation decisions, plan phase development, and force deployment flow can all impact tactical-level CAS planning. CAS planning covered in this chapter provides planners at all levels with the necessary CAS considerations for sound concept and orders development.

For more information on deliberate planning, refer to JP 5-0, Joint Operation Planning.

3. Crisis Action Planning

Crisis action planning (CAP) is the time-critical development of operation plans (OPLANs) and OPORDs in response to an imminent crisis. CAP is the planning process more closely related to the employment of the tactical level procedures of CAS.

For more information on CAP, refer to JP 5-0, Joint Operation Planning.

4. Close Air Support in the Decision-Making Process

The CAS decision-making process, as indicated in Figure III-1, is a continuous three-phase cycle that has been tailored for joint fire support and focused specifically on CAS.

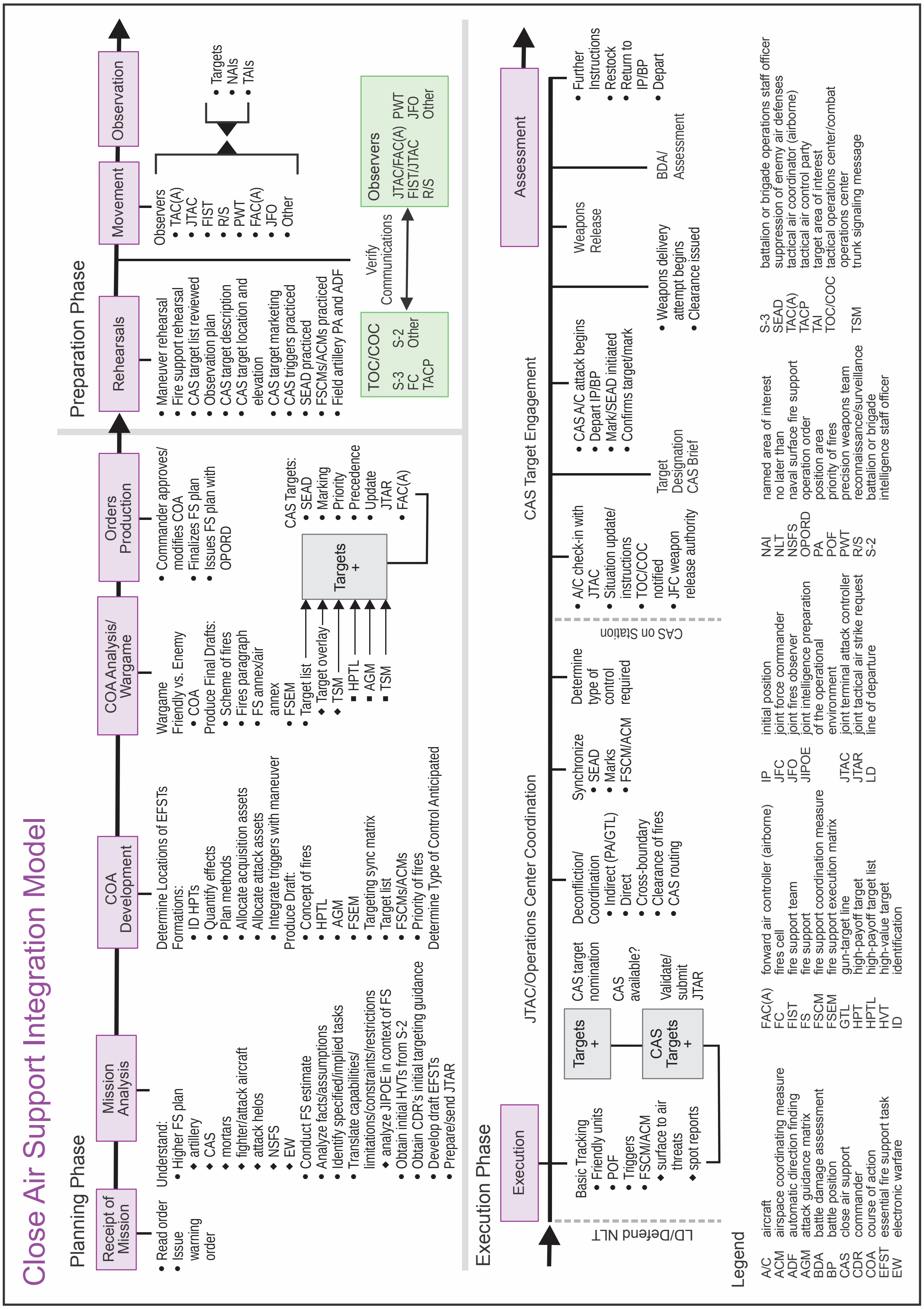
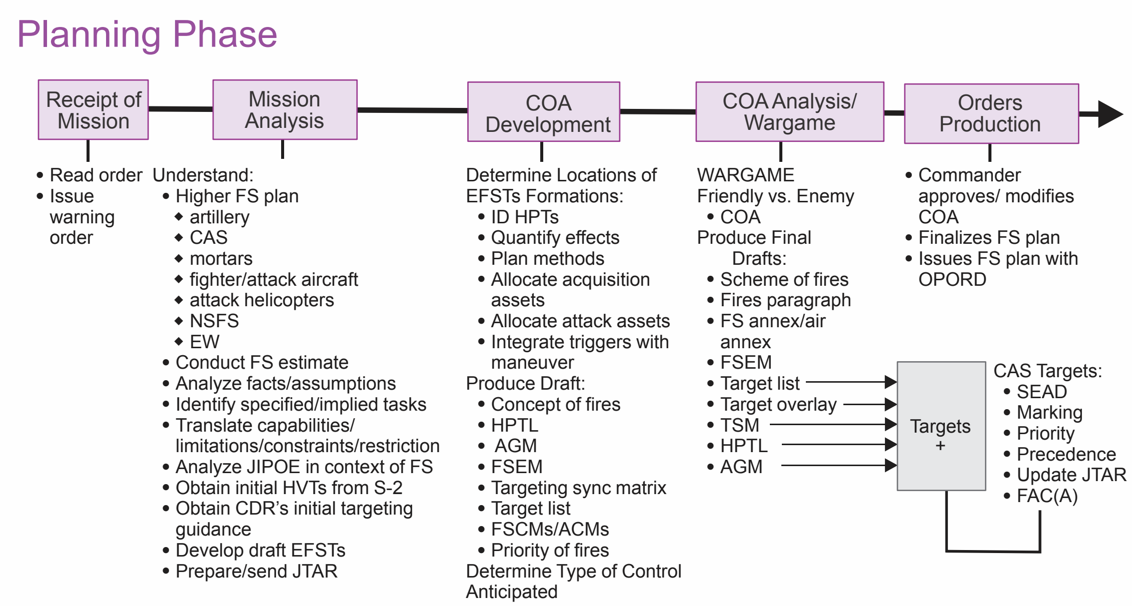


Figure III-1. Close Air Support Integration Model

The CAS decision-making process assists the commander and staff in developing the CAS portion of a fire support plan. The USMC FSC/Army fire support officer (FSO) plays a crucial role in the process both as the staff fire support expert and as a member of the targeting team. This chapter focuses on planning (see Figure III-2). Chapter IV, "Preparation," and Chapter V, "Execution," cover the subsequent phases in detail. For the purpose of this publication, the fire support staff officers, AOs/ALOs, and the BN or brigade or division S-3 are **CAS planners.** CAS planners actively participate with the ground commander to provide CAS-related input to the plan or OPORD. **The planning phase ends in a published order to subordinate units.**

a. **Orders (Basics and Annexes).** Orders are the means by which the commander expresses to subordinates the objectives, intent, and decisive points, and focuses the staff on the results the commander expects to achieve, to include the end-state of an operation. They also help the staff integrate and synchronize the commander's decisions and concepts. FC/FSCC members and AOs/ALOs should pay particular attention to the CAS-related portion of HHQ orders. Planners must understand the commander's objectives for CAS and the utilization of CAS to best support the overall mission objective(s).



Legend

ACM	airspace coordinating measure
AGM	attack guidance matrix
CAS	close air support
CDR	commander
COA	course of action
EFST	essential fire support task
EW	electronic warfare
FAC(A)	forward air controller (airborne)
FS	fire support
FSCM	fire support coordination measure
FSEM	fire support execution matrix
HPT	high-payoff target
HPTL	high-payoff target list
HVT	high-value target
ID	identification
JIPOE	joint intelligence preparation of the operational environment
JTAR	joint tactical air strike request
NSFS	naval surface fire support
OPORD	operation order
S-2	battalion or brigade intelligence staff officer
SEAD	suppression of enemy air defenses
TSM	trunk signaling message

Figure III-2. Planning Phase

b. **Five Steps to CAS Planning Phase**

(1) **Step 1: Receipt of Mission/Prepare for Mission Analysis.** As integral members of the planning team, AOs and ALOs should understand the mission details and be prepared to provide pertinent CAS-related information to the ground force commander's staff from the following sources, at a minimum:

(a) Air order of battle (apportionment, allocation, and distribution decision).

(b) ATO.

(c) ACO.

(d) SPINS.

(e) OPORD.

(f) SOP.

(2) **Step 2: Mission Analysis.** CAS planner responsibilities for mission analysis actually begin before the new mission is received. As part of the ongoing staff estimate, they must continuously monitor and track the status of fire support systems to include available air support. Specifically, during mission analysis, CAS planners perform the following actions:

(a) Update latest products (ATO, ACO, SPINS, etc.).

(b) Estimate air combat capability to support the operation.

(c) Determine capabilities and limitations of assigned personnel and equipment (number of JTACs, systems, equipment status, communications status, etc.).

(d) Provide input to the ground commander's initial guidance.

(e) Determine specified, implied, and mission essential tasks.

(f) Consider mission, enemy, terrain and weather, troops and support available-time available (METT-T).

(g) Assist in developing the mission statement.

(h) Anticipate air power required to support the mission based on:

1. HHQ priorities of fires.

2. Facts and assumptions.

3. Weight of effort decisions.

(i) Provide the following products:

1. AO/ALO estimate.

2. Available CAS assets.

3. CAS constraints and restraints (ground alert CAS and airborne alert CAS response times, weather limitations, tactical directives, ROE, etc.).

4. Warning order(s) to subordinate units.

5. Verification that subordinate TACP elements understand the warning order and have the ability to support the mission.

(j) **Key Considerations.** During the mission analysis step, CAS planners should be familiar with the following elements of the HHQ order:

1. CONOPS/Scheme of Maneuver. What is the commander's intent? Is this an offensive or defensive operation? What type of offensive or defensive operation (deliberate attack, hasty defense, etc.)? How does ROE impact CAS?

2. Concept of fires/fire support tasks (FSTs). What are the commander's desired task and purpose for fires? How can CAS contribute? What other joint functions (C2, intelligence, fires, movement and maneuver, protection, sustainment) are affected? Have all CAS assets been properly integrated?

3. JIPOE. What is the enemy order of battle? What effects will time of day, terrain, and weather have on CAS operations? What are the likely enemy avenues of approach?

4. ISR. What ISR assets are available? Where are ISR assets positioned? How can CAS operators communicate directly/indirectly with ISR assets? What are the commander's critical information requirements (CCIRs)?

5. Observation Plan. How can CAS take advantage of available "eyes" on the battlefield? Are the types of TAC considered? Where will JTACs/JFOs/FAC(A)s be required?

6. Communications Plan. How will maneuver elements, fire support, and TACP personnel communicate? Are JTACs integrated into the ground force communications plan? Are communications plans reliable and redundant?

(k) **Preplanned Air Support Request.** Once CAS planners have analyzed the mission and are familiar with CAS requirements, initial CAS requests should be drafted and submitted. See Appendix A, "Joint Tactical Air Strike Request." Further refinements to these initial requests can be forwarded as details become available. Adherence to the joint air tasking cycle time constraints is critical. Preplanned requests in support of US Army operations will be submitted through the AAGS.

(3) **Step 3: COA Development.** After receiving planning guidance, the staff develops COAs to provide a potential way (solution, method) to accomplish the assigned mission. The staff develops multiple COAs to provide unique choices to the commander, all oriented on reaching the military end-state. Guidance and intent focuses staff creativity toward producing a comprehensive, flexible plan within available time constraints. During this step, CAS planners:

(a) Obtain latest products (ATO, ACO, SPINS, etc.).

(b) Analyze relative combat power. This is typically accomplished by weighing the individual effectiveness of friendly air platforms against anticipated enemy surface forces and air defense threats.

(c) Generate options used to develop possible COAs. Options are activities within a COA that may be executed to enable achieving an objective. Options, and groups of options comprising branches, allow the commander to act rapidly and transition as conditions change through the campaign or operation.

(d) Determine CAS requirements as the scheme of maneuver is developed.

(e) Develop a fire support plan and unit airspace plan; coordinate activation of FSCM/ACMs.

(f) Develop the CAS integration plan by examining opportunities for the best use of air power including the placement of TACP assets.

(g) The AO/ALO assists in developing engagement areas, target areas of interest (TAIs), triggers, objective areas, obstacle plan, and movement plan.

(h) Prepare COA statements and sketches (battle graphics). This part involves brainstorming to mass the most effective combat power against the enemy (CAS, EW, ISR, and surface fire support).

(i) **Key Considerations.** During COA development (for each COA), CAS planners should consider:

1. Commander's Intent. How does the commander intend to use CAS? What are the objectives? Does CAS facilitate the commander's ability to accomplish the mission?

2. CCIRs. What CCIR can CAS assets provide? Will TACPs, JFOs, and/or FAC(A)s be able to provide critical battlefield information? How will this information be relayed to the maneuver unit?

3. Enemy Situation. Where are the enemies and how do they fight (enemy order of battle)? Where are they going? Where can I kill them or affect their actions? When will they be there? What can they do to kill or hamper me? How am I going to kill/influence them?

4. Statements and Sketches. Once COA development has started, sketches of each COA should be made with notes for the staff to better understand what each can offer the unit. Where are preplanned CAS holding points/orbits located and how will CAS aircraft enter/exit the operational area? Does the CAS overlay reflect artillery positioning areas and azimuths of fire (AOFs)? Does the plan promote simultaneous engagement of targets by CAS and surface fires? Has the CAS overlay been shared with all battlefield operating system elements? Where will JTACs/JFOs be positioned on the battlefield? What ACMs and FSCMs are needed to support the COA?

5. Priority of CAS Fires. Priority of fires (POF) for each COA must be identified. As part of the POF, priority of CAS fires must also be identified. The ground maneuver commander establishes which element will receive POF and priority of CAS. It is also important to make the commander and the commander's staff aware of their unit's priority for CAS relative to other units in the operational area. Does the element with priority of CAS fires have a designated JTAC? What if priorities change or CAS is unavailable for the planned COA? How will changes in priority be communicated with forward elements and JTACs? Does the priority of CAS fires support the commander's intent for each COA?

(j) **TACP.** The TACP provides the following inputs during COA development:

1. Specific TACP portions of the following plans:

a. Observation plan (to include target area, aircraft, sensor management, and BDA).

b. Employment plan (e.g., ACAs).

c. Communications plan.

2. Evaluation of overall TACP capabilities/limitations:

a. Personnel.

b. Equipment.

3. Consideration of the most effective TAC procedures.

4. Update initial or submit new JTARs with all information currently available.

5. Current geospatial intelligence.

(4) **Step 4: COA Analysis/War Game.** The planning staff "fights the battle" to determine the advantages and disadvantages of each COA and to identify which COA best accomplishes the commander's intent. CAS planners should:

(a) Identify strengths and weaknesses for CAS in each COA.

(b) Conduct an initial tactical risk assessment for each COA. (See paragraph 11d, "Tactical Risk Assessment.")

(c) Recommend TAC criteria for commander approval. Type of control to use where and under what conditions.

1. Determine best locations for JTACs/FAC(A)s.

2. Plan use of JFOs/observers and assess communications requirements.

(d) Evaluate CAS integration with other fire support assets.

(e) Assess effectiveness of ACA and other FSCMs/ACMs.

(f) Gather war gaming tools.

1. Updated ATO/SPINS information.

2. Decision-making matrices/devices.

3. Briefing cards/CAS briefs.

4. Standard conventional load listings.

5. Aircraft and weapons capabilities information.

(g) List all friendly forces.

1. CAS aircraft.

2. FAC(A).

3. Airborne C2.

4. Ground forces, including fire support assets.

5. JTACs.

6. JFOs/other observers.

7. Other aviation and support assets.

(h) List assumptions.

1. Aircraft operating altitudes.

2. Enemy surface-to-air threat posture.

3. CAS tactics.

4. JTAC procedures in effect.

5. How terrain and weather affect CAS.

6. Aircraft fuel requirements.

(i) List known critical events and decision points.

1. Line of departure or defend no later than times.

2. CAS triggers (named areas of interest [NAIs]/TAIs).

3. ACM/FSCM requirements.

4. SEAD/marking round requirements.

(j) Determine evaluation criteria.

1. Timeliness.

2. Accuracy.

3. Flexibility.

4. Mass.

5. Desired effects.

(k) Select the war game method.

1. Rehearsal of Concept (ROC)/Terrain Model/Sand Table. Commanders and staffs may use a form of rehearsal called a "ROC drill." A ROC drill is a leader and staff rehearsal that usually uses a sand table or similar training aid. Its primary purpose is to synchronize the actions of all six joint functions (C2, intelligence, fires, movement and maneuver, protection, and sustainment).

2. Map.

3. Radio.

4. Other.

(l) Select a method to record and display results.

1. Event logs.

2. Timetables.

3. Reaction times, etc.

(m) War game the battle and assess the results. Did CAS support the commander's intent for fires? Was CAS effectively integrated with ground scheme of maneuver? Was C2 of CAS reliable and effective? Were FSCMs and ACMs effective in supporting the COA?

(n) **Fires Paragraph.** CAS and other fire support planners begin to refine the fires paragraph to the OPORD by further developing FSTs. The essential elements of a fire support plan include, but are not limited to, clear and concise articulation for the use of CAS by identifying the task, purpose, method, and effect of each FST.

1. **Task.** Describes the targeting objectives fires must achieve against a specific enemy formation's function or capability. Examples include:

a. "Disrupt movement of third Guards Tank Regiment."

b. "Delay Advanced Guard Main Body movement by 2 hours."

c. "Limit advance of 32nd Motorized Rifle Regiment."

d. "Destroy lead elements of the Forward Security Element."

2. **Purpose.** Describes the maneuver or operational purpose for the task. Examples include:

a. "To allow 2nd BN to advance to phase line Smith."

b. "To seize and hold Objective Panther."

c. "To enable Task Force 2-69 Armor to secure access to Brown's Pass."

3. **Method.** Describe how the task and purpose will be achieved. Examples include:

a. "CAS engages armored targets vicinity of Brown's Pass, not later than 1400L."

b. "CAS attacks defensive positions at point of penetration at 1300Z."

c. "CAS available to engage targets of opportunity entering the main defensive belt."

4. **Effects of Fires**. Attempts to quantify the successful accomplishment of the task. Examples:

a. "CAS destroys 8-10 vehicles vicinity Brown's Pass; 2-69 Armor secured Brown's Pass."

b. "CAS disables enemy engineer platoon at point of penetration; 2nd BN advanced to phase line Smith, seized and held Objective Panther."

c. "CAS destroys 10 T-80s/T-72s in main defensive belt; 2nd BN advanced to phase line Smith, seized and held Objective Panther."

(5) **Step 5: Orders Production.** The staff prepares the order or plan to implement the selected COA and provides a clear, concise CONOPS, a scheme of maneuver, and a concept of fires. Orders and plans provide all necessary information that subordinates require for execution, but without unnecessary constraints that would inhibit subordinate initiative. TACPs should produce the CAS-specific portion of the appropriate fire support appendix and annex as required.

(a) **Fire Support Annex.** Fire support and CAS planners will also produce a fire support annex. This annex is necessary to expand upon the fire support information in paragraph 3 of the OPORD. A fire support execution matrix (FSEM) may also be developed as part of, or used in place of, a standard fire support annex. Regardless of format, further expansion of fire support information includes:

1. **Purpose.** Addresses exactly what is to be accomplished by fire support during each phase of the battle. It should be specific in addressing attack guidance and engagement criteria. **This is the most important part of the fires paragraph.** The fire support annex must articulate how fires, as a joint function, will be synchronized with the other five joint functions (C2, intelligence, movement and maneuver, protection, and sustainment).

2. **Priority.** Designates POF and when or if it shifts for each phase. Include all fire support systems to include CAS when assigning POFs.

3. **Allocation.** Designates the allocation of fire support assets to include the following: targets allocated to units for planning; CAS sorties for planning; smoke, expressed in minutes and size; priority targets, final protective fires (FPFs), and special munition priority targets; and laser-equipped observation teams.

4. **Restrictions.** Addresses FSCMs and the use of specific munitions. Some examples are critical FSCMs and specific munition restrictions such as those placed on the employment of illumination, smoke, dual-purpose improved conventional munitions, family of scatterable mines, and cluster bomb units.

(b) **ACM Annex.** This addresses ACMs required to support the CAS and fire support plans.

5. Command and Staff Responsibilities

a. **Supported Commander.** The commander's intent and desired end state must be clearly articulated and promulgated. Commanders should ensure CAS planners understand the objectives, scheme of maneuver, C2 requirements, and criteria for specific ROE. Commanders also provide the risk assessment guidance for types of TAC.

b. **Intelligence Officer.** The intelligence officer is the principal staff officer for all matters concerning military intelligence and counterintelligence. In this capacity, the intelligence officer provides current and timely CAS targeting information as well as projected enemy actions. The intelligence officer serves as the focal point for ISR systems that feed real time or near real time battlefield intelligence. The intelligence officer is the source of targeting data (e.g., subordination or suspected maneuver unit identification, measurable target locations, collateral damage risks) and other JIPOE information.

c. **Operations Officer.** The operations officer is the principal staff officer for ensuring the commander's intent is met. The operations officer is responsible for ensuring CAS is fully integrated into the OPORD and fire support plan.

d. **FSC/FSO.** The FSC/FSO is the staff officer in charge of the FSCC/FC. Regardless of Service or echelon, the FSC/FSO works in conjunction with the AO/ALO and other fire support representatives to ensure CAS is fully integrated into the fire support plan. The FSC/FSO prepares the fire support paragraph and the fire support annex. If the fire support paragraph and annex need amplification, the FSC/FSO prepares a FSEM.

e. **NGLO.** NGLOs are Navy officers provided by the USMC supporting artillery units to GCE FSCC/FC. The NGLO assists the FSC/FC in planning NSFS.

f. **AO/ALO.** The AO/ALO advises the respective ground commanders on the capabilities and limitations of CAS. The AO/ALO should maintain awareness of the proposed sortie distribution for the respective ground element. AOs/ALOs should work closely with other members of the staff such as the FSC to ensure the smooth and effective integration of CAS into the planning process. The AO/ALO is responsible for the specific planning tasks as indicated in each step of the CAS planning process.

g. **Ground Liaison Officer.** The ground LNO is the primary ground officer assigned to air commanders' staffs, such as fighter wings, air operations centers, and related HQ. They provide expert advice, information, and interface on all matters pertaining to ground operations to enable more effective air planning in support of ground operations.

h. ISRLOs translate JFACC ISR capabilities, limitations, and processes into terms that ground forces can readily relate to, while interpreting and breaking down the ground unit's requirements for the supporting organizations, which can then more effectively request and employ JFACC ISR capabilities in support of their operations, to include CAS.

i. **Legal Adviser.** The legal adviser advises on the law of war and applicable policy when considering collateral damage risk to civilians, civilian structures, and properties associated with CAS attacks.

6. Close Air Support Planning Considerations—Mission

CAS is coordinated with other maneuver, combat support, and joint forces as part of the combined arms team. CAS delivers joint fire support in offensive and defensive operations to destroy, neutralize, disrupt, suppress, fix, or delay enemy forces. Commanders should plan for the employment of CAS throughout the depth of their assigned operational area.

a. CAS can support shaping, close combat, and JSA operations.

(1) **Shaping Operations.** Commanders may employ CAS to support operations deep within the operational area, which may include SOF or conventional forces with a deep operation mission. **In this case, CAS will normally be limited in scope and duration to supporting maneuver forces or special operations activities against targets in the vicinity of their assigned operational areas.** Shaping operations involving CAS may require additional coordination to deconflict with other missions such as AI (refer to the joint ATO).

(2) **Close Combat Operations.** A commander generally assigns the preponderance of available CAS to the unit designated as the main effort. **CAS aircraft and fire support assets can mass with surface forces to support the commander's objectives.** The speed, range, and firepower of CAS also make it a valuable asset for exploiting friendly success, disrupting rapid adversary maneuver, and attacking a retreating enemy.

(3) **JSA Operations.** CAS is effective for countering enemy penetrations. The responsiveness and firepower of CAS greatly augment the combat power of forces including those in a JSA. The potential for friendly fire, however, is high in a JSA because of the larger number of support personnel and activities located there. CAS aircrews and JTACs 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 JSAs.

b. CAS can support offensive, defensive, and stability operations.

(1) **CAS in Support of Offensive Operations.** CAS supports offensive operations with scheduled or on-call missions to destroy, disrupt, suppress, fix, or delay enemy forces. Commanders employ CAS depending on the type of offensive operation being conducted: movement to contact, attack, exploitation, or pursuit.

(a) **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 (IP) of contact can overwhelm and force the enemy to prematurely deploy forces. The ground commander should rapidly augment organic combat power with CAS to secure time and space to maneuver forces, gain positional advantage, and seize the initiative. CAS assets might be the first friendly force to make contact with the enemy. **When planning for CAS integration in a movement to contact, consider possible CAS engagement areas along the entire axis of advance and friendly force vulnerable flanks.**

(b) **Attack.** Commanders plan for and use CAS to support attacks against enemy forces. CAS can destroy critical enemy units or capabilities before the enemy can concentrate or establish a defense. CAS can also help fix the enemy in space or time to support the movement and assault of ground forces. CAS may add to the concentration of firepower and the violence against the enemy. CAS can be utilized to isolate enemy forces on the battlefield and force them to defend in a direction from which they are unprepared to fight. CAS is incorporated into the detailed planning and coordination involved in a deliberate attack.

(c) **Exploitation.** Exploitation is an offensive operation that usually follows a successful attack and is designed to disorganize the enemy and erode cohesion. In exploitation, CAS is used to sever escape routes, destroy fleeing forces, and strike unprotected enemy targets that present themselves as enemy cohesion deteriorates.

(d) **Pursuit.** In the pursuit, the commander attempts to destroy the combat effectiveness of the fleeing enemy force as the enemy becomes demoralized and cohesion and control disintegrate. Because 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.**

(2) **CAS in Support of Friendly Defensive Operations.** In defensive operations, commanders employ CAS to interdict, disrupt, or delay attacking enemy forces. CAS can be distributed to support specific forces in the JSA or main battle area depending on the type of defense (mobile or area). Commanders may use CAS to:

(a) **Support Maneuver.** CAS can complement maneuver forces and integrate with surface-delivered fires as part of a combined arms spoiling attack.

(b) **Support Movement.** CAS can support the movement of friendly forces between positions. Commanders use CAS to augment protection to the front, flank, and rear of the moving force.

(c) **Attack Penetrations.** CAS can engage enemy units that have bypassed main battle area forces or penetrated friendly positions. **CAS participants must take special care to identify the location and movement of friendly forces and civilians** to ensure that they are not subject to direct attack or weapons effects.

(3) **CAS in Stability Operations.** The employment of CAS during stability operations is significantly different from CAS employed during major combat operations. Since the purpose of stability operations is to establish civil security and civil control, restore essential services, and repair and protect critical infrastructure, CAS in stability operations may be limited in scale and scope and may result in more restrictive ROE. However, when CAS is effectively employed in stability operations it can prove to be decisive. The use of PGMs by CAS aircraft is often preferred by JFCs when supporting ground operations intended to destroy high-payoff targets in urban environments. PGMs allow the commander to limit collateral damage while creating the desired effects and mitigating adverse effects. CAS in support of stability operations often depends heavily on detailed and timely intelligence, detailed coordination with the maneuver commander's plan, appropriate munitions, and JTAC with "eyes on" the intended target. JFCs and their staffs should consider the use of CAS carefully during stability operations. Other roles for CAS-capable assets in stability operations can include: a flexible and timely forward aerial observation platform, limited defensive capability for troops in contact, a show of force deterrence option, route and ground convoy security, and an aerial quick reaction force. CAS can also

provide the JFC with timely information to satisfy certain CCIRs that can facilitate the mission.

7. Close Air Support Planning Considerations—Enemy

CAS planners must account for the enemy's disposition, composition, order of battle, and likely COAs.

a. Other enemy considerations include:

(1) What are the enemy's offensive/defensive capabilities?

(2) What is enemy capability regarding surface-to-air threats, decoys, camouflage, etc.? Note: High-payoff and high value targets are usually defended by surface-to-air missiles (SAMs), antiaircraft artillery (AAA), and/or automatic weapons. Joint force use of "standoff weapons" and varying IP location will enhance aircraft survivability by reducing exposure and predictability.

(3) What is the enemy's capability to conduct EW or affect C2 systems (communications, navigational aids, and targeting)?

b. From this information, CAS planners anticipate the enemy's ability to affect the mission, and the potential influence enemy actions may have on flight tactics. As the threat level increases, prebriefing of aircrews and detailed mission planning become more important. The potential for the threat situation to change during the course of the mission makes communications and close coordination between the aircrews, control agencies, and the supported ground force crucial. In-flight updates on enemy activity and disposition along the flight route and in the target area may require aircrews to alter their original plan and tactics. Therefore, alternatives are planned to ensure mission accomplishment in a contested communications environment. Secure voice equipment and frequency-agile radios can overcome some enemy interference.

8. Close Air Support Planning Considerations–Troops (Close Air Support Assets)

CAS planners must consider available C2, ISR, EW, and CAS aircraft assets.

a. **C2 Assets.** A detailed, flexible, and redundant C2 plan is essential. Airborne C2 support systems may alleviate some of the challenges in C2, but each of the platforms has inherent capabilities and limitations that must be considered in planning. Unique or high-demand C2 assets in support of the mission may generate specific requirements that, in turn, end up as formal requests for air support. As a minimum, planners should consider the following C2 capabilities and answer these important questions:

(1) **Airborne C2 Assets.** Consider integrating airborne C2 assets to enhance the plan. Are these assets critical and do they warrant specific requests to HHQ? What is the specific role and function of each? Have provisions been made to ensure adequate low level communications for C2 of RW attack assets? As a minimum, review the following:

(a) **JSTARS and DASC(A).** JSTARS and the USMC DASC(A) provide C2 of strike resources in support of a ground conflict. JSTARS can support a brigade-sized operation with battle management when no ASOC/DASC is available. The DASC(A) can serve as an alternate ASOC/DASC for battle management of immediate CAS operations.

(b) **Tactical Air Coordinator (Airborne).** The TAC(A) provides an extension for the ASOC/DASC with the goal of extending the ASOC/DASC's range and ability to send and receive tactical information. The TAC(A) acts as a communications relay between the JTAC and attack aircraft, as well as other agencies of the TAGS. It also expedites CAS aircraft-to-JTAC hand-off during "heavy traffic" CAS operations by providing information to CAS assets such as situation updates and CAS briefs, as well as managing pre-handoff deconfliction. At the discretion of the Service, the TAC(A) mission can be performed by a variety of platforms with training and appropriate communication equipment.

(c) **Army Aviation Unit Commander.** The aviation unit commander controls aviation maneuver and fires and provides reports to the command group. Is there an Army aviation unit commander involved in the mission? How will he integrate with the JTAC?

(2) **Ground C2 Assets.** Integrating ground C2 assets into the plan is critical and warrants specific consideration by HHQ. What is the specific role and function of each? Have provisions been made to ensure adequate communications for C2 of all attack assets? As a minimum, review the following:

(a) **TACP/JTAC.** While corps through brigade TACPs act primarily as liaisons, BN TACPs and company JTACs have primary TAC responsibility. As such, it is important to consider TACP capabilities and limitations, including those of subordinate or adjacent unit TACPs. This consideration should include personnel levels of training and qualification, as well as equipment serviceability and availability. How will the TACP move, shoot, and communicate? Which units will the TACP support?

(b) **A JFO or a PWT** may aid the JTAC by acquiring or lasing targets. If the JTAC plans to use a JFO or PWT, then he must be able to communicate and coordinate with the team during target marking or TGO.

(c) **ASOC/DASC.** The USAF ASOC or USMC DASC functions as the primary control agency of the TACS and/or MACCS for the execution of CAS in direct support of ground operations. Normally aligned with the senior tactical ground command HQ at corps level and below, the ASOC/DASC coordinates and directs CAS for land forces. The ASOC/DASC facilitates CAS, AI, SEAD, mobility, and ISR missions within its assigned operational area. The ASOC/DASC is the NCS for immediate air support requests and monitors aircraft check-in/check-out. Use the DD 1972 in Appendix A, "Joint Tactical Air Strike Request," to ensure the ASOC/DASC has all the pertinent information concerning the mission (see Line 8, "REMARKS" of the DD 1972) for transmittal to supporting aircrews.

b. **ISR Assets.** Use all sources of ISR—assets that may be used, including UAS and JSTARS feeds, JSTARS voice link, ELINT sources, scout reconnaissance troop reports, FAC(A) and JTAC observations, O&I reports, feeds from elements of the TACS/AAGS, and strike aircraft with targeting pods are all viable sources of information. There are many human sources of CAS targeting information available in the operational environment. These elements are specifically tailored for ISR roles and normally report through established intelligence channels. Nontraditional ISR assets should also be considered on an as-needed basis. For example, many strike aircraft contain organic ISR capabilities for imaging, ELINT, and ground moving-target indicator tracking. Resultant sensor data can be passed to and used by JTACs via electronic or voice links to complement the operational environment picture. Although possibly limited in field of view (FOV) resolution, or scope of operations when compared to traditional sources, nontraditional ISR data from strike aircraft has the advantage of being focused, flexible, and more readily adjusted to suit the JTAC's immediate needs. Aircrew, JTACs, and CAS planners should make every effort to become familiar with the capabilities and limitations of traditional and nontraditional methods, particularly in reference to their ability to distinguish between individual combatants and noncombatants on the battlefield.

c. **CAS Aircraft Weapons and Capabilities.** The weapons and capabilities of FW and RW aircraft can be found in Army Tactical Publication 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP 3-2.6 *JFIRE Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower*. CAS planners should select those combinations of munitions and aircraft offering the required accuracy, firepower, and flexibility. To create the desired level of destruction, neutralization, or suppression of enemy CAS targets, the weapons load, arming, and fuze settings must be tailored for the desired results. Cluster and general-purpose munitions are very effective against troops and stationary vehicles. However, hardened, mobile, or pinpoint targets may require specialized weapons, such as laser-guided, electro-optical (EO), IR munitions, PGMs, special equipment or capabilities. The requesting commander should provide sufficient information outlining the desired effects, plus any external or self-initiated tactical restrictions or limitations. This allows CAS to best support the commander's intent while simultaneously giving them as much flexibility as possible. Ground commanders should be aware that immediate CAS requests might have to be filled by aircraft loaded with less-than-optimum munitions.

9. Close Air Support Planning Considerations—Terrain

a. **How Terrain Affects CAS.** Terrain can affect communications and visual line of sight (LOS) for identifying the target and/or aircraft. RW attack assets are extremely vulnerable to LOS limitations. Planners must overcome this shortfall by leveraging other C2 capabilities (DASC[A], other airborne C2, remote relay, etc.) or accept this condition as part of the mission environment. Situational awareness-enhancing systems (e.g., synthetic aperture radar and data link type systems) and coordinate-seeking weapons improve the ability to execute CAS in certain tactical situations despite weather limitations. Regardless, favorable visibility normally improves CAS effectiveness. Ceiling and visibility may affect the decision to employ low-, medium-, or high-altitude tactics, or whether to employ FW or RW assets. These conditions will also affect the JTAC's ability to see the target. Weather conditions may also determine the attack profile of the aircraft. If enemy vehicles are moving, exhaust smoke, dust trails, and movement can indicate their location. Visibility is more critical for long-range deliveries (e.g., free-fall bombs/rockets) than it is for short-range deliveries (e.g., retarded bombs and guns). Thick haze or smoke has a greater effect on low-level attacks than on steep-dive attacks because horizontal visibility is usually lower than oblique visibility. Reduced visibility and cloud layers restrict laser and EO-guided ordnance. Target acquisition is usually easier when the sun is behind the aircraft. However, when the sun is behind the target, it may create a noticeable shadow detectable by aircrews.

For example of terrain verbiage and visual depictions, see Appendix F, "Terrain Examples."

(1) **Target Masking.** A target screened by terrain, urban development, or natural cover may be difficult to see on low-level attacks. An increase in altitude may be necessary to find the target.

(2) **Thermal Significance.** Many variables can affect a target's vulnerability to detection and attack by thermal systems. Recent operating conditions, time of day (thermal crossover), and target composition and background should all be considered.

(3) **Contrast and Brightness.** A major factor in target detection is the contrast of the target against its background. Camouflaged targets against a background of similar color may be impossible to detect from high altitudes or significant distances. All targets, regardless of contrast differences, are more difficult to locate under poor light conditions.

(4) **Mountainous Environments.** Mountainous terrain may force the enemy to concentrate forces along roads, valleys, reverse slopes, and deep defiles, where CAS is very effective. However, the terrain also restricts the attack direction of the CAS strikes. CAS planners must assume the enemy will concentrate air defenses along the most likely routes CAS aircraft will fly. CAS planners must thoroughly identify the air defense systems and target them to enhance the survivability of CAS assets.

(5) **Desert Environment.** CAS aircraft may be more vulnerable in the desert because of the lack of covered approaches, and both friendly and enemy units are often widely dispersed.

(a) **Target Acquisition.** In general, if good contrast exists between the target and the background, target detection will be possible at extended ranges. Deserts that have vegetation will reduce target detection capabilities from standoff ranges. In a desert environment, target identification by aircrews may be hampered by enemy capability to cover and conceal potential targets. Camouflage and decoys have proven to be effective countermeasures in the desert environment and will also delay target acquisition. In the absence of timely or accurate battlefield tracking information, the ability to detect potential targets beyond the range where PID is possible could lead to friendly fire incidents. The same is true considering the speed at which forces are able to move. What was an enemy element at the time of target nomination could easily be a friendly element soon thereafter.

(b) **Weapons Employment.** In most cases the desert environment will allow weapons to be employed at maximum ranges and will provide increased weapons effects due to lack of obstructions. Targets in revetted positions may only be visible from the air. JTACs may have trouble designating these types of targets.

(c) **Communications.** Greater communication ranges may be possible due to increased LOS ranges. Some non-LOS communications may be adversely affected by nonconductive soil. Repeaters and relay stations may be necessary.

(d) **Threat Avoidance.** Enemy threats may be able to acquire aircraft at longer ranges.

(e) **Lack of Geographic References.** In flat desert terrain, the lack of visual references makes target talk-on techniques more difficult in the absence of target marking aids. Also, flat desert terrain increases the difficulty in selecting points that will be visible from the air, impacting IP and contact point (CP) selection.

(6) **Jungle/Forested Environment.** In jungle terrain, most contact with the enemy is at extremely close range. If the friendly force has a substantial advantage in fire support, the enemy will most likely try to close with the friendly force and maintain that close contact. Thus, the friendly force commander might not be able to use a fire support advantage without increasing the risk of inflicting friendly casualties. Therefore, knowledge of the type of munitions best suited for jungle/forested terrain and how to employ them is vital.

(a) **Target Acquisition.** Target acquisition may be difficult or impossible under dense jungle canopies for both the JTAC and aircraft. In these cases, every effort must be made to mark the target by any effective means. Colored smoke or WP rounds may be effective. In thick forest or double and triple canopy jungles smoke tends to disperse as it rises creating an ambiguous mark. There may also be a significant delay before smoke breeches thick canopy cover and is visible to aircraft. Ground-burst artillery illumination flares may be effective in this type of terrain. FAC(A) aircraft that can remain on station may aid the targeting process due to their increased SA.

(b) **Munitions Effects.** Ordnance and fuzing may have to be tailored to penetrate dense forest or jungle canopies. Because combat in these environments is usually of such close nature, the delivery of the munitions must be closely controlled to avoid friendly fire.

(c) **Observation/Terminal Attack Control.** The dense vegetation of most jungles makes observation beyond 25-to-50 meters very difficult. The jungle also makes navigation, self-location, target location, and friendly unit location very difficult.

(d) **Communications.** Communications will suffer between the JTAC and aircraft in dense jungles and forests due to limited LOS. Communications may improve at reduced ranges. Use FAC(A)/TAC(A) or airborne C2 platforms as relay stations.

(7) **CAS in Urban Environments.** The compressed urban environment creates unique considerations for planning and conducting CAS operations. These include operations in urban canyons, deconfliction in confined airspace, restrictive ROE, difficulty in threat analysis, the presence of noncombatants, the potential for collateral damage, and the increased risk of friendly fire. Urban considerations may include:

(a) **Threats.** Urban terrain provides excellent cover and concealment for a variety of weapons systems. The urban environment also affects the employment of antiaircraft weapons, including AAA, man-portable air defense systems (MANPADSs), and SAM systems. Light to medium AAA may be employed from ground sites, from the tops of buildings, or weapons mounted on civilian vehicles. The terrain may limit suppression options. The cluttered environment with lights, fires, and smoke will make threat and target acquisition difficult. Proper placement of holding airspace is made difficult by widespread threats within large urban areas. RW aircraft require a safe sector or area to hold and roam in order to remain less predictable and adjust for attack timing and geometry. FW aircraft should hold in airspace over non-hostile terrain, yet still be positioned closely enough to the fight to allow the aircrew to build SA and deliver timely support.

(b) Infrared and NVD Use

1. IR signatures are affected by the proximity of other buildings and structures. Urban temperatures are generally higher than rural areas and can be 10 to 20 degrees higher than the surrounding environment. Thermal heating can adversely affect thermal sights and other IR sensors. In many cases unassisted vision is sufficient for some portions of target acquisition and/or engagement.

2. Urban lights may overwhelm aircrew NVDs and render them useless for standard night formation tactics. Plans may have to be adapted to allow for additional deconfliction.

(c) **C2.** Urban terrain presents severe problems in maintaining communications due to man-made structures that inhibit LOS and absorb or reflect transmitted signals. While these problems will force a higher degree of decentralization, the combat force should make every attempt to minimize them. The use of aircraft such as JSTARS/DASC(A), TAC(A), FAC(A), attack aircraft, UA, and rooftop communicators can minimize the ground based LOS communication limitations. A detailed, flexible, and redundant C2 plan is essential.

(d) **JTAC Considerations.** Tall buildings make it difficult for pilots to identify targets and may require specific attack headings to achieve LOS with the target. Observers may be placed on upper floors of buildings to improve visibility. There will be an increased need for marking and designating CAS targets. Recommended items for a JTAC include NVDs, an IR pointer, LRF, LTD, IR strobe light, IR and visible chemlights, spotting scope, multiband radio, pyrotechnics (smoke/illumination), gated laser intensifier (GLINT) tape, access to an M203 grenade launcher with illumination and smoke rounds, compass, mirror, common objective graphics, GPS, and video data link capability with full-motion video receiver. The JTAC must plan for redundant communication and marking tools. A single tool will not work in all urban environments. A JTAC will only be able to utilize a ground laser target designator (GLTD) when in a stationary position and preferably from an elevated position. In brightly lit objective areas, a JTAC may consider shooting out street lights to darken the area for use of IR pointers, or if directed by the commander, in order to optimize friendly NVDs. The ability of FW and RW aircraft to provide fires may be limited by the structural makeup of the urban location.

1. **Proficiency.** Training in an urban environment is required for JTAC/FAC(A) and aircrew proficiency. The critical link between the aircrew and the commander for urban CAS is the JTAC/FAC(A). The JTAC/FAC(A) must provide an extraordinary level of detail in the CAS remarks section of the brief working from big to small features (funnel approach). If not, then the pilots must pull details from the JTAC/FAC(A). The "big" portion of the talk-on brief can be eliminated if the JTAC/FAC(A) can mark either their position or the target location visually or electronically with an IR pointer, GPS grid, or with reference to a gridded reference graphic (GRG), for example. Even if a ground JTAC/FAC cannot see the target, TAC hand-off to a FAC(A) can be done. The JTAC/FAC must always keep in mind that the ground perspective is drastically different from the attacking aircraft's. The JTAC/FAC may not be in a position to observe all buildings containing friendly forces due to intervening buildings and battlefield confusion. It's likely that a JTAC/FAC will be marking and engaging targets within 100 meters of their own or friendly positions, within danger close parameters. **Historical studies prove that 90 percent of all urban engagements occur where friendly and enemy forces are within 50 meters of each other, and that urban engagements using supporting arms occur with less than 250 meters between the same. The JTAC/FAC must select the appropriate ordnance to limit the potential of friendly fire incidents, particularly in an urban environment.** The JTAC/FAC may not always see the target or whatever is firing at the unit, but only hear where the rounds are coming from and see their impacts. The friendly and enemy situation will be changing rapidly, even if only from building to building or room to room inside a building. The CAS aircraft or FAC(A) on station may be required to do aerial reconnaissance to find and report targets or enemy movement. This may prevent an unexpected ambush or stop units advancing to reinforce. For aircrew survivability, every effort should be made to exploit standoff capabilities with optics and weapons systems; however, pilots may need to get very close to see what the maneuver force is experiencing. The commander must decide when organic/attached ground weapons are insufficient for the mission, and CAS is required. JTACs/FAC(A)s will judiciously use FW ordnance when troops are in contact, due to blast and fragmentation dangers. Historically, 80 percent of urban combat injuries result from glass shards from blast and overpressure. JTACs may use FAC(A)s or CAS aircraft to reconnoiter and attack enemy forces outside the area of immediate engagement in order to prevent further reinforcement.

2. **Navigation.** Navigation over urban terrain can be more difficult than over natural terrain. **Navigation is more difficult because maps do not show the vertical development of urban terrain.** Rapid movement from position to position can often create confusion between aerial and ground observers as to friendly and enemy locations. Familiarity with the characteristics of urban terrain allows aircrews to discern key features in this environment. Navigational aids, such as GPS, have reduced but not eliminated this challenge. The use of the GRG, GPS, and handheld pointers or designators eases the

problems associated with night navigation, orientation, and target identification. Navigation systems may be degraded due to interference induced by buildings and enemy GPS jamming equipment. Aircrews and ground controllers should perform detailed mission planning to maximize the effectiveness of all available assets.

3. **GRG/Urban Grid System.** Detailed gridded maps or imagery shall have a military grid reference system (MGRS) grid and may contain information including building numbers, FSCMs, phase lines, helicopter landing zones, NAIs, etc., (see Figure III-3). It is the responsibility of the ground unit that owns a particular operational area to produce GRGs for that area, ensure dissemination to subordinate, adjacent, and higher echelons, and maintain version control on the products as they are updated or revised. **The developing unit should consider selecting grid sectors based on what the aircrew/aircraft sensors can most easily see such as rivers, road junctions, buildings, bridges, etc.** Below are recommendations for GRG creation:

a. Imagery should contain a north arrow and the picture should be oriented north-up whenever possible.

b. Easting and northing lines should be labeled at the top and left side of the GRG, respectively.

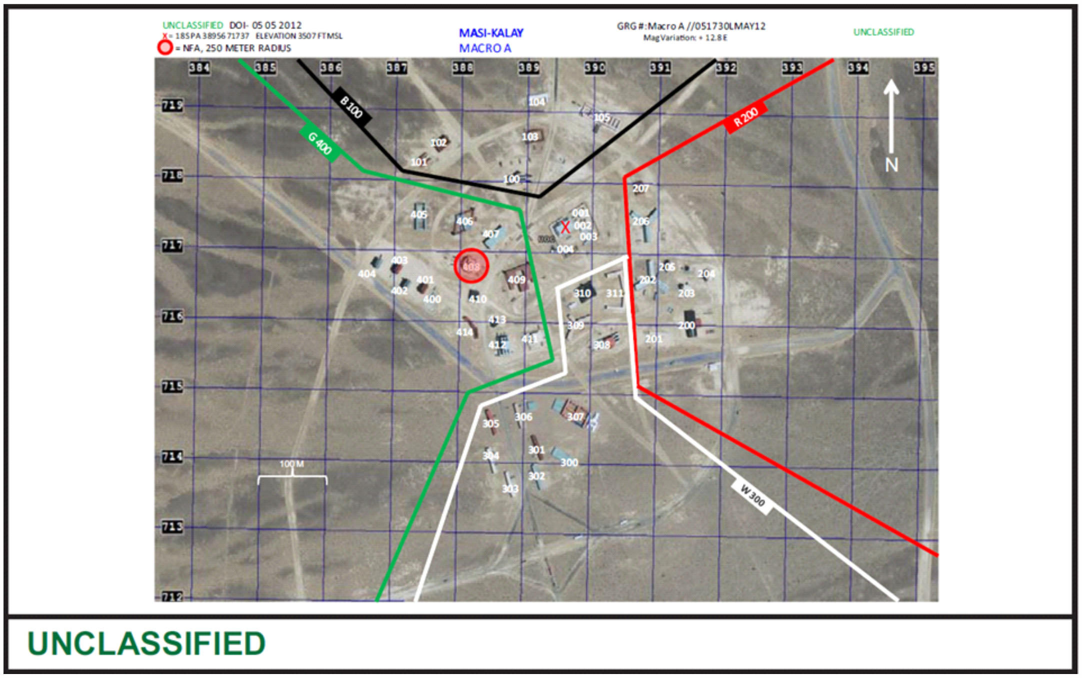
c. Buildings may be numbered from northwest to southeast for large area GRGs, or from the objective building clockwise for smaller scale single-objective GRGs.

For more information on GRG production, refer to AFTTP 3-3, JTAC, Combat Fundamentals –Joint Terminal Attack Controller, *or the* USMC TACP TAC/SOP.

4. **Target reference points (TRPs)** (Figure III-4) can also be used. TRPs are generated by labeling buildings or distinctive urban structures in and around the objective area. These can be labeled TRP#1, TRP#2, etc. TRPs expedite passing or interpreting a call for fire. If fire is being received, pass a TRP number, heading, approximate distance and description of where and what type of fire is being received.

5. **Urban Talk-On.** Due to the uncertainty of urban warfare, it is possible to receive fire from a position that cannot be covered by one of the sectoring methods discussed. Use the CAS brief to ensure critical information is passed between concerned participants. Describing the target location as it relates to surrounding structures is essential. Plain language descriptions will greatly assist the CAS aircrew in locating the target. Describing building color, type of roofing, window structure, etc., as it relates to surrounding structures, can greatly assist aircrew in locating the correct target. However, do not proceed with a talk-on without establishing a common reference point for both the JTAC/FAC(A) and aircrew. Adapt the talk-on for nighttime or sensor use, as NVDs and IR systems can display shapes but not colors. Items that provide **contrast** will allow for faster target acquisition. Even with preplanned control measure graphics, JTACs/FAC(A)s may select the most prominent structure nearby for initial orientation between themselves and the aircrew. The time to pass a brief and then pass talk-on type remarks will decrease as the level of pre-mission planning increases.

Urban Grid



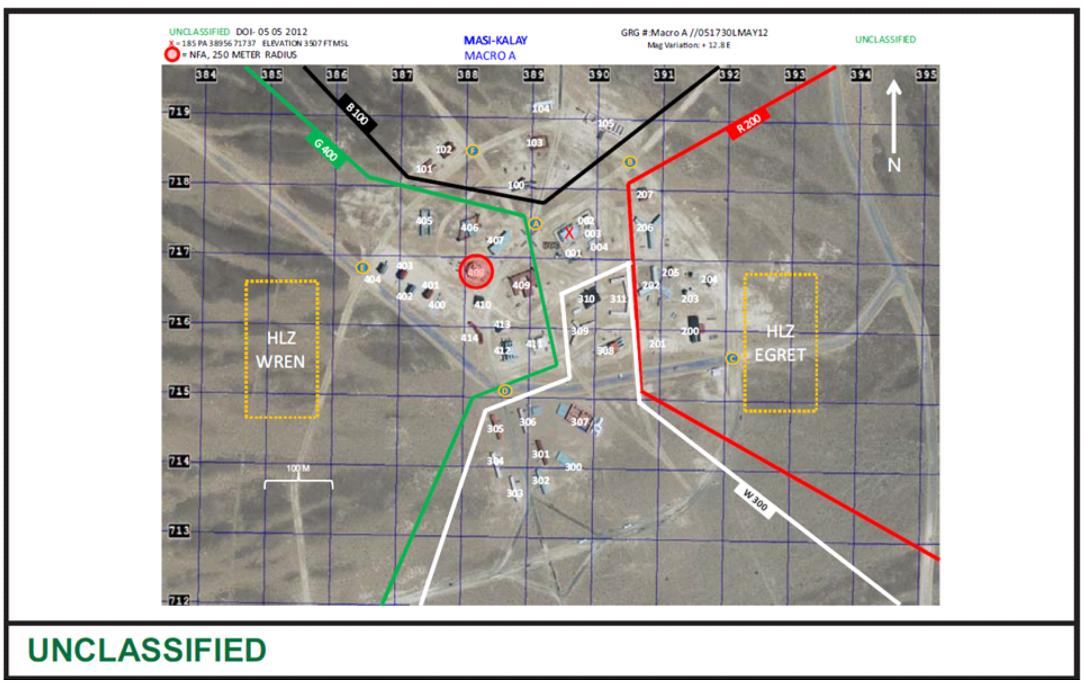


Figure III-3. Urban Grid

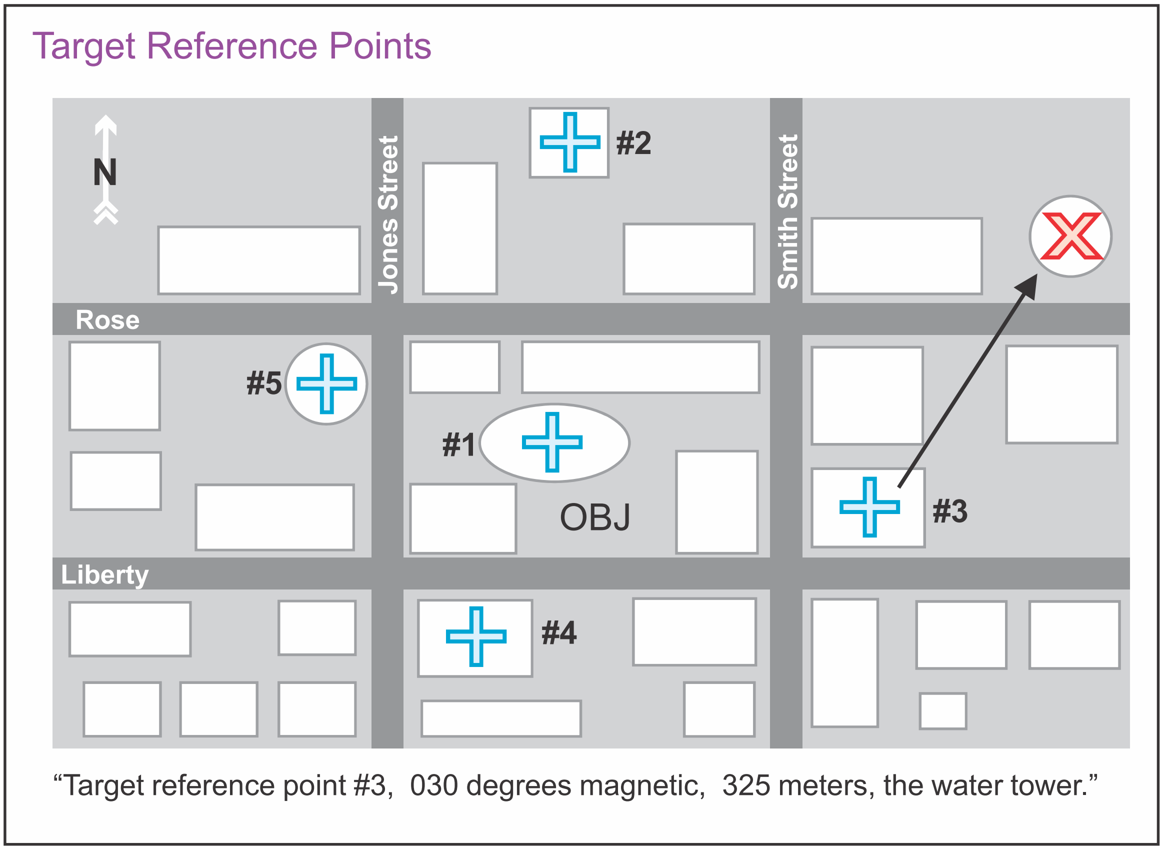


Figure III-4. Target Reference Points

(e) **Ground Unit Control Measures.** Establishing objectives and phase lines assists in understanding the ground scheme of maneuver and is one method to integrate air and ground operations. Consider all types of maps and charts, ranging from joint operations graphic charts and aerial photos to tourist maps, for use in urban environments.

(f) **Weapons Selection. The considerations for weapons in the urban environment must focus on rapid employment, the target set, minimum collateral damage, rubbling, the ability to employ in proximity to ground forces, and high precision.** The potential for friendly fire or collateral damage must be considered whenever ordnance is employed. Detailed planning of weapons and delivery tactics will minimize the risk to friendly forces, civilians, and adjacent buildings/structures. Consider combining FW and RW platform capabilities in an urban environment. For example, take advantage of FW capability to target/designate within urban areas to employ low-yield PGMs fired from a RW attack asset holding in a relatively safe battle position (BP). CAS weapons should minimize rubbling and be precise enough for delivery in very close proximity to friendly forces. To achieve the desired level of destruction, neutralization, or suppression of enemy targets, it is necessary to tailor the weapons load and fuzing to create the desired effects. 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, EO, inertially aided munitions (IAMs), or aircraft with special equipment or capabilities. In all cases, the requesting commander needs to know the type of ordnance to be expended. To provide effective CAS, the weapons delivery platform must have adequate sensors to deliver weapons with a high degree of accuracy. The type of fuzing to best destroy a CAS-type target is also critical to weapon selection. This is extremely critical when diverting sorties from a different kind of mission or target.

(g) **SEAD Requirements.** If the enemy air defense threat is significant, CAS may be limited until the threat is reduced. SEAD support may be required against enemy air defenses both inside and outside the urban area. SEAD targets embedded in the urban environment may be more difficult to find and anticipate. An aggressive, proactive SEAD effort may be necessary during the early stages of urban operations.

b. **Limited Visibility, Night, and Adverse Weather.** Limited visibility may occur due to fog, smoke, or dust on the battlefield, but occurs most frequently due to operations extending into hours of darkness. See Appendix C, "Planning Considerations for Close Air Support Using Night Vision Devices and Infrared (Laser) Pointers." Fundamental CAS procedures do not go away at night. However, **limited visibility and adverse weather CAS demands a higher level of proficiency** that can only come about through dedicated, realistic CAS training. JTACs/FAC(A)s, AOs/ALOs, ground units, and aircrews **must routinely train together during these conditions.** In addition to training, limited visibility CAS relies heavily on systems and sensors due to an aircrew's limited ability to visually ascertain friendly positions and targets. Aircraft and JTACs/FAC(A)s can perform night CAS using artificial illumination or with NVDs. Specific attack and delivery techniques vary depending on the amount of illumination, the specific capability of the CAS aircraft, and equipment available to the JTAC/FAC(A). For these reasons, limited visibility operations require additional coordination and equipment. **There are three general categories of limited visibility employment: visual, system-aided, and NVD.**

(1) **Visual Employment (Non-NVD and Inoperable/Degraded Forward-Looking Infrared [FLIR]).** During night visual employment JTACs/FAC(A)s and aircrews must contend with lower ambient light conditions, and use battlefield fires, or artificial illumination to successfully attack targets. Threat permitting, the JTAC's/FAC(A)'s requirement to see the CAS aircraft may require use of aircraft lights or flares.

(a) **Visual Employment Mission Planning**

<u>1.</u> **Weather and Reduced Visibility.** Target weather can affect illumination. If the weather is clear and a bright moon is available, additional artificial illumination may not be necessary. Smoke, haze, and precipitation in the target area may cause reduced visibility and force the aircraft to maneuver closer to the threat in order to maintain visual contact with the target. Flying closer to the threat presents an obvious problem. On the other hand, flares employed under an overcast sky will highlight the aircraft for enemy defenses. Heavy haze will cause a "milk bowl" effect—the absence of visual cues that allow aircrews to distinguish between the ground/water and the sky—which severely limits slant-range visibility and may cause spatial disorientation. Avoid allowing such conditions to drive the aircrews into flying a more predictable flight path close to a threat. Illumination flares can increase the effects of smoke and haze and further reduce the visibility.

2. **Low Ceilings.** Low ceilings may force the aircraft to maintain lower altitudes. Flares dropped below low ceilings may not produce the desired results. Low ceilings will further complicate deconfliction between aircraft holding at control points.

3. **Terrain.** Knowledge of the terrain is a crucial aspect of any night CAS mission. Be thoroughly familiar with the general terrain as well as the highest terrain and obstructions in the immediate target area.

4. **Non-Illuminated.** The capability to attack targets without artificial illumination depends on several variables:

a. The need to attack a point target (i.e., a person, vehicle, or location) or an area target (i.e., set of buildings, troops in the open).

b. Total ambient and cultural lighting in the target area.

c. Contrast between targets and their background.

d. Lighted versus unlighted targets.

e. Minimum acceptable slant range to the target due to threats.

f. Theater restrictions.

5. **Rapidly Changing Ambient Lighting Conditions (Dusk/Dawn).** At dawn and dusk, controllers and aircrew must adapt to rapidly changing light conditions, and visual acuity limitations when transitioning from NVDs to optical vision (or vice versa). Therefore, use all available means to ensure correct target identification. These means include, but are not limited to, referencing significant terrain features, using external marks such as smoke or illumination rounds, and employing targeting pods and/or other on-board sensors and navigation systems. If necessary, controllers and aircrew may need to alter attack geometry or change timing to mitigate the negative effects of increasing or decreasing ambient light conditions.

6. **Artificial Illumination.** In most cases, CAS aircrews will be using night vision goggles (NVGs) or FLIR equipment and will not require overt illumination of the target area. However, flare employment is essential for low-illumination night operations without NVGs. If at all possible, do not illuminate friendly positions. Any illumination introduced into the battle area must be coordinated with the ground commander prior to flare release.

a. **Ground-Delivered Flares.** Artillery or mortar flares are not as bright as LUU-2 flares and will not burn as long. Army Tactical Publication 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP 3-2.6, *JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower,* contains the artillery/illumination call-for-fire format.

b. **LUU-2 Flares.** LUU-2 overt illumination flares are designed to illuminate while airborne for approximately five minutes.

c. **LUU-19** is an IR illumination flare designed to illuminate while airborne for approximately seven to twelve minutes.

d. **LUU-1/-5/-6 Flares.** LUU-1/-5/-6 overt flares (known as logs) are designed to illuminate while on the ground and burn for 30 minutes. Normally, two logs are used to provide a distance and directional reference. A line of logs can also establish a sector. Logs should be dropped on cardinal headings unless run-in restrictions, friendly positions, or strong winds dictate otherwise. Logs are used for a variety of purposes: marking a lucrative target area, sectoring a search area, marking an area boundary to stay within, and/or marking an IP.

e. **Illumination Rockets.** M-257s are overt 2.75-inch rockets that provide an excellent point-and-shoot capability for target illumination. M-257 intensity is approximately one-third the intensity of an LUU-2 and will burn for approximately 2 minutes. M-278s are similar to M-257s but provide IR illumination. The M-278 IR flare is used to provide target illumination capability when using NVGs and FLIR aircraft equipment. The M-278 produces light output of 700 candlepower for approximately three minutes. The warhead is similar in function to the M-257 and is employed in the same manner.

7. **Marks.** WP or red phosphorus (RP) rockets/shells are widely used marking devices. The detonation is an obvious flash with a one to five second afterglow. The WP/RP bloom will cast a visible shadow with good moon-like illumination. Flares, explosive ordnance, burning targets, enemy muzzle flashes, tracers, and various marking rounds can be employed to provide target identification.

(b) **Visual Employment Mission Execution.** Friendly positions, winds, and the threat will determine the position and direction of the weapons delivery pattern. Prior to allowing aircraft to illuminate or mark a target at night, coordinate with the commander so that precautions are made to preserve own-troop night vision or prevent enemy observation of own-troop locations.

(2) **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, EO/IR (to include targeting pods), radar, GPS and/or IAMs, and helmet-mounted cueing systems (HMCSs).

(a) **Laser.** Night procedures for target marking or 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.** Cloud cover, humidity, precipitation, thermal crossover, and battlefield conditions (smoke, dust, or other obscurants) may degrade IR and low-light-level television effectiveness.

(c) **Radar.** 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. In order to perform a radar delivery, the target or offset aimpoint(s) must be radar significant.

(d) **IAMs.** Weapons can be delivered at night or through the weather at a set of coordinates by properly equipped aircraft. The effectiveness of an IAM depends upon the tactical situation (type of target, desired weapons effects, target movement, etc.) and the accuracy, or TLE of the target coordinates (to include elevation). Datum planes should be verified prior to deployment/mission as part of deployment/mission checklist and coordinated or confirmed with the ASOC/DASC and/or higher echelons. **Significant errors can result if different datums or excessive TLEs are used. These errors increase the risk of friendly fire as the distance to friendly troops decreases to within the TLE.**

For further guidance on coordinate datum planes, refer to the Chairman of the Joint Chiefs of Staffs Instruction (CJCSI) 3900.01C, Position (Point and Area) Reference Procedures.

(e) **HMCS.** In an air-to-ground role, the HMCS is used in conjunction with targeting sensors (radar, FLIR, etc.) to accurately and precisely attack surface targets. HMCS provides the pilot with aircraft performance, targeting, weaponry, and threat warning information, regardless of where the pilot is looking, significantly enhancing pilot SA throughout the mission.

(3) **NVD Employment.** NVDs 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 NVD terms. JTACs/FAC(A)s must be equipped with IR marking devices to fully integrate with supported maneuver forces and exploit the potential of NVDs.

(a) **NVD Mission Preparation**

1. **Weather.** Target area weather can affect illumination. An overcast sky can decrease effective illumination but may also highlight an attacking aircraft to the threat, especially night-vision-capable threats. Smoke, haze, and precipitation will degrade NVD capabilities; however, NVDs still increase the pilot's awareness of the battlefield.

2. **Artificial Illumination.** LUU-1/-2/-5/-6/-19/M-257/M278s can be used effectively at night with NVDs. They provide a very accurate reference for target area identification and can establish run-in lines. Log illumination is funneled skyward and does not illuminate the surrounding terrain. Due to the halo effect of the flare, it is best to place the log away from the actual target to prevent it from reducing NVD effectiveness.

3. **Marks.** IR-marking devices provide the perfect complement to NVDs and allow the pilot to identify both friendly and enemy positions. As a result, the combination of NVDs and IR marking devices allows safe, accurate employment in close proximity to friendly ground forces. Particular care must be taken to ensure that friendly location is not confused with target location. Both the friendly IR position-marking devices and the IR marking pointer devices used to identify enemy positions can be set to flashing,

programmable, or steady. Detailed coordination between ground forces and aircrews is essential to ensure that friendly location is not confused with target location.

4. **Artillery.** Artillery marking round effects are enhanced with NVDs. The WP/RP round is obvious upon detonation and will be visible for one to two minutes. Burning embers may be seen up to 10 minutes after impact. Artillery flares that provide bright visible light are not normally used for NVD operations because they are not covert. However, IR illumination rounds may be available for use by the firing element. The 155 millimeter smoke round provides smoke and burning embers that can be seen for several miles.

5. **WP Rockets.** WP rockets produce a brilliant flash lasting one to five seconds. The radiated heat from the rocket usually can be seen for one to five minutes after impact, depending on the terrain.

6. **IR Marking Devices.** There are numerous IR pointers in use by ground units. These pointers vary in intensity and are all visible with NVDs but not with the naked eye.

(b) **NVD Mission Execution**

1. **Aircraft Ordnance.** In general, all free-fall munitions (e.g., MK 82, MK 84, and cluster bomb unit) will cause an initial flash and may cause fires that are useful as marks. Depending on terrain, these weapons will heat up the ground in the impact area that will be detectable even in the absence of fire. This is usable as a mark for a short period of time and can also be used for adjustments.

2. **Ground Unit IR Marking Devices.** The effective range of ground marking devices (like ground commander's pointer and IR zoom laser illuminator/designator) will vary depending on their power and the amount of illumination that is present. Depending on environmental conditions, the entire IR beam or just a flashlight-type spot around the target may be seen. High illumination levels will decrease the effectiveness of IR marks but will not negate them completely. During low illumination conditions, the entire IR beam may be visible to both aircrew and ground personnel with NVDs. The shape of the IR beam will appear narrow or pencil-like at the JTAC/FAC(A)'s position, while the beam will be mushroomed at the target. When working with IR pointers, try to minimize the target illumination time. This will minimize the chance of the friendly position being compromised, especially if the enemy is night-vision capable.

3. **Airborne IR Marking Devices.** Airborne marking devices include advanced targeting pods, and weapon-mounted, as well as hand-held, pointing devices. Effective range will vary depending on their power and the amount of illumination and environmental conditions present, but usually these devices function extremely well in good conditions from medium altitude. They may be set to flash or maintain a steady beam. High-illumination levels will decrease the effectiveness of IR marks but will not negate them completely. These devices may be used to increase JTAC/FAC(A) and

aircrew SA by marking the target or matching the JTAC/FAC(A) sparkle for target confirmation (see Figure III-22 for IR brevity terms). Aircraft equipped with these devices must coordinate with the JTAC/FAC(A) prior to their use.

(c) **Friendly Marking. Ground forces can illuminate their position with IR devices or other friendly tagging devices.** The current battlefield (all sides) is rife with pointing and marking devices due to their low cost and wide availability. Ground forces should always be prepared to provide distinguishing marker characteristics to supporting aircrew. IR lights should be placed where aircrew overhead can visually acquire and maintain sight of friendly positions.

1. **IR Position Markers.** There are numerous IR position markers used by ground forces. These devices can be flashing, programmable, or steady. These devices vary in intensity and all are visible with NVDs but not with the naked eye. Flashing devices are easier to visually acquire. When possible, identification of marking devices should be verbally confirmed with the aircrew to avoid misidentification with other ground lighting. As with IR pointers, the higher the ambient illumination, the more difficult it will be to acquire these devices.

2. **IR Pointers.** Used alone or in conjunction with other IR marking devices, IR pointers are very effective for identifying both friendly and enemy positions. These devices can be flashing, programmable, or steady. Depending on environmental conditions, pilots (and enemy personnel) may see the entire beam or just the flickering of the IR pointer source on the ground.

3. **GLINT Tape.** Ground forces with GLINT tape may be seen by the SOF gunship or UAS low-light level television, depending on the amount of environmental or artificial illumination in the area. Identification of friendly forces by this manner should be verified by other means to avoid misidentification. Do not use more than a 1/2-inch square for an individual or four 1-inch squares per vehicle.

(d) **Clearance Parameters for Ground-Based IR Marking Devices for a Bomb on Target (BOT) Employment.** Any time IR pointers are employed from the ground to mark the target, attacking aircrew will call "VISUAL" for confirmation of the friendly position and either "TALLY" for the target or "CONTACT SPARKLE" on each and every pass/attack prior to receiving clearance. In either case, this communications brevity provides confirmation that the CAS aircrew has distinguished the source end (friendly) from the target end (enemy) of the mark. Standard IR pointer communications should still be followed until a "CEASE SPARKLE" command is given.

(e) **CAS Brief.** When using IR pointer/illuminators, indicate the **target mark type** with **"IR"** or **"IR pointer."** Additionally, consider including the pointer-to-target line in the remarks section of the CAS brief.

(f) **Friendly Tagging Devices.** Units equipped with tagging devices can use their capability to relay the latest position to C2 nodes equipped to receive and display data.

If airborne CAS forces are equipped to receive and/or display this information, they can use it to help confirm or update friendly locations.

(4) **Advantages.** The most important advantage of night and adverse weather CAS is the limitation it imposes on enemy optically-directed AAA and optical/IR-guided SAMs. Selectively placed airborne and ground illumination may further degrade enemy night vision capabilities while preserving or enhancing those of friendly forces.

(5) **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 acquiring targets and accurately locating enemy and friendly forces. Accurate target marking plays a vital role in target acquisition. Low ceilings may require CAS aircraft to operate in the low-to-very-low altitude environment. Consideration must be given to target marking, SEAD, and fires deconfliction. CAS aircraft operating in the low-to-very-low environment will also have reduced target acquisition times.

(6) **Friendly Force Location and CID.** The challenges of identifying friendly and enemy locations, targets, and maintaining SA become acute in the night or adverse weather CAS environment. The entire training, equipping, planning, tasking, and execution process must recognize these challenges.

10. Close Air Support Planning Considerations—Time Considerations

a. **Time Available for Planning.** Time is the critical element in coordinating events and massing fires to create the combined arms effect of ground and air forces. Planners must estimate the amount of time necessary to plan the mission, effect the coordination, and execute the mission to support the ground commander. Inadequate planning time will result in reduced effectiveness and increased risk to aircrews and ground troops alike.

b. **Joint Air Tasking Cycle.** The specific theater or joint operations area supporting JAOC will establish cut-off times to receive preplanned air support requests for inclusion in the ATO. CAS requirements that do not meet the established cut off times are treated as immediate air support requests and processed by the ASOC. If time permits changes to the ATO through the combat operations division of the JAOC are published and disseminated per theater/joint operations area SOPs.

c. **Synchronization.** Synchronization of maneuver and fires is critical. Whenever possible, use GPS time to synchronize actions.

11. Planning Concepts Essential for Effective Close Air Support

It is critical for JTACs and COC/TOC elements to coordinate their efforts in the planning stage. Key issues such as battle tracking, target nomination, tactical risk assessment, weapons release authority, methods of attack, types of TAC, airspace deconfliction and coordination, synchronization, and which JTAC/FAC(A) will provide TAC must be clearly understood and carefully planned. **Only through effective**

coordination can the CAS team successfully achieve the supported commander's objectives for CAS.

a. **Battle Tracking.** Battle tracking is the process of building and maintaining an overall picture of the operational environment that is accurate, timely, and relevant. Effective battle tracking increases the probability of CAS attack success by ensuring its application at the proper time and place. The level of detail required and scope of the picture will depend on the mission and information requirements of the joint force. At the tactical level, the simplest form of battle tracking is the mental and graphic picture built and maintained by using maps, observations, and battle updates from HHQ. At higher levels, battle tracking is more complex and takes advantage of digital information systems using multiple sources to generate a coherent picture of the operational environment. Effective battle tracking will aid in maintaining an understanding of friendly and enemy progress, reduce redundant targeting, and reduce the possibility of friendly fire. Effective methods of battle tracking include maintaining up-to-date maps, imagery, and status boards, and utilizing computerized tracking and display methods. **It is imperative that TACP personnel remain part of the information flow (e.g., battle drills, spot reports, targeting).** Additionally, the JTAC, FAC(A), and COC/TOC must operate with the most current information:

(1) **FSCMs/ACMs,** as applicable: IPs, CPs, BPs, ingress/egress routes, minimum-risk routes (MRRs), ACAs, no-fire areas (NFAs), restricted operations zones (ROZs), coordinated fire lines (CFLs), restrictive fire lines (RFLs), and FSCLs.

(2) **Friendly Unit Information.** Unit boundaries, phase lines, friendly locations, PWT and scout locations, objectives, engagement areas, and obstacles.

(3) **Artillery.** Current and planned artillery locations and gun-target lines (GTLs).

(4) **Enemy Locations** (including surface-to-air threats).

(5) **Targeting.** Planned target locations, CAS target triggers, air support requests, observation plan, and fire support plan, immediate target locations/coordinates and associated TLE.

(6) **Fragmentary Orders, Spot Reports, and ATO Updates**

(7) **Communications/Data-Link Plan.**

b. **Supported/Supporting Relationship.** In a CAS engagement, the ground commander is the supported commander inside the boundaries of an assigned operational area. CAS aircraft, the TACP, FAC(A)s, JTACs, and JFOs are supporting elements. By definition, the ground commander is the OSC. CAS aircraft cannot be an OSC; however, the aircraft with the highest SA may be delegated tactical lead for coordinated attacks. Tactical lead authority can only be delegated by the JTAC/FAC(A). The JTAC or FAC(A) is the ground commander's direct representative, and information passed by the JTAC/FAC(A) with regard to commander's intent and approval of fires should be viewed as coming directly from the ground commander. The execution of a CAS engagement is a two-way dialogue and agreement between the aircrew and the supported commander's representative—the

JTAC/FAC(A). The terminal attack controller/aircrew team work together to accomplish the ground commander's intent. At the end of the day, two individuals on either end of the radio are working to assist another individual who needs aviation fires. Aircrew should interpret a CAS brief as an order. Supporting units, including aircrew, should provide the supported commander with as much information as necessary for the commander to make the appropriate decision. **Once the ground commander has all the appropriate information, it is the supported commander's decision to employ ordnance in the commander's operational area. Given that aircrew have passed all relevant information and SA to the ground commander prior to employment, and that they have SA to the correct target, the responsibility for the resulting weapons employment remains with the ground commander, not the aircrew.**

c. **Targeting and TLE**

(1) Target coordinates (preplanned and immediate) and associated TLE only need to be of sufficient fidelity to create the desired effects on target through efficient battle tracking and effective fire support integration. The level of accuracy/TLE required for the target coordinate will be tactical scenario dependent. TTT/TOT should not be delayed in order to generate more coordinate precision and/or accuracy if the current coordinates, TLE, CAS asset, ordnance, and mark plan will create the desired effects. Through effective use of BOT and bomb on coordinate (BOC) methods of attack, desired target effects can be created quickly through CAS engagement at the JTAC/FAC(A)'s level. Simultaneously, the target coordinate and TLE must be sufficient to provide an accurate and timely operational picture at the TOC/COC/FSCC. Examples include:

(a) A dense urban environment with friendly ground units working cross boundaries with no easily defined forward line of own troops (FLOT) or forward edge of the battle area will likely require a very precise and accurate target location with low TLE. Target mensuration may provide this level of accuracy.

(b) In a conventional, linear battlefield, less coordinate accuracy and/or precision may be required for successful target engagement. The target coordinate serves as an anchor point for COC/TOC/appropriate-level fires approval agency, and FSCCs/FCs, in order to provide an accurate, **timely,** and relevant operational picture.

(c) Target coordinate mensuration is the process of measurement of a feature or location on the Earth to determine an absolute latitude, longitude, and height. For targeting applications, the errors inherent in both the source for measurement as well as the measurement processes must be understood and reported. Mensuration tools can employ a variety of techniques to derive coordinates. These may include, but are not limited to, direct read from a digital point positioning database (DPPDB) stereo-pairs in stereo or dual mono mode, multi-image geopositioning, or indirect imagery correlation to DPPDB. Target coordinate mensuration occurs at the strategic (national agency), operational (theater HQ and components), and tactical levels of warfare. Due to its importance as a critical function in the targeting process, supporting precision fires, personnel who conduct target coordinate mensuration must be certified to do so. The targeting process requires due diligence in all facets, to include target coordinate mensuration. Individuals who mensurate points to support employment of coordinate-seeking weapons, and/or are tasked to provide points for the Modernized Integrated Database targeting database, require certification by the National Geospatial-Intelligence Agency, or certification by a National Geospatial-Intelligence Agency-accredited Service, combatant command, or combat support agency program.

(2) **Laser Range Finders and Target Locating Devices.** LRFs use low power laser pulses to measure range to an object. Target locating devices are devices that incorporate an LRF, magnetic or gyroscopic compass, tilt measurement devices, and GPS. These systems measure the range and angles from their positions provided by the GPS to mathematically derive a target location.

(3) TLE is the difference between the coordinates generated for a target and the actual location of that target. TLE is expressed primarily in terms of circular and vertical errors (VEs), or infrequently, as spherical error (SE).

(a) CE is the error of the coordinates in the horizontal ground plane (i.e., circular).

(b) VE is the error of the coordinates in the vertical plane (i.e., elevation).

(c) SE is the error of the coordinates in three-dimensional spherical space (i.e., the combined error of CE and VE).

(4) These errors are expressed as CE90, VE90, and SE90 distances which mean that there is a 90 percent chance that the actual target will be within these circular, vertical, and spherical distances.

(a) TLE should be communicated when it will significantly affect the likelihood of mission success or failure. In general, TLE CAT is not required to either approve a mission or successfully engage a target with CAS.

(b) In order to facilitate the communication of targeting accuracy, TLE is characterized in six CATs. The first row presents the categories of TLE which range from best (CAT I) to worst (CAT VI) and are used to classify the accuracy of any coordinate-generating system. See Figure III-5.

(c) Proper coordinate generation procedures must be followed when stating that a given system is capable of a specific TLE CAT. In reality, variables such as DPPDB errors, slant range, altitude, beam divergence of the laser spot, and aim point on the target all have significant effects on the accuracy of the coordinate generated.

(d) Aim point is a significant factor in the TLE of all coordinate generation systems. As an example, portable tactical imagery tools may be capable of CAT I coordinates, but a JTAC may not be able to produce a CAT I solution for a vehicle parked in a field that is not adequately depicted in the system. Likewise, a FW aircraft/targeting pod combination may be capable of CAT II coordinates, but not able to generate a CAT II solution for a target/aim point that is not sensor significant such as a bunker, trench line, or emplacement with overhead cover and concealment.

Target Location Error Categories

TLE Categories (reference circular error on ground)	CAT I CE 0-20 ft 0-6 m			CAT II CE 21-50 ft 7-15 m			CAT III CE 51-100 ft 16-30 m			CAT IV CE 101-300 ft 31-91 m			CAT V CE 301-1000 ft 92-305 m			CAT VI CE >1000 ft (>305m) or Large Elliptical Error		
Circular, Vertical, Spherical Error Predictions	CE 90	VE 90	SE 90	CE 90	VE 90	SE 90	CE 90	VE 90	SE 90	CE 90	VE 90	SE 90	CE 90	VE 90	SE 90	CE 90	VE 90	SE 90

Legend

CAT category
CE circular error
ft feet
m meter
SE spherical error
TLE target location error
VE vertical error

Figure III-5. Target Location Error Categories

Note: If the JTAC/FAC(A) desires to pass the TLE of a coordinate, prior to passing 10-digit grid coordinates in a CAS brief, the JTAC/FAC(A) could state the CAT of TLE and the number of digits to expect in the game plan, prior to the CAS brief (e.g., "Cat II, 10-digit grid to follow, advise when ready for 9-line"). A **game plan** is a concise and SA enhancing tool to inform all players of the flow of the following attack. At a minimum, the game plan will contain the type of control and method of attack.

d. **Tactical Risk Assessment.** In addition to proper battle tracking, the supported commander and staff make continuous tactical risk assessments. Risk assessments involve the processing of available information to ascertain a level of acceptable risk to friendly forces or civilians. **Based on the current risk assessment, the supported commander will weigh the benefits and liabilities of authorizing CAS employment. CAS is not always the best option.** Specific levels of risk should not be associated with each type of control or method of attack. Information to consider when assessing risk includes:

(1) Confidence in, and the training of, the unit, staff, and key personnel.

(2) Timeliness of information.

(3) Absence of information.

(4) Information flow and communications.

(5) Confidence in battle tracking.

(a) Friendly force locations.

(b) Civilian locations.

(c) Enemy locations.

(6) Threat information.

(a) Threat to ground forces.

(b) Threat to aircraft.

(7) Confidence in targeting information.

(a) Targeting information source and accuracy (HUMINT, signals intelligence, geospatial intelligence, visual, etc.).

(b) Stationary or moving.

(c) Ability to mark the target.

(d) Level of difficulty for aircrew to acquire mark/target.

(8) Ordnance available for attack.

(a) Capabilities.

(b) Limitations.

(c) Restrictions.

(d) Proximity of friendlies/civilians.

(e) Risk of collateral damage.

(9) **Troops in Contact.** JTACs/FAC(A)s and aircrews should regard friendly ground forces receiving effective fire as "troops in contact." JTACs and aircrews must carefully weigh the choice of munitions and types of TAC against the risk of friendly fire (e.g., "troops in contact" does not necessarily dictate a specific type of control). "Troops in contact" is an advisory call to increase awareness and to highlight the urgency of the ground situation; however, the call does not remove the aircrews'/JTACs' responsibility to avoid civilian and friendly troop casualties. "Troops in contact" requires the supported commander to determine priority of CAS with respect to other mission impacts.

(10) **Risk Estimate Distance**

(a) Risk estimate distances allow the supported commander to estimate the potential danger to friendly troops from the CAS attack. They are discussed as 0.1 percent probability of incapacitation (P_i) (i.e., 1 in 1,000 P_i). Different factors such as delivery profile, target elevation, terrain, buildings, trees, etc., can significantly reduce or increase P_i.

For further information on risk estimate distances and computations and casualty criterion, refer to Army Tactical Publication 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP 3-2.6, JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower.

(b) **Danger Close.** Ordnance delivery inside the 0.1 percent P_i distance will be considered "danger close." The supported commander must accept responsibility for the risk to friendly forces when targets are inside the 0.1 percent P_i distance. Risk acceptance is confirmed when the supported commander passes their initials to the attacking CAS aircraft through the JTAC/FAC(A), signifying that they accept the risk inherent in ordnance delivery inside the 0.1 percent P_i distance. When ordnance is a factor in the safety of friendly troops, the aircraft weapon's axis of attack should be parallel to the friendly force's axis or orientation, to reduce the risk of munitions impacting long or short of the intended impact point onto friendly positions.

(11) **Collateral Damage.** Avoidance of collateral damage during CAS operations begins in the planning phase and is then continuous throughout the preparation and execution phases. Collateral damage is unintentional or incidental injury or damage to persons or objects that would not be lawful military targets in the circumstances ruling at the time. Civilian casualties is a narrower term used to refer to unintentional injury or death to civilians who would not be lawful military targets. When referring to CAS, civilian casualties are a type of collateral damage. Discussion in this publication will be focused on minimizing collateral damage during CAS operations.

(a) **Impacts and Importance.** The failure to mitigate collateral damage below acceptable risk levels may expose political and military leadership to adverse consequences in assigned military missions and national security goals. Excessive collateral damage can lead to reduced public support for operations, more restrictive ROE, and prolonged reconstruction operations.

(b) **Methodology.** Per CJCSI 3160.01, *No-Strike and the Collateral Damage Estimation Methodology*, a formal collateral damage estimate (CDE) can only be accomplished by a certified/qualified CDE analyst and must be approved by the appropriate level commander delineated in the ROE. CDE is not required for RW or FW air-to-surface direct-fire weapon systems less than, or equal to, 105 millimeter (e.g., 2.75-inch rockets, GAU-8 30-millimeter Gatling gun, and the M137A1 105 millimeter) because the risk of collateral damage from these weapons systems is presented by the distribution of munitions in the target area, and not from the explosive effects of the warhead; however, the law of war principles of necessity, distinction, proportionality, and unnecessary suffering must still be considered for employment of these direct-fire weapons systems. The collateral damage methodology (CDM) does not account for weapon malfunctions, unknown delivery errors, altered delivery tactics based on operator judgment, unknown transients, individual marking, or adjusting rounds when employing surface-to-surface ballistic munitions, or secondary explosions. The joint CDE does not limit or supersede a commander's responsibility to respond to time-sensitive targets or inherent right and obligation of self-defense. However, an understanding of CDM can assist the CAS planner or JTAC/FAC(A) in making a proportionality decision by answering five basic questions:

1. Can I make a PID of the object I want to affect? (PID is the reasonable certainty that a functionally and geospatially defined object of attack is a legitimate military target in accordance with the law of war and the applicable ROE.)

2. Are there protected or collateral objects, civilian or noncombatant personnel, involuntary or unwitting human shields, or significant environmental concerns within the effects range of the weapon I would like to use to attack the target?

3. Can I mitigate damage to those collateral concerns by striking the target with a different weapon or with a different method of engagement, yet still accomplish the mission?

4. If not, how many civilians and noncombatants do I think will be injured or killed by this attack?

5. Are the collateral effects of my attack excessive in relation to the expected military advantage gained, and do I need to elevate this decision to the next level of command to attack the target based on the ROE in effect?

(c) **JTAC/FAC(A) Responsibilities.** All CAS planners employ available resources, within the constraints of mission accomplishment, time, and friendly force protection, to minimize collateral damage. The primary cause of collateral damage is PID failure. Therefore, JTACs physically present at the point of air weapons employment have a responsibility to work with the supported ground commander to ensure PID is attained and SA accounts for both friendly and civilian locations. JTACs/FAC(A)s often provide final terminal control of CAS weapons, which ensures weapons employment is correct and safe, in order to limit collateral damage. JTACs/FAC(A)s can help minimize and mitigate collateral damage in the following ways:

1. Understand the major causes of collateral damage.

a. Failure to positively identify targets as hostile and geospatially define their location, or failure to identify civilians in the vicinity of the target.

b. Improper weapon-to-target match in a given operational environment. Ordnance, fuzing, and delivery method can all have large impacts on the level of collateral damage and must be appropriately selected based on mission accomplishment, friendly force protection and proximity of collateral entities.

c. Weapon Malfunctions. Failure to properly plan attack axis to mitigate weapon guidance failures or miss distances. Human error or technology failure can lead to weapons landing off target or large miss distances resulting in increased collateral damage.

d. Occasionally, certain targets are of such high strategic importance that a conscious decision is made by military and political leaders to engage the target despite the collateral risk. These cases are not typical in the CAS environment and require a specialized review and approval process as governed by the CJCSI 3122.06. *Sensitive Target Approval and Review (STAR) Process*.

2. Apply the proper mitigation techniques.

a. JTACs/FAC(A)s must be vigilant to identify the presence of non-combatants and incorporate pattern-of-life into their targeting decisions and recommendations to the supported ground commanders. JTACs/FAC(A)s must be proactive and especially careful when using any form of remote targeting (scout, JFO, VDL).

b. JTACs/FAC(A)s can select ordnance with lower explosive yield, greater precision, or which have less fragmentation potential if it still achieves the ground commander's intent. In addition, JTACs/FAC(A)s can specify fuzing combinations that lead to lower collateral damage such as delay fuzing to minimize fragmentation, or airburst fuzing to minimize the weapon's penetration and effect of blast against a structure. However, using secondary fuzing options may increase the risk of weapon failure (dud or low order detonation) or decrease the weapon's effectiveness. JTACs/FAC(A)s can also select an aimpoint offset to bias weapons effects away from nearest collateral concerns if the ground commander's desired effect will still be met.

c. JTACs/FAC(A)s must take not only friendly locations but collateral concerns into account when planning attack axis to mitigate the effects of weapons landing off target due to human or technological failure. Properly orienting attack axis, so the weapon is moving away from the nearest collateral concern at the point of impact, accounts for possible misses, and orients fragmentation pattern away from the nearest collateral concern.

d. JTACs/FAC(A)s must use all means available to ensure target location is accurate and of sufficient fidelity to achieve mission objectives. They must also exercise appropriate diligence in target correlation to ensure the correct target is attacked.

3. CJCSI 3160.01, *No-Strike and the Collateral Damage Estimation Methodology,* Appendix D states that CDM is not an exact science and relies on computer-based modeling which has some inherent variability and does not predict the actual outcome of weapons employment. As such, CDM and the products derived from CDE will not be the only input to the commander's decision making. Detailed operational analysis may introduce factors that outweigh the value of CDM input and provide guidance with regard to the CDM and collateral damage concerns.

For further information on collateral damage, see CJCSI 3160.01, No-Strike and the Collateral Damage Estimation Methodology.

e. **CAS Target Nomination.** After making a tactical risk assessment, commanders nominate CAS targets based on previously planned target sets or from spot reports received during execution. The nomination process can occur before or after aircraft arrive at the control point.

f. **Weapons Release Authority.** The intent is to offer the lowest level supported commander, within the constraints established during risk assessment, the latitude to authorize weapons employment. Prior to CAS target engagement, supported commanders also delegate weapons release authority to JTACs/FAC(A)s for specific engagements. See Figure III-6 for JTAC/FAC(A) clearance calls. **The authority and responsibility for the expenditure of any ordnance on the battlefield rests with the supported commander.** Weapons release authority grants JTACs/FAC(A)s the authority to provide the following clearance calls to attacking aircraft:

TERMINAL ATTACK CONTROLLER CLEARANCE CALLS	
CALL	MEANING
ABORT	Cease action/attack/event/mission.
CLEARED HOT	Type 1 and 2 close air support terminal attack control clearance to release ordnance on this pass.
CONTINUE	Continue present maneuver, does not imply a change in clearance to engage or expend ordnance.
CONTINUE DRY	Continue present maneuver, ordnance release not authorized. Used to provide approval to aircraft to continue the pass without expending ordnance during Type 1, 2, or 3 control. (Joint terminal attack controller must use "Type 3, CONTINUE DRY" for dry Type 3 control.)
CLEARED TO ENGAGE	Type 3 close air support terminal attack control clearance. Attack aircraft or flight may initiate attacks within the parameters imposed by the joint terminal attack controller.
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 friendly fire incidents. Nonstandard calls must be avoided at all times.	

Figure III-6. Terminal Attack Controller Clearance Calls

(1) **ABORT.** Term used by a JTAC/FAC(A) during all types of control to terminate the attack prior to weapons release.

(2) **CLEARED HOT.** Term used by a JTAC/FAC(A) during Type 1 and 2 control when granting weapons release clearance to an aircraft attacking a specific target. An exception to this would be a JTAC/FAC(A) providing a specific cleared hot clearance for the entire flight/section to attack. When providing clearance for an entire flight/section to attack, the JTAC/FAC(A) should preface the clearance with the term "flight" after the call sign. For example, JTAC—"Ragin' 41, flight, CLEARED HOT."

(3) **CONTINUE.** Term used by a JTAC/FAC(A) during all types of control to authorize the aircraft to proceed with the attack profile, but weapons release is not granted yet.

(4) **CLEARED TO ENGAGE.** Term used by a JTAC/FAC(A) during Type 3 control, granting a weapons release clearance to an aircraft or flight to attack a target or targets within the parameters prescribed by the JTAC/FAC(A).

(5) **CONTINUE DRY.** Continue present maneuver, ordnance release is not authorized. Used to provide approval to aircraft to continue the pass without expending ordnance during Type 1, 2, or 3 controls. (JTAC/FAC[A] must use – "Type 3, CONTINUE DRY" for dry Type 3 controls). Given in place of a cleared hot when weapons release is not intended, such as in training or during a show of force.

Note: For the most recent communications brevity codes and meanings, see the most recent revision of FM 1-02.1/MCRP 3-25B/NTTP 6-02.1/AFTTP 3-2.5, *Brevity, Multi-Service Brevity Codes.*

g. **Post Launch Abort (PLA) Considerations**

(1) Some guided aviation munitions offer a very limited capability to shift impact point during time of flight. If required, a PLA plan shall be developed and approved by the supported commander before CAS employment. With CAS weapons delivery time of flight typically less than 30 seconds, the decision for PLA must be made very early in the time of flight to make any significant change to weapon impact point. Therefore, PLA is a procedure of last resort and may only be valid for certain platforms, weapons, and employment envelopes. Aircrews shall inform the supported commander via the JTAC or FAC(A) if they are unable to comply if PLA is requested.

Warning: Moving desired point of impact location away from intended target may significantly increase the risk of collateral damage or friendly fire.

(2) The supported commander must authorize the use of PLA and clearly establish the requirements (CDE, pattern of life, etc.) for the PLA impact point as well as the area between the PLA impact point and the target. Procedures for PLA execution shall comply with the traditional fires approval process and need to be established prior to weapon launch. Unknown transients entering the impact area, a late abort call, or an evolving scene that will result in unacceptable collateral damage are examples of contingencies where a PLA plan can mitigate dangers. If the ground commander wishes to authorize PLA, the JTAC shall inform the CAS aircrew in the remarks section of the situation update of the PLA impact point. The PLA impact point must be approved by the JTAC, and the aircrew must explicitly be given PLA authority, including the criteria for executing the procedure. If the JTAC does not grant approval, PLA shall not be performed and "silence is not consent." The PLA point should be transmitted as a restriction and can be a specific impact point or a direction and distance from the intended target. Transmission of an abort point or direction and distance should not be confused with authority to perform a PLA procedure. JTACs and aircrews should exercise caution before utilizing this procedure in urban areas.

(3) Procedures for PLA are as follows:

(a) Standard CAS brief transmitted.

(b) Restrictions will include a PLA point or direction/distance as well as the specific circumstances under which the JTAC expects the aircrew to initiate the procedure.

(c) Aircrew readbacks include the PLA instructions.

(d) Mission is approved using standard verbiage already in use. If PLA is approved, "post launch abort approved as briefed" must be transmitted.

(e) In the event that the ground commander or JTAC needs to initiate a post launch abort, the directive communication will simply be "Aircraft call sign, Abort!" followed by PLA actions to the previously approved abort point.

1. An example of a capable post launch abort (PLA) munition is the AGM-114 Hellfire. Paveway II and GBU-54 are not recommended for PLA.

2. PLA coordination/execution will affect tempo and therefore is not recommended unless time permits and the ground force commander desires to incorporate it.

Note: Any delay by the launch platform prior to PLA execution significantly reduces the ability to actually move the weapon impact point. This tactic also introduces added uncertainty and risks, is very difficult to execute properly, must be executed very early in the weapon delivery, and therefore should only be considered in rare cases. This tactic should not be briefed as a viable option to decision makers to reduce collateral damage and should be used only as an option of last resort.

h. **JTAC to FAC(A) Coordination.** The responsibilities of the JTAC and the FAC(A) must be determined prior to the attack. These responsibilities may include coordination with maneuver elements, attack aircraft briefing, target marking, airspace deconfliction, SEAD execution, and the person who provides final attack clearance. The coordination or core duties and responsibilities between the TACP and the FAC(A) can be found in Chapter V, "Execution," paragraph 5d, "FAC(A) Duties and Responsibilities."

12. Types of Control and Methods of Attack

a. **Types of Control.** Types of TAC are tools that give the ground commander the greatest chance of accomplishing the mission while mitigating friendly fire and collateral damage. The tactical risk assessment determines which type of control (1, 2, or 3) is used. Type of control shall be passed as part of the game plan before the attack brief for aircrew SA, but imposes no requirement on the aircrew. Technological advances in aircraft capabilities, weapons systems, and munitions provide JTACs/FAC(A)s additional tools to maximize effects of fires while mitigating risk of friendly fire when employing air power in close proximity to friendly forces. GPS-equipped aircraft and munitions, LRFs, LTDs, and digital system capabilities are technologies that can be exploited in the CAS mission area. **There are three types of control (Types 1, 2, and 3).** The type of control conveys the JTAC's/FAC(A)'s intent on how best to mitigate risk and the need to control individual attacks: Type 1, accomplished by visually acquiring the attacking aircraft, assessing the attack geometry and maintaining control of individual attacks; Type 2, accomplished by paying particular attention to other measures in place to reduce risk and maintaining control of individual attacks; or Type 3, accomplished by paying particular attention to other measures in place to reduce risk and the measures in place allowing for multiple attacks within a single engagement. During the fires approval process at the appropriate unit level, the commander considers the situation and issues guidance to the JTAC/FAC(A) based on recommendations from the staff and associated risks identified in the tactical risk assessment discussed earlier. Type of control may be a decision delegated to the JTAC/FAC(A) under certain conditions. **Specific levels of risk should not be associated with each type of TAC.** The tactical situation will define the risk associated with a given type of TAC (e.g., GPS and digital targeting systems used in Type 2 control may be a better mitigation of risk than using Type 1). The three types of control are not ordnance specific.

Note: Any change to the type of TAC should be coordinated with the appropriate fires approval agency, as the type of control is part of the approved CAS mission. This change must be made prior to the "IN" call for Type 1 and 2 attacks and the "COMMENCING ENGAGEMENT" call for Type 3. If a type change is required after these calls, then the JTAC or FAC(A) should abort the attack and rebrief the aircrew.

(1) **Type 1 Control**

(a) Type 1 control is used when the JTAC/FAC(A) requires control of individual attacks and the situation requires the JTAC/FAC(A) to visually acquire the attacking aircraft and the target for each attack. Type 1 control **should be** utilized when the visual acquisition of the attacking aircraft and analysis of attacking aircraft geometry by the JTAC/FAC(A) is the best means available to ensure mission success and reduce the risk of the attack affecting friendly forces and/or collateral concerns. The intent is that the JTAC/FAC(A) is able to assess the attack geometry of the aircraft to predict the weapon trajectory from release to impact, helping to ensure friendly positions and collateral damage concerns are safe from undesired weapons effects. **The JTAC/FAC(A) will withhold clearance until the attacking aircraft has completed maneuvering on the target**. The JTAC/FAC(A) may also restrict the type of ordnance used by attacking aircraft to minimize the chance of unwanted weapons effects from munitions capable of high off boresight trajectories. Some aircraft provide a unique off-axis weapons employment capability. Additional consideration should be given to certainty of target correlation, presence of a unique mark, and proximity of friendly forces. Language barriers when controlling multinational aircraft, lack of confidence in a particular platform, ability to operate in adverse weather, or aircrew capability are all examples where visual means of control may be the method of choice.

Note: Due to the guidance of GPS or inertial navigation systems (INS) weapons, deliveries of GPS or INS guided weapons should not be controlled under Type 1. Assessing the aircraft's geometry in relation to the target does not allow a JTAC/FAC(A) to predict the weapon trajectory from release to impact. The weapon, regardless of aircraft position and flight path, will attempt to fly to the coordinates entered.

(b) **Type 1 control procedures are as follows:**

1. The JTAC/FAC(A) visually acquires the target.

2. The JTAC/FAC(A) passes the game plan and CAS brief to the attacking aircrew.

3. The attack aircrew validates target location by cross-checking that the position is coincident with the expected target area, using all appropriate means.

4. The aircrew will read back Line 4, Line 6, and any restrictions provided by the JTAC/FAC(A).

5. The JTAC/FAC(A) will conduct correlation as required.

6. Aircrew will provide an "IP INBOUND" call if requested.

7. Attack aircrew will provide "IN" call, indicating entering terminal phase of air-to-ground attack prior to weapons release. The terminal controller may require the CAS aircraft to "Call 'IN' with direction" during the remarks/restriction portion of the CAS brief.

8. The JTAC/FAC(A) will visually acquire the attacking aircraft.

9. The JTAC/FAC(A) will analyze attacking aircraft geometry to ensure mission success and reduce the risk of the attack affecting friendly forces and/or collateral concerns.

10. The JTAC/FAC(A) will provide a "CLEARED HOT," "CONTINUE DRY," or "ABORT," based on the above procedures being met.

Note: In the case where aircraft acquisition/analysis by the JTAC/FAC(A) is difficult or impossible, attack aircraft may be forced to modify their attack profile to aid in acquisition.

See paragraph 12d, "Considerations for All Types of Control," for amplifying information. For examples of Type 1 missions, see Appendix E, "Examples of Close Air Support Missions," Examples 1 and 2.

Type 2 control is used when the joint terminal attack controller (JTAC)/forward air controller (airborne) (FAC[A]) requires control of individual attacks and any or all of the conditions below exist:

JTAC/FAC(A) is unable to visually acquire the attacking aircraft at weapons release.

JTAC/FAC(A) is unable to visually acquire the target.

(2) **Type 2 Control**

(a) The JTAC/FAC(A) must visually acquire the target or utilize targeting data from another asset with accurate real-time targeting information. Type 2 control requires control of individual attacks. **While not required, if the tactical situation allows, the JTAC/FAC(A) should make every effort to visually acquire the attacking aircraft and assess attack geometry in order to provide an additional measure of safety, enhance SA, and be able to abort the attack if necessary.** Examples of when Type 2 control may be applicable are troops in contact, night, adverse weather, and high altitude or standoff weapons employment.

(b) **Type 2 control procedures** are as follows:

1. The JTAC/FAC(A) visually acquires the target or acquires targeting data from another asset with accurate real-time targeting information.

2. The JTAC/FAC(A) passes the game plan and CAS brief to the attacking aircrew.

3. The attack aircrew validates target location by cross-checking that the position is coincident with the expected target area, using all appropriate means.

4. The aircrew will read back Line 4, Line 6, and any restrictions provided by the JTAC/FAC(A).

5. The JTAC/FAC(A) will conduct correlation as required.

6. The aircrew will provide an "IP INBOUND" call if requested.

7. The attack aircrew will provide the JTAC/FAC(A) with an "IN" call, indicating entering terminal phase of air-to-ground attack, prior to weapons release. Aircrew should make this call at the appropriate time to allow clearance before entering the release window. If a restriction in the form of a direction or final attack heading (FAH) was given in the CAS brief, then it will be included with the IN call. Example: "IN from the South" or "IN heading 360." All attacking aircraft are required to provide an IN call unless coordinated otherwise.

8. JTAC/FAC(A) will provide a "CLEARED HOT," "CONTINUE DRY," or "ABORT" based on the above procedures being met. In the case of a flight conducting attacks together, the JTAC/FAC(A) may elect to either provide a single clearance for the flight or each attack aircraft individually, based upon the tactical scenario.

See paragraph 12d, "Additional Considerations for All Types of Control," for amplifying information. For examples of Type 2 missions, see Appendix E, "Examples of Close Air Support Missions," Examples 3 and 4.

(3) **Type 3 Control**

(a) Type 3 control is used when the JTAC/FAC(A) requires the ability to provide clearance for **multiple attacks** within a single engagement, subject to specific attack restrictions.

(b) The JTAC/FAC(A) must visually acquire the target or utilize another asset with accurate real-time targeting information. **While not required, if the tactical situation allows, the JTAC/FAC(A) should make every effort to visually acquire the aircraft and assess attack geometry under Type 3 control, in order to provide an additional measure of safety, enhance SA, and be able to abort the attack if necessary.** JTAC/FAC(A) will provide the CAS aircraft with targeting restrictions (e.g., time, geographic boundaries, FAH[s], specific target set). Following mandatory readback by the CAS asset, the JTAC/FAC(A) then grants a weapons release clearance ("CLEARED TO ENGAGE") or calls "Type 3, CONTINUE DRY" if weapons release is not intended. All targeting data must be coordinated through the appropriate supported unit's battle staff for approval. The JTAC/FAC(A) will monitor radio transmissions and other available digital information to maintain control of the engagement. The JTAC/FAC(A) maintains abort authority.

(c) Type 3 control procedures are as follows:

1. The JTAC/FAC(A) visually acquires the target or acquires targeting data from another asset with accurate real-time targeting information.

2. The JTAC/FAC(A) passes the game plan and CAS brief to the attacking aircrew. Briefing should include area for attacks, restrictions/limitations, and attack time window in the remarks/restrictions.

3. The attacking aircrew validates target location by cross-checking that the position is coincident with the expected target area, using all appropriate means.

4. The aircrew will read Line 4, Line 6, and any restrictions provided by the JTAC/FAC(A).

5. The JTAC/FAC(A) will conduct correlation as required.

6. Once satisfied the attacking aircraft are correlated on the appropriate target(s), the JTAC/FAC(A) will provide attacking aircraft "CLEARED TO ENGAGE" or "Type 3, CONTINUE DRY."

7. Prior to initial weapons release, the attack aircrew will report "COMMENCING ENGAGEMENT" to the JTAC/FAC(A).

8. JTAC/FAC(A) will continue to monitor the engagement by all means available (visual, voice, digital, etc.). No other communications are required unless directed by the JTAC/FAC(A).

9. The attack aircrew will report "ENGAGEMENT COMPLETE" to the JTAC/FAC(A).

See paragraph 12d, "Considerations for All Types of Control," for amplifying information. For examples of Type 3 missions, see Appendix E, "Examples of Close Air Support Missions," Examples 5 and 6.

b. **Methods of Attack.** The method of attack and type of control are separate and independent constructs. The method of attack is an agreement between the supported commander, the JTAC/FAC(A), and the aircraft, regarding the aircrew's correlation requirement, and is completely independent of the type of control. In CAS, correlation is the process by which the JTAC/FAC(A) coordinates and confirms that the attacking aircrew, and/or a third-party contributor, have acquired the correct target or mark. Correlation is required on each and every CAS attack. Method of attack conveys the JTAC's/FAC(A)'s intent for the aircraft prosecution of the target; either the aircraft will be required to acquire the target (BOT) or not (BOC). The method of attack is broken down into two categories, **BOT** and **BOC.** These two categories define how the aircraft will acquire the target or mark. Any type of control can be utilized with either method of attack and no type of control is attached to one particular method of attack (see Figure III-7).

Summary of Types of Control and Methods of Attack	
Type of Control	**JTAC/FAC(A) Requirement**
Type 1	JTAC/FAC(A) will visually acquire the target and the attacking aircraft during the terminal phase of an attack, prior to weapons release, and assess attack aircraft geometry while maintaining control of individual attacks.
Type 2	JTAC/FAC(A) will utilize other measures to mitigate risk while maintaining control of individual attacks.
Type 3	JTAC/FAC(A) will utilize other measures to mitigate risk and assesses that the measures in place will allow multiple attacks within the same engagement.
Method of Attack	**Requirement**
BOT	Aircraft/aircrew will acquire the target or intended aimpoint using the best method available.
BOC	Aircraft/aircrew will employ weapons on the specified coordinates given in the CAS brief.

BOC bomb on coordinate
BOT bomb on target
CAS close air support
FAC(A) forward air controller (airborne)
JTAC joint terminal attack controller

Figure III-7. Summary of Types of Control and Methods of Attack

(1) **BOT and BOC.** JTACs/FAC(A)s will state the method of attack, whether BOT or BOC, as part of the game plan prior to the CAS brief. These methods of attack apply to all types of control and all ordnance employed in CAS missions. JTACs/FAC(A)s and CAS aircrews should think of and use these methods of attack as a clear, concise, effective manner to communicate the requirements for correlation from CAS aircraft employing ordnance. Effective use of BOT and BOC constructs to clarify JTAC/FAC(A) and CAS requirements for a CAS engagement will result in more expeditious attacks and

help mitigate friendly fire and collateral damage. The misapplication of BOT and BOC in tactical scenarios will often result in confusion between CAS aircraft and JTAC/FAC(A), increased time to kill, and potentially cause friendly fire or collateral damage.

(a) For BOT missions, only the lead aircraft is required to read back Line 4 and Line 6, in conjunction with other required restrictions. All attack aircraft will conduct readbacks if requested by the JTAC/ FAC(A).

(b) For BOC missions, all aircraft delivering ordnance must read back Line 4 and Line 6 from their system or weapon, as appropriate, in conjunction with other required restrictions.

(2) A BOC attack is used when the JTAC/FAC(A) determines that the desired effects can be created against the target with CAS aircraft employing ordnance on a specified set of coordinates. The coordinates must be of sufficient fidelity/mensuration to produce the desired effect on the target and be used for fires approval. If the aircraft is never required to be TALLY/CAPTURED the target or CONTACT the mark, it is a BOC attack. The JTAC/FAC(A) does not need to delay the CAS attack in order to build CAS aircraft awareness to achieve target TALLY/CAPTURE. If a BOC attack is planned based on the tactical scenario, then unnecessary exposure to the threat by CAS platforms is avoided and time is not wasted conducting targeting confirmation. Great care must be taken to ensure that the target location with the required precision and accuracy determined in the commander's tactical risk assessment is obtained and entered into the weapon/navigation system. Aircrew will not modify coordinates once read back. For a BOC attack, aircrew readback will be from the weapon or aircraft system.

BOMB ON COORDINATE ATTACK EXAMPLES INCLUDE:

- Laser guided weapons employed into a laser attack zone with the intent to be guided by a source outside the attacking aircraft flight/section (e.g., joint terminal attack controller/forward air controller (airborne), another flight/section).

- Unguided ordnance dropped from medium to high altitude above an overcast with ability to achieve the supported commander's intent for CAS.

- Inertially aided munitions employed on a static coordinate sufficient to achieve the supported commander's intent for CAS.

- Weapons employed on a Global Positioning System coordinate and then lased by an off-board source.

For examples of BOC missions, see Appendix E, "Examples of Close Air Support Missions," Examples 2, 3, and 6.

(3) A **BOT attack** requires that the **JTAC/FAC(A)'s intended target or mark is TALLY/CONTACT/CAPTURED by the aircrew.** Coordinate accuracy and precision (to include TLE) are not as important as the JTAC's/FAC(A)'s ability to aid CAS aircraft in acquiring the target. Coordinates provided in the attack brief must be of sufficient fidelity to: provide initial cueing to the attacking aircraft and be used for fires approval. **If at any point during the CAS engagement, the attack aircrew is required to gain TALLY/CONTACT/CAPTURE the target, it is a BOT attack.** This **delivery method** is advantageous in numerous tactical situations such as mobile target sets (whether stationary or moving); low threat environments that support continuous target observation by CAS aircraft; situations where controllers are not able, or do not need, to generate low TLE coordinates; or when TALLY/CONTACT/CAPTURED by the aircrew. If a BOT attack is planned based on the **tactical scenario,** then time should not be wasted conducting detailed precision and/or accurate target coordinate generation. **In many tactical scenarios suited to BOT attacks, delaying the attack in order to generate a coordinate for BOC employment will increase the time to kill or result in missed targeting opportunities.**

BOMB ON TARGET EXAMPLES INCLUDE:

- Laser guided weapons employed into a laser attack zone and self-lased by the delivering close air support (CAS) aircraft.

- Unguided ordnance dropped from any altitude under the weather with CAS aircraft TALLY or CONTACT and employing off of the correction.

- Correction from mark or reference point.

- Weapons employed on a Global Positioning System coordinate and then lased by the CAS aircraft.

- Rockets and guns on positively identified targets, or contact a mark and correction.

For examples of BOT missions, see Appendix E, "Examples of Close Air Support Missions," Examples 1, 4, and 5.

c. **Introduction to 9-Line CAS Brief.** JTACs/FAC(A)s will use a standardized briefing to pass information rapidly. The 9-Line CAS brief (Figure V-9), also known as the "9-Line Briefing," is the standard for use with FW and RW aircraft. The CAS briefing form helps aircrew to determine whether they have the information required to perform the mission. See Chapter V, "Execution," paragraph 2b(5), "CAS Brief," for detailed information.

(1) Line 1—IP or BP. The IP is the starting point for the run-in to the target. For RW aircraft, the BP is where attacks on the target are commenced.

(2) Line 2—Heading and Offset. The heading is given in degrees magnetic from the IP to the target or from the center of the BP to the target. The offset is the side of the IP-to-target line on which aircrews can maneuver for the attack.

(3) Line 3—Distance. The distance is given from the IP/BP to the target.

(4) Line 4—Target Elevation. The target elevation is given in feet mean sea level (MSL) unless otherwise specified.

(5) Line 5—Target Description. The target description should be specific enough for the aircrew to recognize the target.

(6) Line 6—Target Location. The JTAC/FAC(A) provides the target location.

(7) Line 7—Mark Type/Terminal Guidance. The type of mark the JTAC/FAC(A) will use (for example, smoke, laser, or IR). If using a laser, the JTAC/FAC(A) will also pass the call sign of the platform/ individual that will provide terminal guidance for the weapon and laser code.

(8) Line 8—Friendlies. Cardinal/sub-cardinal heading from the target (N, NE, E, SE, S, SW, W, or NW) and distance of closest friendlies from the target in meters (e.g., "South 300").

(9) Line 9—Egress. These are the instructions the aircrews use to exit the target area.

(10) Remarks/Restrictions. Supplies additional information important to the conduct of the attack.

d. **Additional Considerations for All Types of Control**

(1) Because there is no requirement for the JTAC/FAC(A) to visually acquire the target or visually acquire the attacking aircraft in Type 2 or 3 control, JTACs/FAC(A)s may be required to coordinate CAS attacks using targeting information from an observer. An observer may be a scout, PWT, FIST, UAS, JFO, SOF, CAS aircrew, or other asset with real-time targeting information. The JTAC/FAC(A) maintains control of the attacks, making clearance or abort calls based on the information provided by other observers or targeting sensors. The JTAC/FAC(A) must consider the timeliness and accuracy of targeting information when relying on any form of remote targeting. When any form of remote targeting is used with single-source targeting information, targeting data should be routed through the commander's battle staff to ensure target validity.

(2) JTACs/FAC(A)s will provide the type of control and method of attack as part of the game plan. It is not unusual to have two types of control in effect at one time for different flights. For example, a JTAC/FAC(A) may control helicopters working Type 2 control from a BP outside the JTAC/FAC(A)'s FOV while simultaneously controlling medium- or low-altitude FW attacks under Type 1 or 3 control. The JTAC/FAC(A) maintains the flexibility to change the type of TAC at any time within guidelines established by the supported commander, and must be coordinated with the appropriate fires approval agency. The JTAC/FAC(A) must ensure that any changes to the attack brief are adequately conveyed in a timely manner to the attacking aircraft and that both the terminal controller and the aircrew have the required SA to safely prosecute the attack. Senior commanders

may impose restrictions that will prevent subordinate commanders from choosing certain TAC types. However, the intent is for senior commanders to provide guidance that allows the lowest-level supported commander to make the decision based on the situation.

(3) Weapon time of flight will be a factor relative to movement of enemy targets and friendly forces when employing standoff weapons. Detailed planning and preparation by both the JTAC/FAC(A) and the aircrew are required to identify situations and locations conducive to standoff weapons attacks, and to address flight profile and deconfliction (aircraft/weaponry/terrain) considerations.

(4) Digital or data-link systems capable of displaying aircraft track, sensor point of interest (SPI), etc., can enhance SA and the effectiveness of TAC.

(5) While recent technological advances in weaponry and digital/data link systems have provided significant enhancements to the CAS mission, it is imperative that commanders and operators fully understand the capabilities and limitations of the systems being used. Confirmatory dialogue between the JTAC/FAC(A) and aircraft will often provide the best means of mitigating risk and producing the desired effect on target. It is essential that standard procedures and terminology be used by all CAS participants.

Note: The JTAC/FAC(A) maintains abort authority in all cases.

(6) When targeted by a surface-to-air threat, the CAS aircrew will execute defensive maneuvers to allow it to survive long enough to egress the threat envelope. The type of defensive maneuver will depend on the type of threat.

(a) **SAMs.** When a SAM is launched against a CAS aircraft, the pilot will execute a break turn and dispense chaff, flares, or active decoys in an attempt to defeat target tracking and/or decoy the missile. The maneuver is designed to force the missile to fly a longer flight path, thus using up energy and ultimately causing it to overshoot and miss the aircraft.

(b) **AAA.** When fired upon by AAA, the pilot will maneuver the aircraft, changing altitude and heading in a 3-dimensional maneuver, called a "jink," to defeat the bullets already fired by the gunner and complicate further firing solutions. This also causes an increasing slant range, which decreases the gun's accuracy. The pilot may also dispense chaff to decoy any radar that is providing aiming information to the gun.

(c) **JTAC Mutual Support.** During wartime, when CAS aircraft have been shot down, it was usually by threats they were not aware of. The JTAC can contribute greatly to the mission's success by suppressing threats, briefing the CAS aircraft on the threats, and monitoring for threats during the attack. During CAS mission execution, the JTAC/FAC(A) should endeavor to monitor the attacking aircraft and the target area to the extent possible. Depending on the threat level, aircraft may need to expend ordnance on AAA or SAM systems before they can prosecute the required CAS target(s). In general, attacking aircraft will attempt to first avoid known threats, then suppress threats during CAS attacks, and finally, if necessary, kill the threats with the prosecution of an AAA/SAM system as an actual target. The JTAC can provide attacking aircraft with mutual support by providing descriptive communications during threat activity. In the case of a SAM launch, the JTAC should immediately transmit, "(Aircraft call sign), SAM launch," followed by the launch location in relation to the target. Do not delay the call, since the time of flight of the missile may only be a few seconds. If AAA is observed in or around the target area, then transmit, "(Aircraft call sign), Triple A," followed by the firing location in relation to the target.

Note: During CAS operations at night, JTACs should be aware that SAM and AAA threats will be easier to see, potentially causing threat activity to be called out that is further away/outside the tactical effective range to attacking aircraft.

Examples of pop-up threat responses by joint terminal attack controllers(JTACs):

"Latch 01, SAM launch southwest of the target."

"Hawg 61, Triple A north of the target."

13. Considerations for Planning with Laser Guided and Inertial Aided Munitions

Laser guided weapons, IAMs, and GPS-based systems can assist in target acquisition and weapons guidance during CAS.

a. **Laser-Guided Systems.** Laser-guided systems provide the joint force with the ability to locate and engage high-priority targets with an increased first-round hit probability. Laser-guided systems can effectively engage a wide range of targets, including moving targets. Laser-guided systems provide additional capabilities, but also have distinct limitations. Laser operations supplement other CAS procedures and are not substitutes for other planning and execution procedures and techniques. In any laser-designating situation, strive for simplicity and use all available resources to help ensure first-pass success. **For off-board laser designation, the JTAC/FAC(A) shall confirm the laser code prior to CAS execution. For ground-based laser designation, the JTAC/FAC(A) shall pass FAHs to ensure the attacking aircraft is in the laser acquisition area and not the laser safety zones. The laser-to-target line (LTL) shall be passed during the CAS mission briefing in the Remarks section.** This paragraph provides CAS-specific TTP and background information on laser-guided system employment.

(1) **Basic Considerations.** There are five basic considerations for using laser spot trackers (LSTs) or laser-guided weapons (LGWs):

(a) **LOS** must exist between the designator and the target and between the target and the LST/LGW.

(b) **Pulse repetition frequency (PRF) codes** of the laser designator and the LST/LGW must be compatible.

(c) **The direction of attack** must allow the LST/LGW to sense enough reflected laser energy from the target for the seeker to acquire and lock onto the target.

(d) **The LTD** must designate the target at the correct time, and for the correct length of time. If the length of time is insufficient, the seeker head could break lock and the flight pattern of the LGW becomes unpredictable.

(e) **The delivery system** must release the LGW within the specific LGW delivery envelope to ensure the weapon can physically reach the target. There is an **increased hazard to friendly forces** when aircrews release weapons behind friendly positions. The final decision to release standoff LGWs from behind friendly positions in a CAS environment rests with the ground commander.

(2) **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.

(a) **Atmospheric Scatter.** A seeker may detect scattered radiation that is caused by suspended matter in the atmosphere. It can occur even on clear days. This phenomenon can cause **false seeker lock-on and target indications** within short distances from the laser exit port. This is also referred to as "backscatter."

(b) **False Seeker Lock-On.** Laser seekers may occasionally lock onto other reflected energy instead of the target. Even in optimum conditions the seeker may incorrectly lock onto the LTD or the atmospheric scatter present along the laser beam. In this case, a seeker is most likely to detect stray energy only in the immediate vicinity of the designator. To help to minimize seeker lock-on of the designator position due to LOS with the LTD optical port, the **designator should be masked from the seeker FOV.** The designator can be masked by terrain, vegetation, or means of a temporary screen such as blankets or a tarp. **Due to the threat of false seeker lock-on, it is imperative that JTACs/FAC(A)s conduct follow-on correlation after a laser hand-off has been attempted.**

(c) **The Obscured Battlefield.** Smoke, dust, and other particulates in the air may attenuate or reflect the laser beam, thereby preventing reflection from the target of sufficient energy for lock-on by LSTs or LGWs. Laser energy reflected from such particles may also present a false target to the tracker or the munitions. Backscatter refers to a portion of the laser energy that is scattered back in the direction of the seeker by an obscurant. Since backscatter energy competes with the reflected energy from the target, a seeker may attempt to lock onto the obscurant rather than the target. Laser designator operators can reduce the effect of enemy obscurants by following some simple rules of thumb. **Positioning is a key to reducing the degradation obscurants imposed on laser performance.** Possible considerations are positioning lasers on flanks or on high ground where smoke is likely to be less heavy along the LOS and repositioning from an obscured to a non-obscured position. Using multiple lasers and transferring the mission from an obscured laser to a non-obscured laser are other possible tactics to counter enemy obscurants.

(3) **Beam Divergence, Target Size, and Spillover.** If a LTD has a beam spread or divergence of one milliradian, its spot would have a diameter of approximately one meter at a distance of one thousand meters in front of the designator. If this spot were aimed at a

three-square-meter box, three thousand meters away, the laser spot would be as wide and tall as the box. The laser spot size is a function of beam divergence and the distance from the laser designator to the target. Spillover is caused by the laser spot either being too large or only partially placed on the target. Any laser energy traveling beyond the target may be reflected back to the weapon and cause erroneous guidance.

(4) **Target Reflection.** Most surfaces have a mixture of mirror-like and scattered reflections. Laser energy reflects in an arc, but is strongest at the angle where it would reflect if the surface were a mirror. If the LTD is perpendicular to a surface the reflection can be seen from all angles on the designated side, but can be detected best near the LTL, which is a line from the LTD to the target, usually expressed in degrees magnetic. When the surface is at an angle to the laser designator, the angle of strongest reflection is also predictable. Glass, water, and highly polished surfaces are poor surfaces to designate because they reflect laser energy in only one direction. This requires the seeker to be in this small region and looking toward the reflected energy to achieve target acquisition. Battlefield dynamics will rarely provide the opportunity to perfectly align laser designation/reflectivity in the direction of approaching aircraft or munitions. Strict adherence to laser cones or baskets and center mass target designation will best ensure success.

(5) **Laser designation operations** are divided into two primary categories: target acquisition and weapons guidance.

(a) **Target Acquisition.** LSTs are laser sensors that provide heads up display cueing for aircraft equipped with these systems. While scanning for laser energy, these systems have a limited FOV that depends on range and switch settings. Target acquisition involves the use of an LST carried by the aircraft and an LTD aimed by a ground team or another aircraft. The LST is used to acquire the laser spot to assist in visual or sensor-aided attacks. In general, the chances of acquisition are improved when cueing aids such as target marks, landmarks, and INS/GPS coordinates help the pilot point the LST in the direction of the target.

WARNING

Aircrews shall not use LSTs as the sole source for target identification.

(b) **Weapons Guidance.** Weapons guidance allows an LGW to home in on reflected laser energy placed on a target by an LTD. This allows precision delivery of weapons, some at standoff distances.

(6) **Laser Hardware**

(a) **LGWs.** All LGWs home on PRF-coded reflected laser energy. Some LGWs require target illumination before launch and during the entire time of flight. Other LGWs require target illumination only during the terminal portion of flight. Most LGWs require illumination until weapon impact. Typical LGWs are:

1. **Laser-Guided Bombs (LGBs).** Paveway II, III, and enhanced Paveway III (GPS aided), as well as weapons such as a laser Joint Direct Attack Munition (JDAM) and dual-mode LGB.

2. **Laser-Guided Missiles (LGMs).** AGM-65E/L Laser Maverick and AGM-114 Hellfire. **LGMs generally provide greater standoff launch ranges than LGBs.** Greater range provides increased survivability for aircrews operating in a high-threat environment. Aircrews and JTACs/FAC(A)s must exercise caution when launching LGMs from behind friendly troops. The final decision to release standoff LGMs from behind friendly positions in a CAS environment rests with the maneuver commander.

3. **Laser Maverick employment considerations include:**

a. The Maverick system allows aircrew to engage targets designated by either air or ground sources with in-flight selectable PRF codes.

b. Delivery aircraft must have unobstructed LOS to the target to achieve Maverick lock-on.

c. The missile must lock onto the laser source prior to launch.

d. The Maverick and the laser designator must be set to the same PRF code prior to weapon delivery.

e. For other than self-designation, the attack heading must be adjusted to optimize the reflected laser energy.

4. **Hellfire employment considerations include:**

a. Employment of the Hellfire missile varies greatly depending on launch platform. The Hellfire system allows aircrews to engage targets designated by either air (buddy or autonomous, FW, or RW) or ground forces with in-flight selectable PRF codes.

b. The Hellfire can be employed in a lock-on before launch (LOBL) or lock-on after launch (LOAL) mode. In LOBL, the missile must acquire the laser energy prior to launch, requiring LOS to the target. FW employ Hellfire via LOAL mode. In LOAL, the missile can be fired from behind a mask, climbing above obstacles before searching for properly coded laser energy as it executes its fly-out.

(b) **Laser Target Designators.** GLTDs are employed by ground forces to illuminate targets with laser energy. LGWs use this energy to guide to the target. LSTs use the reflected laser energy as a reference point for lock-on and tracking. The laser energy PRF is adjustable and must match the PRF setting on the weapon or tracker. GLTD ranges vary from 10 meters to 20 kilometers (km). Airborne laser target designators (ALTDs) are carried on aircraft and provide the same function as the GLTD. ALTDs are capable of very long range lasing and are normally employed below 30,000 ft above ground level (AGL). See Figure III-8 for advantages and disadvantages of airborne and ground designators

Airborne and Ground Designators
Advantages and Disadvantages

Type Designators	Advantages	Disadvantages
Airborne	• Increased standoff • Larger target area footprint	• Larger laser spot size • Increased susceptibility to podium effect
1. Trail Position	• Increased probability of success (spot detection) • Increased standoff	• Axis restrictive • Increased platform predictability
2. Overhead Wheel Position	• Decreased platform predictability • Good standoff	• Decreased effectiveness in target areas with varying vertical developments (podium effect)
3. Offset or Opposing Wheel Position	• Decreased platform predictability • Excellent standoff	• Axis restrictive • Increased susceptibility to podium effect • Coordination intensive
Ground	• Smaller laser spot size • Decreased targeting ambiguity • Rapid battle damage assessment	• Axis restrictive • Increased designator exposure • Coordination intensive

Figure III-8. Airborne and Ground Designators Advantages and Disadvantages

.

Note: The PRF of LGBs is normally only adjustable prior to flight and cannot be changed once airborne. Most missiles such as Maverick and Hellfire can be adjusted in-flight prior to launch. JTACs/FAC(A)s and aircrews must ensure the laser designator PRF matches the code programmed into the weapon or the weapon will not guide.

(c) **LST.** LSTs must be set to the same code as the coded LTD for the user to see the target being lased. In the case of airborne LSTs, the aircrew can select PRF codes for the LST while in flight. See Army Tactical Publication 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP 3-2.6, *JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower,* for a listing of aircraft with LSTs.

(7) **Laser Procedures**

(a) **Final Attack Headings.** JTACs/FAC(A)s 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 during ground laser designations, FAHs must avoid the 20-degree safety exclusion zone, unless the tactical situation dictates otherwise. The safety zone is a 20-degree wedge whose apex is at the target, extends 10 degrees either side of the target-to-designator line, and extends from the surface to infinity. The optimal attack zone is a 120 degree wedge whose apex is at the target and extends 60 degrees either side of the target-to-laser designator line. To give the laser trackers/weapons a better chance of acquiring the reflected laser spot, a smaller 90 degree wedge (+/- 45 degrees) is preferred (see Figure III-9).

Note: The optimal attack zone must be used when a ground LTD is used to either mark or designate a target to prevent the LST or weapon from guiding on the designator rather than the designated target. Aircraft are required to be within the 120-degree attack zone (10 to 60 degrees) with 10-to-45 degree zone being preferred/optimal.

(b) **Attack Angles.** Aircrews release or launch LGWs so the reflected laser

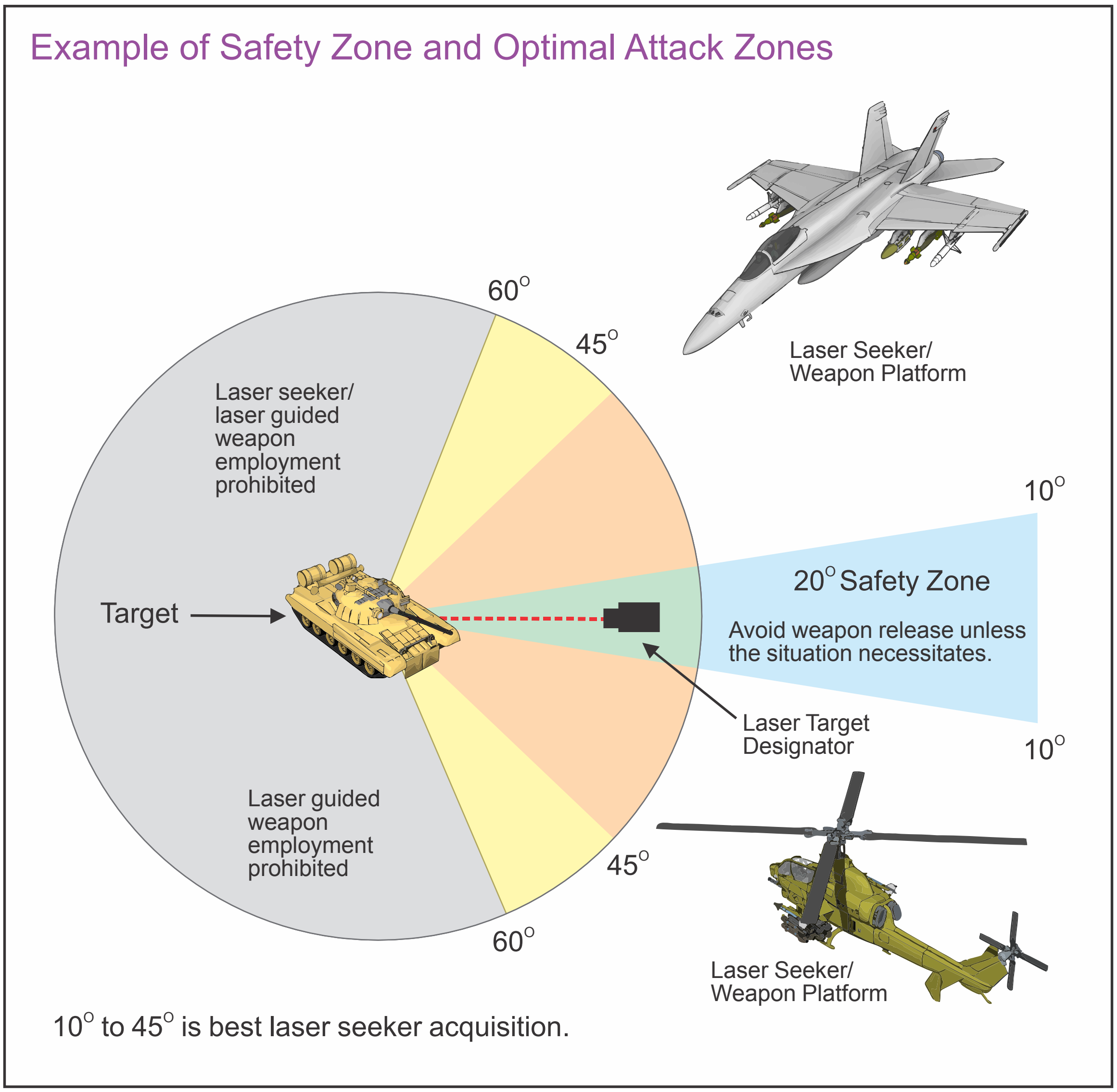


Figure III-9. Example of Safety Zone and Optimal Attack Zones

energy will be within the seeker FOV 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 JTAC/FAC(A).** Laser-guided systems improve the delivery accuracy of unguided ordnance. If the attack aircraft has an LST, the JTAC/FAC(A) 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 JTAC/FAC(A), then self-designate the target and deliver the weapon or, in some cases, confirm the correct target with an airborne IR pointer.

(d) **Employment of LGBs in conjunction with coded LTDs is either autonomous or assisted.** Autonomous LGB employment uses the CAS aircraft's onboard 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 GLTD (such as a ground/vehicle laser locator designator), FAC(A), or another aircraft (known as "buddy lasing"). Aircraft without on-board ALTDs that can carry and deliver LGBs require assisted LGB employment. **Coded LTDs are ground and airborne systems that have two specific purposes.** First, they provide terminal weapons guidance for LGWs. Second, they designate targets for coded LSTs. Coded LTDs 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 the designator and seeker interface. **Coded LTDs used for terminal weapons guidance must be set to the same code as the LGW.** Certain LGWs, such as LGBs, are coded prior to takeoff and cannot be changed once the aircraft is airborne. However, all coded LTDs/FAC(A)s, with the exception of the AC-130H, can change codes while airborne (Note: The AC-130H's LTD is permanently preset with only one code [1688] and cannot be changed). The JTAC/FAC(A) will have to coordinate efforts to ensure both the aircraft and designator are on the same code. Coordination for the LTD to match the LGW code is conducted through the ATO, ASOC/DASC, or JTAC/FAC(A) CAS brief. Sometimes, a LTD will serve the dual purpose of target designation for a coded laser acquisition/spot tracker and terminal weapons guidance for LGWs. In these cases, the LTD, LST, and the LGW must have the same code. Laser codes are always passed as four-digits to avoid confusion. When briefing LST-equipped aircraft, include the four-digit laser code and LTL, in accordance with the CAS briefing format. If aircraft check in with a different code, then it is the JTAC's/FAC(A)'s responsibility to make appropriate corrections. Even if the aircraft is capable of self-designation, the JTAC/FAC(A) should have a backup GLTD ready if it is available.

(e) **Laser Designation Time.** To avoid missing the target, the laser designator must be turned on at a time that will permit the bomb to follow an optimum glide path. Lasing too early will cause the weapon to guide on and turn down toward the target prematurely, losing valuable energy, and will cause impacts short of the target. In the absence of positive two-way communications, target designation time and duration must be predicted on the basis of known TOT (weapons impact time) and specific LGB laser requirements. 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.

For examples of laser hand-off and ground lase missions, see Appendix E, "Examples of Close Air Support Missions," Examples 5 and 8.

(8) **Hellfire Laser-Guided Systems Employment and Characteristics**

(a) **General.** The Hellfire is an air-to-surface LGM system designed to defeat individual hard point and soft targets. It is guided by ground or airborne laser designators to rapidly engage multiple targets.

(b) **Laser Characteristics.** The Hellfire homes in on targets designated by US and North Atlantic Treaty Organization (NATO) laser designators. The Hellfire system should use PRF codes in the range of 1111-to-1488 to achieve the highest probability of hit. UA may use PRF codes in the range of 1111-to-1788 due to the absence of pronounced jitter resulting from the airframe. The Hellfire system allows the aircrew to conduct multiple, rapid launches using one or two designation codes simultaneously. UA can ripple release, but four Hellfires would require four seconds. The aircrew can set individual missiles to their own PRF code, but only one per missile. The aircrew can set or change the missile PRF code from the cockpit. If using two designators (each set to a different PRF code) the missile launch interval can be as low as two seconds. USAF UA can set as low as 0.3 seconds. The use and coordination of multiple designators present a complex problem for the aircrew and the JTACs/FAC(A)/designator.

(c) **Safety Considerations.** See Figure III-10 for Hellfire designator safety zone.

(d) **Obstacle clearance** requirements including terrain and cloud height.

(e) **Target Designator Options.** Autonomous and remote are two basic options for designating the missile's target.

<u>1.</u> **Autonomous.** The launching aircraft designates its own target. This may be the easiest form of designation to set up, but requires the aircrew to identify the correct target.

<u>2.</u> **Remote.** The target is designated by an aircraft other than the launching aircraft, or by a remote ground-based designator. This requires the designator to properly identify and lase the target because the aircrew may not see the target during this option. Remote designation allows the launching aircraft to fire from a masked position, and with longer standoff than is possible with autonomous designation.

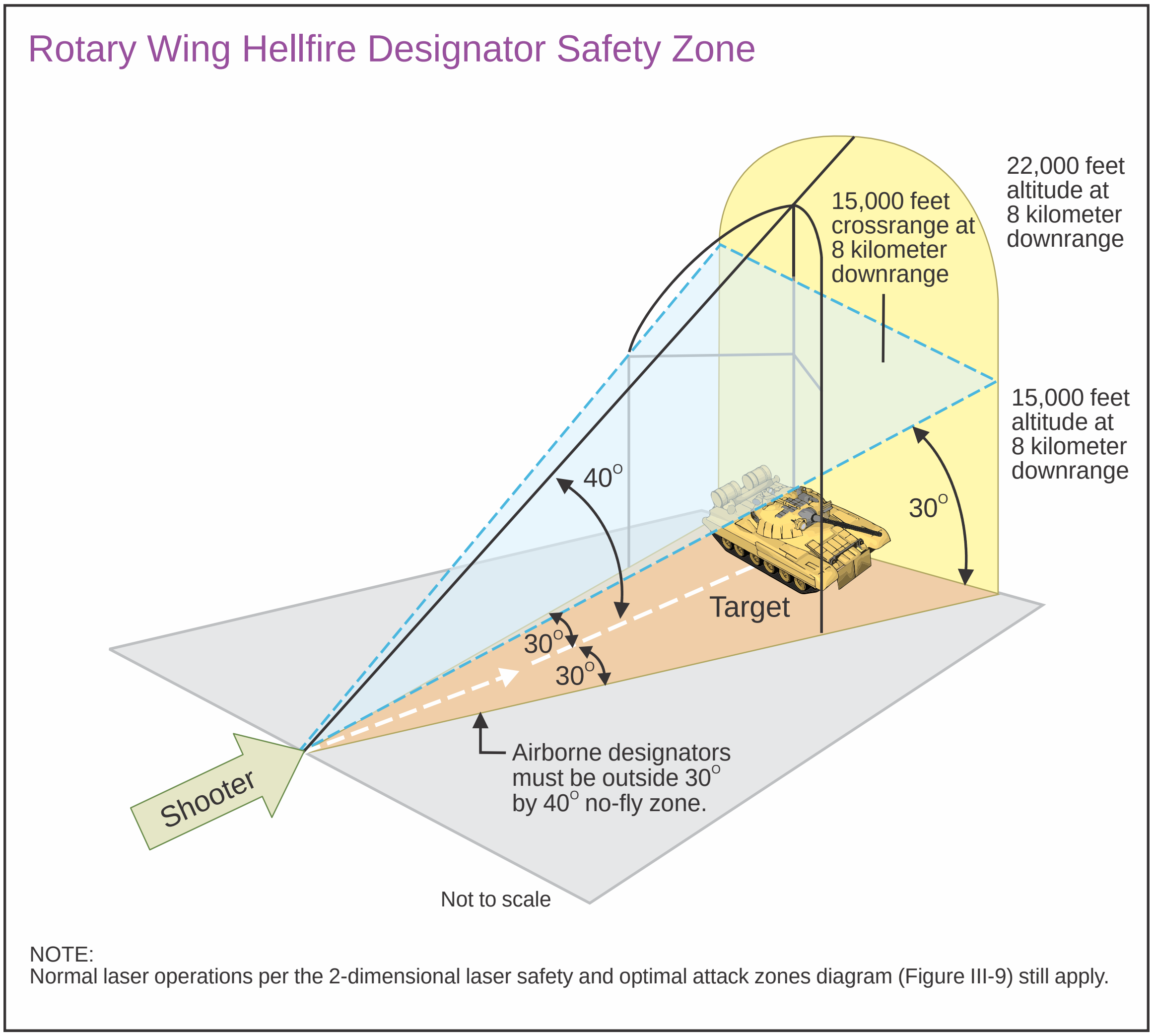


Figure III-10. Rotary Wing Hellfire Designator Safety Zone

(f) **Launch Modes.** The two basic types of launch modes are LOBL and LOAL. Both launch modes can be used with either autonomous or remote designation options.

1. **LOBL** is when the missile seeker locks onto properly coded laser energy prior to the missile launch. The missile seeker must have direct LOS with the designated target for this launch mode to work properly. LOBL gives a higher probability of hit when the aircraft is close to the target. It is also used to confirm the aircraft is within missile launch constraints, that the missile "sees" the correct laser code and target, and when the threat or environment does not require delayed designation.

2. **LOAL** is when the missile seeker locks onto the coded laser energy after the missile is launched and is in flight. This method allows the aircrew to launch the missile without LOS to the target. This reduces the exposure of launch aircraft, helps defeat laser countermeasures by delaying the designation, and extends the missile range when using a remote designator.

(g) **Attacks on Multiple Targets.** Multiple missiles attacking multiple high threat targets reduce the aircrew's exposure. Rapid fire reduces laser operating time when engaging multiple targets. During rapid fire, the aircrew uses a minimum of eight seconds between missiles. For UA, a minimum of 0.3 seconds is used to ensure simultaneous impacts. The aircrew can use longer intervals, based on experience, terrain, target array, and battlefield obscuration. During multiple missile launches, the JTAC/FAC(A)/designator 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 JTAC/FAC(A)/designator should consider wind speed and direction when selecting multiple targets. Working targets from downwind to upwind reduces the impact of post-detonation dust and smoke. Multiple missile launches require close coordination and timing.

b. **IAMs.** These weapons rely on a self-contained GPS-aided INS, which guides the weapon from the release point to target coordinates regardless of weather, camouflage, or obscurants. Some IAM/GPS-aided munitions may have seekers that if used, will provide enhanced terminal guidance corrections, further increasing accuracy. These seekers may include, but are not limited to, laser, television, and millimeter-wave sensors. These weapons require encrypted GPS signals and may require considerable preflight planning to achieve optimum accuracy depending on weapon type and mission.

(1) **Advantages**

(a) **Accuracy.** When provided three-dimensional target locations of sufficient accuracy, these weapons can achieve delivery accuracies exceeding those of LGWs. Accuracy is also unaffected (assuming GPS-aided guidance) by launch range.

(b) **Standoff.** These weapons can provide standoff capability at very long distances. Aircraft and aircrew can use the standoff capability of these weapons to potentially avoid threats in the target area.

(c) **All-Weather Capability.** IAM/GPS-aided munitions will normally offer an all-weather capability because they do not require designators for guidance. INS/GPS-aided weapons do not require the aircrew to see the target or to maintain a clear LOS to the target, as do laser-guided munitions.

(d) **Multiple Target Capability.** Depending on platform and weapon variety, the weapons allow one aircraft to strike multiple stationary targets in one 'pass'.

(e) **Modifiable Impact Angle.** By increasing the impact angle of IAM/GPS aided weapons, the effect of vertical TLE (elevation error) is greatly reduced.

(2) **Limitations**

(a) **Moving Targets.** Single mode IAM/GPS weapons have no inherent capability against moving targets unless employed with an onboard ground moving target indicator radar. Even then, these weapons still fly to preprogrammed coordinates. If the target moves between the time it is targeted, and the time that the weapon is released, the weapon will miss. Dual mode IAM/GPS weapons allow the munitions to guide onto a pre-programmed coordinate, as well as receive follow-on guidance via a laser designator allowing the weapon to be effective against moving targets.

(b) **Location Error.** These weapons require extremely accurate target location in both the horizontal and vertical plane. Additionally, some weapons require sufficient time to acquire guidance information following release. If precise information is not available, the commander must be advised of the impact on accuracy and subsequent reduction in effectiveness. **(All CAS participants must ensure they are using the same maps, charts, databases, and target materials with the same datum and/or grid reference system. World Geodetic System 1984 is the Department of Defense assumed standard unless stated otherwise in the SPINS.)**

(c) **Malfunctions.** The footprint for these weapons in the event of a malfunction, such as loss of guidance or control fin hard-over, is very large and, in some cases, increases the probability of friendly fire. When able, PGMs should be employed parallel to the FLOT.

(3) **TTP.** IAMs have multiple modes of employment and may be used with both the BOC and BOT constructs.

(a) **BOC.** Using this method, IAMs guide to a designated impact angle and azimuth over the coordinates entered into the munitions via the aircraft system. Aircrew will not adjust coordinates that are passed and put into the system for any reason. **Therefore, great care must be taken to ensure that the most accurate target location (i.e., lowest TLE) is obtained and correctly put into the weapon/system. The tactical scenario and commander's tactical risk assessment determine the acceptable TLE.** Aircraft altitude and speed can yield significant standoff ranges (in excess of 10 nautical miles). Therefore, it is necessary to deconflict high altitude/long range release profiles from other systems operating below the release altitudes. Significant issues exist when using weapons that transit over or around friendly forces using preprogrammed flight paths and impact points. Once released, these weapons may not be redirected.

(b) **BOT.** Some aircraft can deliver IAMs via self-derived targeting; examples include FLIR, advanced targeting pod (ATP), radar or visually. This method indicates that aircraft are employing an IAM based on sensor or visual target acquisition, as opposed to bombing on a coordinate given to the aircrew. It assumes that the JTAC's/FAC(A)'s intended target or aim-point is CAPTURED/TALLY/CONTACT by the aircrew. TLE for a BOT delivery will depend on aircraft/sensor type and may not be as accurate as a BOC with a low TLE coordinate, therefore all normal methods of deconfliction and release restrictions apply.

14. Integrating Close Air Support Planning Considerations

Successful employment of both aircraft operations and surface fires requires careful planning combined with an ability to rapidly coordinate during changing conditions. The JTAC/FAC(A)/TAC(A), airspace control, and fire support personnel must integrate airspace users in order to provide a reasonably safe operating environment for aircraft to maneuver and attack targets. Airspace integration must also accommodate other airspace users to include UA, medical evacuation, C2, ISR, and transport aircraft. C2 agencies must ensure transitory aircraft not under a JTAC/FAC(A)'s control are made aware of other aircraft operating in their vicinity. CAS aircraft may require specific deconfliction and coordination using time, space, and altitude. **JTACs/FAC(A)s and fire support personnel should select separation techniques that require the least coordination without adversely affecting the ability to safely complete the mission.** Successful integration requires deconfliction methods that facilitate simultaneous multiship/platform CAS and IDF operations. To be successful, all participants must be well versed in ACA terminology and have knowledge of all applicable ACAs in use. The goal is to integrate CAS aircraft with other supporting arms in a manner that quickly achieves the commander's objectives and supports the commander's scheme of maneuver and intent.

For further detail concerning airspace deconfliction, refer to JP 3-52, Joint Airspace Control.

a. **Fire Support Coordination Measures.** Within their operational areas, commanders employ permissive and restrictive FSCMs to expedite attack of targets; protect forces, populations, critical infrastructure, and sites of religious or cultural significance; clear joint fires; deconflict joint fire support operations; and establish conditions for future operations. Along with other control measures, FSCMs and their associated procedures help ensure that joint fire support does not jeopardize troop safety, interfere with other attack means, or disrupt operations of adjacent units. The primary purpose of permissive measures is to facilitate the attack of targets, while the primary purpose of restrictive measures is to safeguard friendly forces. Figure III-11 depicts common FSCMs.

For further details of FSCMs, refer to JP 3-09, Joint Fire Support.

(1) **Permissive Measures.** Permissive measures facilitate target attacks.

(a) **CFL.** A CFL is a line beyond which conventional, indirect, surface fire support means may create effects at any time within the boundaries of the establishing HQ without additional coordination. Use of the CFL does not eliminate the requirement/responsibility to coordinate the airspace required to conduct the mission.

(b) **FSCL.** FSCLs facilitate the expeditious engagement of targets of opportunity beyond the coordinating measure. The FSCL applies to all fires of air, land, and maritime-based weapon systems using any type of munition against surface targets. An FSCL is established and adjusted by the appropriate land or amphibious force commanders within their boundaries, in consultation with superior, subordinate, supporting, and affected commanders. The FSCL is an FSCM oriented to air-land operations and is normally located only on land; however, in certain situations, such as littoral areas, the FSCL may affect both land and sea areas. If possible, the FSCL should follow well-defined terrain features to assist identification from the air. In amphibious operations, the FSCL is normally established by the commander, LF, after coordination with the commander, amphibious task force. Changes to the FSCL require notification of all affected forces within the operational area and must allow sufficient time for these forces and/or components to incorporate the FSCL change.

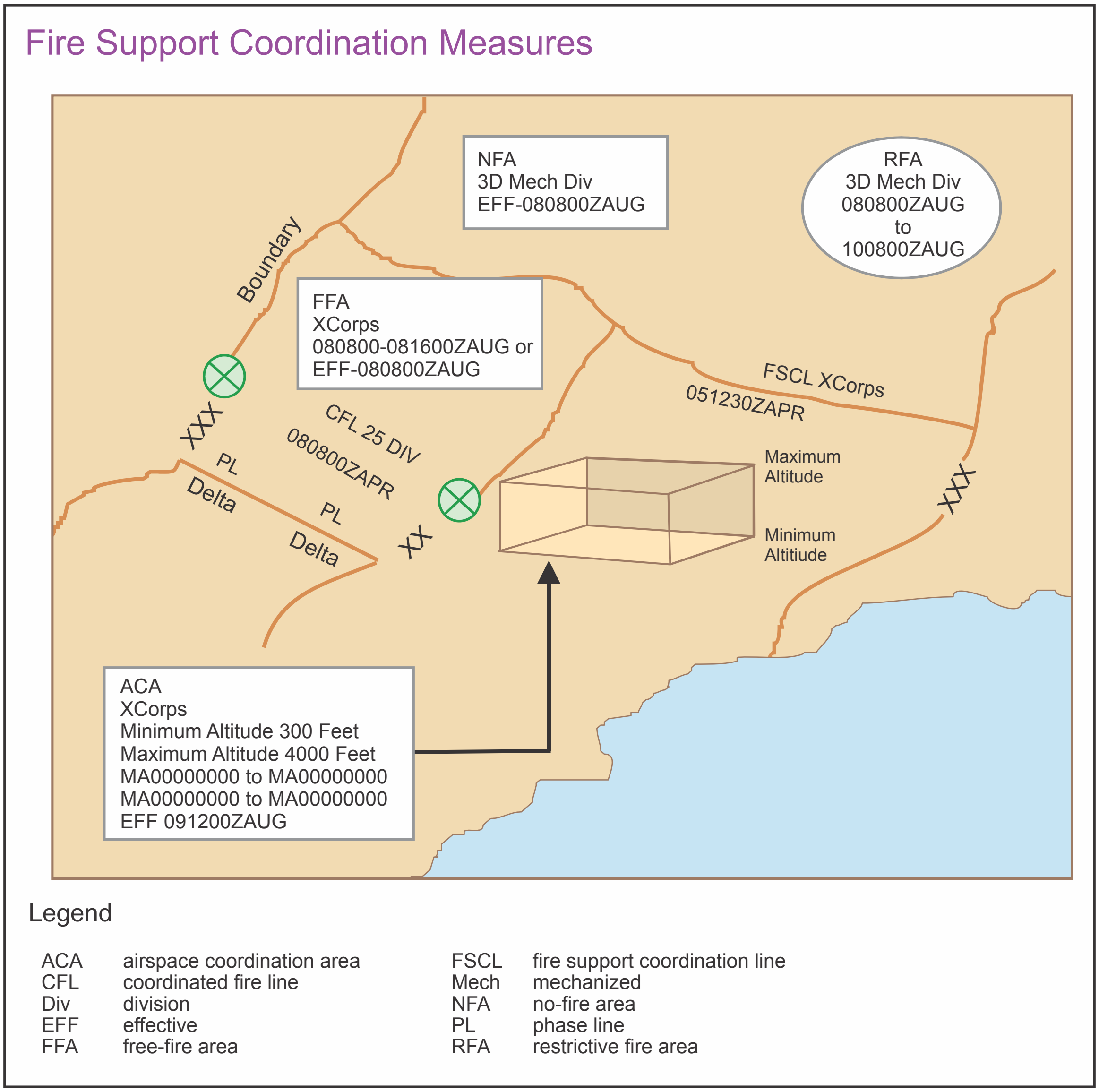


Figure III-11. Fire Support Coordination Measures

Current technology and collaboration tools between the elements of the joint force determine the times required for changing the FSCL. The JFC should establish guidance for shifting FSCLs. Use of an FSCL is not mandatory. Forces engaging targets beyond an FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid friendly fire, both in the air and on the land. Short of an FSCL, all air-to-ground and surface-to-surface engagement operations are controlled by the appropriate land or amphibious force commander. This control is exercised through the operations staff or with predesignated procedures. The FSCL is not a boundary—the synchronization of operations on either side of the FSCL is the responsibility of the establishing commander out to the limits of the land or amphibious force boundary. **The establishment of an FSCL does not create a free-fire area (FFA) beyond the FSCL.** When targets are engaged beyond an FSCL, supporting elements' engagements must not produce adverse effects on or to the rear of the line.

Engagements beyond the FSCL must be consistent with the establishing commander's priorities, timing, and desired effects and deconflicted whenever possible with the supported HQ. See JP 3-09, *Joint Fire Support,* for further discussion of the FSCL.

(c) **Battlefield Coordination Line (BCL).** A BCL is a USMC supplementary FSCM, established based on METT-T, which facilitates the expeditious attack of surface targets of opportunity between the measure (the BCL) and the FSCL. An ACA will always overlie the area between the BCL and the FSCL.

(d) **FFA.** An FFA is a specific designated area into which any weapon system may fire without additional coordination with the establishing HQ. It is used to expedite joint fires and to facilitate emergency jettison of aircraft munitions. Authority to engage is not automatically granted by the establishment of an FFA: US forces must still comply with mission requirements such as designated target priority, effects, and timing of fires; PID of targets; CDE; ROE; and SPINS.

(e) **Kill Box.** A kill box is a three-dimensional area used to facilitate the integration of joint fires and airspace. The kill box is an FSCM with an associated ACM. The establishing commander must coordinate its use through both fires and airspace channels. It is a permissive FSCM, generated by the appropriate commander, that may contain other restrictive control measures (ACM or FSCM) inside its boundaries. For current kill box operations, refer to theater-specific SOP. When established, the primary purpose of a kill box is to allow lethal attack against surface targets without further coordination with the establishing commander and without TAC. When used to integrate air-to-surface and surface-to-surface IDFs, the kill box will have appropriate restrictions. Authority to engage is not automatically granted by the establishment of a kill box. All aircrew conducting AI within the confines of a kill box will execute their mission in accordance with requirements for PID and CDE and in accordance with applicable ROE and SPINS.

For further guidance on kill boxes, refer to JP 3-09, Joint Fire Support, *and Army Tactical Publication 3-09.34/MCRP 3-25H/NTTP 3-09.2.1/AFTTP 3-2.59,* Multi-Service Tactics, Techniques, and Procedures for Kill Box Planning and Employment.

(2) **Restrictive Measures.** Restrictive measures restrict the use of supporting arms for various reasons: To safeguard friendly forces, protect religious sites, and deconflict fires.

(a) **NFA.** An NFA is land area designated by the appropriate commander into which fires or their effects are prohibited. Two exceptions are:

<u>1.</u> When the establishing HQ approves fires temporarily within the NFA on a mission by mission basis.

<u>2.</u> When an enemy force within the NFA engages a friendly force and the engaged commander determines there is a requirement for immediate protection and responds with the minimal force needed to defend the force.

(b) **Restrictive Fire Area (RFA).** An RFA is an area in which specific restrictions are imposed and into which fires (or the effects of fires) that exceed those restrictions will not be delivered without coordination with the establishing HQ.

(c) **RFL.** The RFL is a line established between converging friendly forces — one or both may be moving — that prohibits joint fires or the effects of joint fires across the line without coordination with the affected force. The purpose of the line is to prevent friendly fire and duplication of engagements by converging friendly forces.

(d) **ACA.** A three-dimensional block of airspace in a target area, established by the appropriate commander, in which friendly aircraft are reasonably safe from friendly surface fires. An ACA is normally established using lateral, altitude, or time separation, or a combination thereof. The ACA is the primary FSCM which reflects the coordination of airspace for use by air support and indirect joint fires. There are two types of ACAs: formal and informal.

1. **Formal ACA.** The airspace control authority establishes formal ACAs at the request of the appropriate commander. Formal ACAs require detailed planning. Although 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 the fire direction center (FDC) can determine the trajectory for a specific round or NSFS asset firing at a specific target, each target must be evaluated to ensure the trajectories of the rounds do not penetrate the ACA. The 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. Formal ACAs are promulgated in the ACO, ATO, or SPINS (see Figure III-12).

2. **Informal ACA.** Informal ACAs can be established using separation plans and may be established by any supported commander. An informal ACA is an expedient measure designed to provide immediate, yet temporary control and deconfliction. As such, informal ACAs are normally short-lived and not as widely disseminated as formal ACAs. Aircraft and surface fires may be separated by distance (lateral, altitude, or a combination of lateral and altitude), or by time. Informal ACAs can be more difficult for the FC/FSCC and airspace elements to coordinate and ensure all affected airspace users are informed. FC/FSCC must ensure restrictions to IDFs or aircraft are limited to those required to successfully execute the attack and are coordinated with all affected agencies.

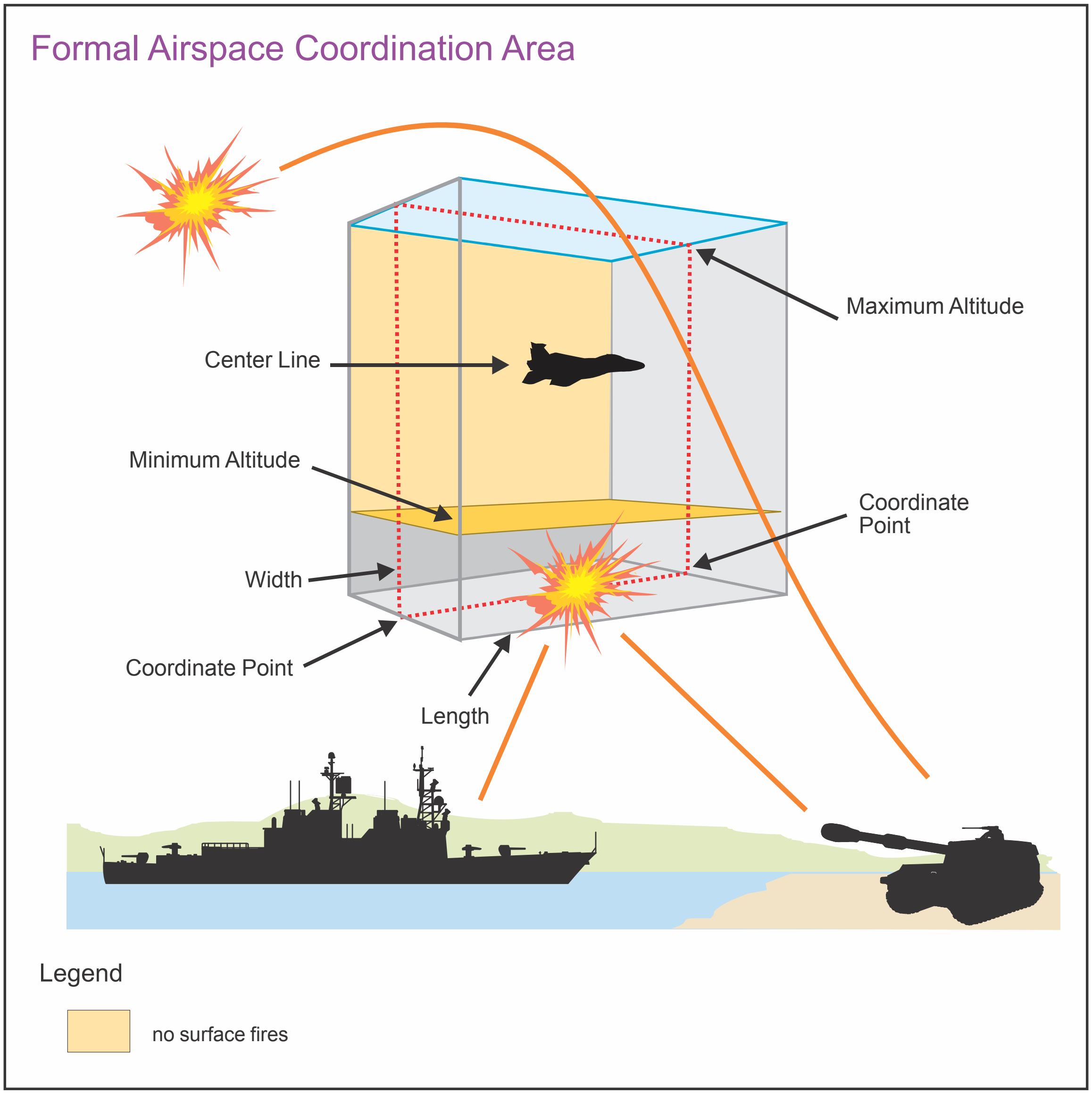


Figure III-12. Formal Airspace Coordination Area

a. **Lateral Separation.** (See Figure III-13.) Lateral separation is effective for coordinating fires against targets that are adequately separated from flight routes to ensure aircraft protection from the effects of friendly fires. Lateral separation allows coordinated attacks against two adjacent targets. The informal ACA should be big enough to allow aircraft to operate over the target yet small enough to minimize restrictions on supporting fire. Divide the target area into two or more engagement zones. While the separation measure may be described by an MGRS, grid line, or latitude/longitude reference, terrain features have the added advantages of simplicity and constant visual reference. This is an appropriate technique when aircrews and firing units engage separate targets and aircraft will not cross GTLs. JTACs/FAC(A)s must know the GTLs so they can prevent aircraft from flying through trajectories. For example: "Stay west of the 62 gridline" or "Remain west of the river."

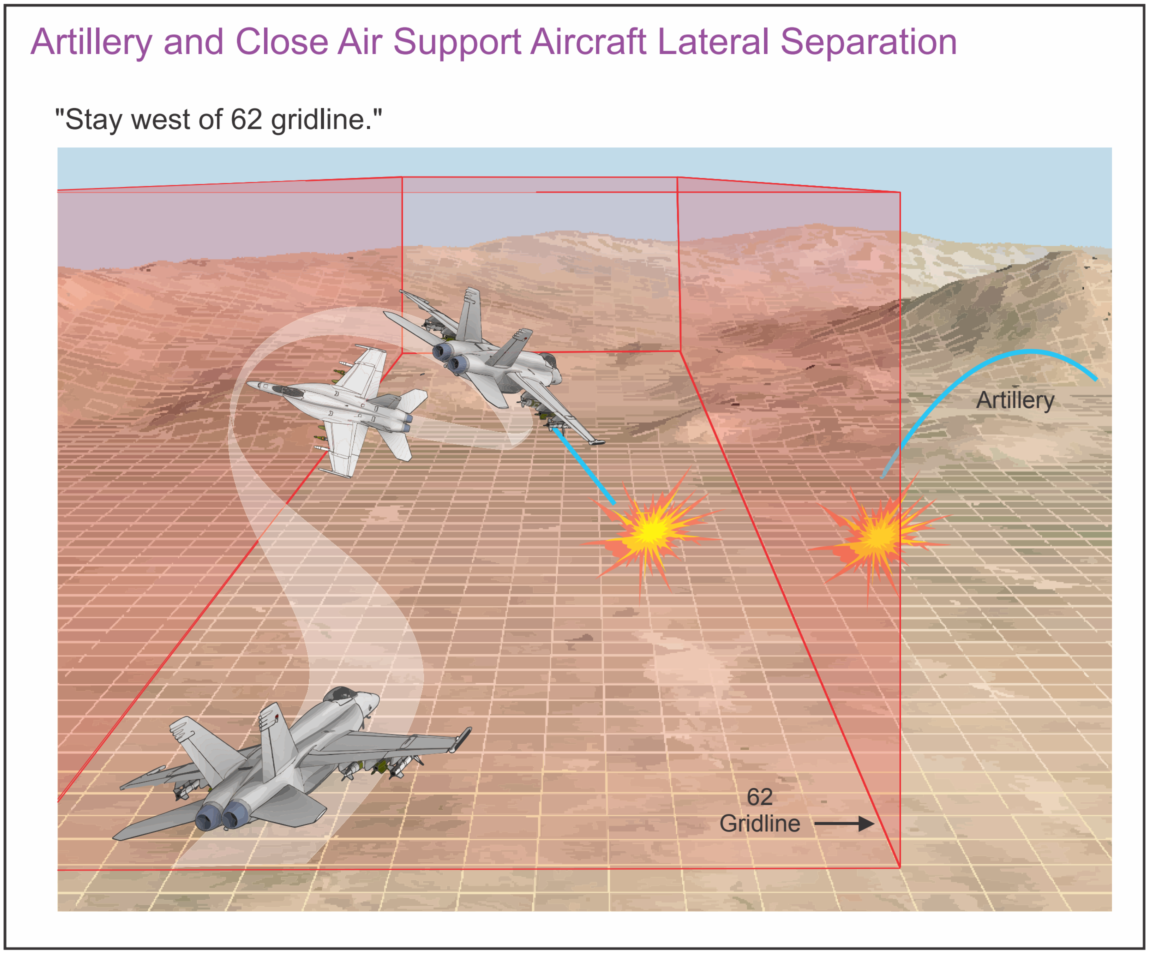


Figure III-13. Artillery and Close Air Support Aircraft Lateral Separation

b. **Altitude Separation.** Altitude separation is effective for coordinating fires when aircraft remain above or below IDF trajectories and their effects (see Figure III-14). This technique permits IDFs to continue when the aircraft must cross the GTL. Avoidance of the IDF trajectory and fragmentation pattern is provided by "stay above" or "stay below" altitude restrictions. When calculating the safe separation for an aircraft to stay above or below the IDF trajectory, the JTAC/FAC(A) and FSC/FSO use firing tables to determine the ordinate (altitude) of the projectile at the location where the aircraft will cross the GTL. This altitude is converted to feet above MSL and a margin of safety is applied prior to passing the aircraft a "stay above" or "stay below" altitude (for example, "stay above 5,000 ft MSL"). The JTAC and FSC/FSO must coordinate with the firing unit to determine the appropriate entry argument data to use when referencing the firing tables.

c. **Altitude and Lateral Separation.** (See Figure III-15) Altitude and lateral separation may be required when aircraft must cross the firing unit's GTL. This is an appropriate technique when aircraft and firing units engage targets along the GTL or aircraft must cross the GTL. This requires aircraft to remain above or below IDF trajectories. To calculate safe separation from IDFs, determine the point where the aircraft will cross the GTL, determine the ordinate at the selected point, and add or subtract the

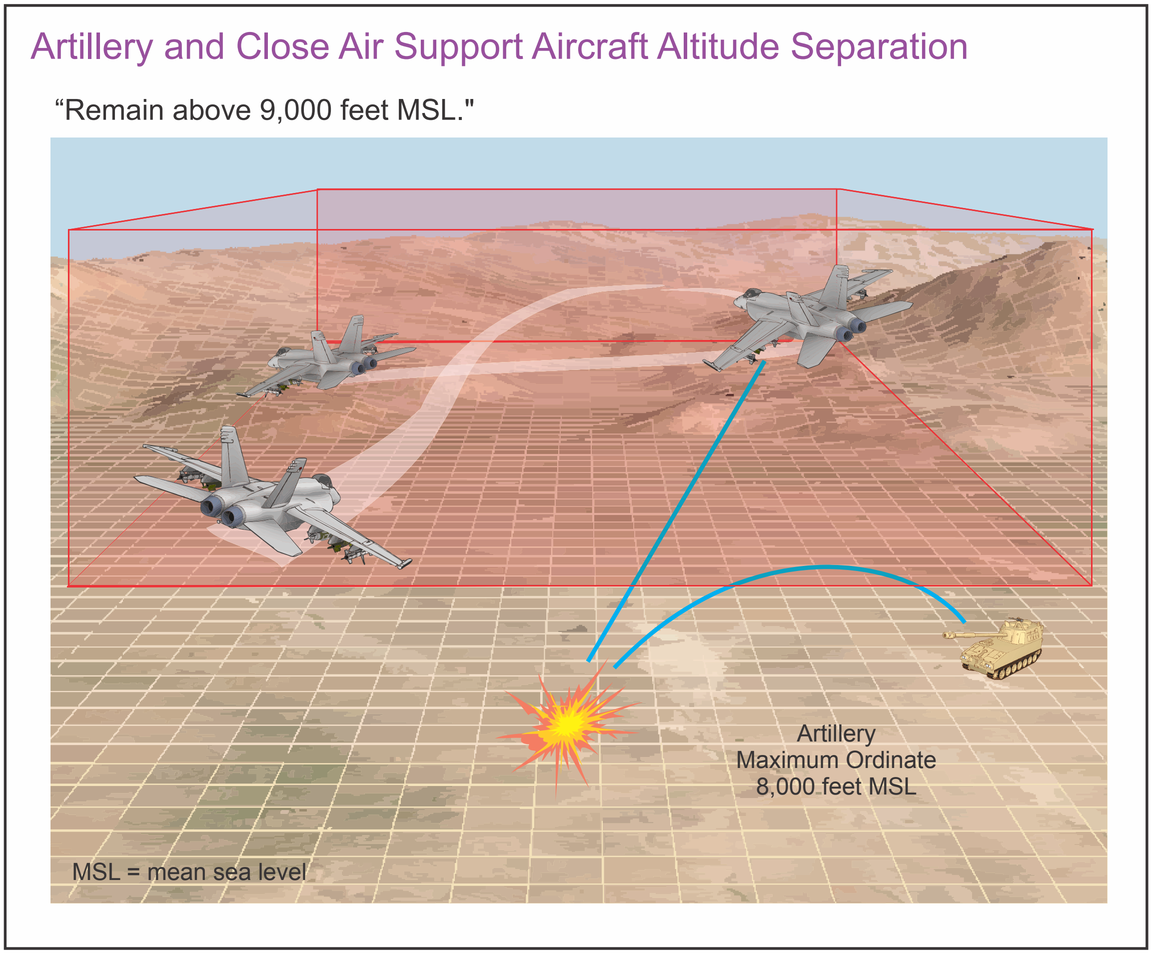


Figure III-14. Artillery and Close Air Support Aircraft Altitude Separation

margin of safety. For example, "Stay west of 62 gridline and remain below 3,000 ft MSL." When deconflicting by altitude always specify in ft MSL.

d. **Time Separation.** Time separation requires the most detailed coordination and may be required when altitude restrictions from IDF trajectories adversely impact aircraft ordnance delivery (e.g., mortar trajectory). The timing of surface fires must be coordinated with aircraft routing. This technique is appropriate when aircrews and firing units engage the same or nearby targets, when IDF is providing SEAD in coordination with the aircraft attack, or when the target is being marked by IDF. When deconflicting sorties, consider the weapons fragmentation envelope and the likelihood of secondary explosions. All timing for surface fires will be based on the specific aircraft event time (TOT/TTT).

(1) **TOT.** TOT is a time at which the aircraft bombs are to impact the target and around which supporting surface fires can be coordinated. TOT requires minimum communication. All participants, air and ground, must understand the time standard in use (Zulu or local), and the JTAC/FAC(A) may need to ensure all clocks are synchronized by providing a "time hack." **GPS time is the standard for US and allied forces** in establishing a common time reference and for setting TOT. Strict adherence to timing by participants is required for aircraft safety. If a CAS aircrew is unable to comply

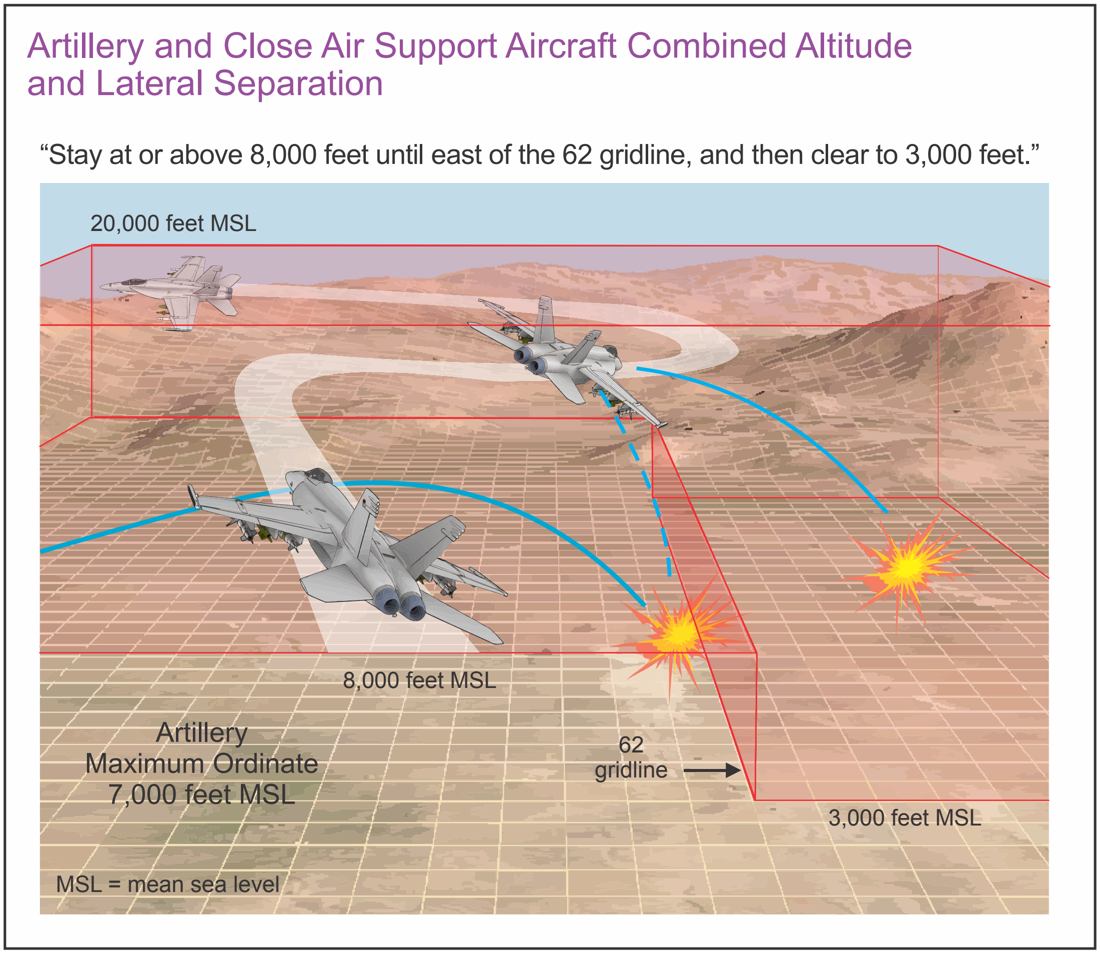


Figure III-15. Artillery and Close Air Support Aircraft Combined Altitude and Lateral Separation

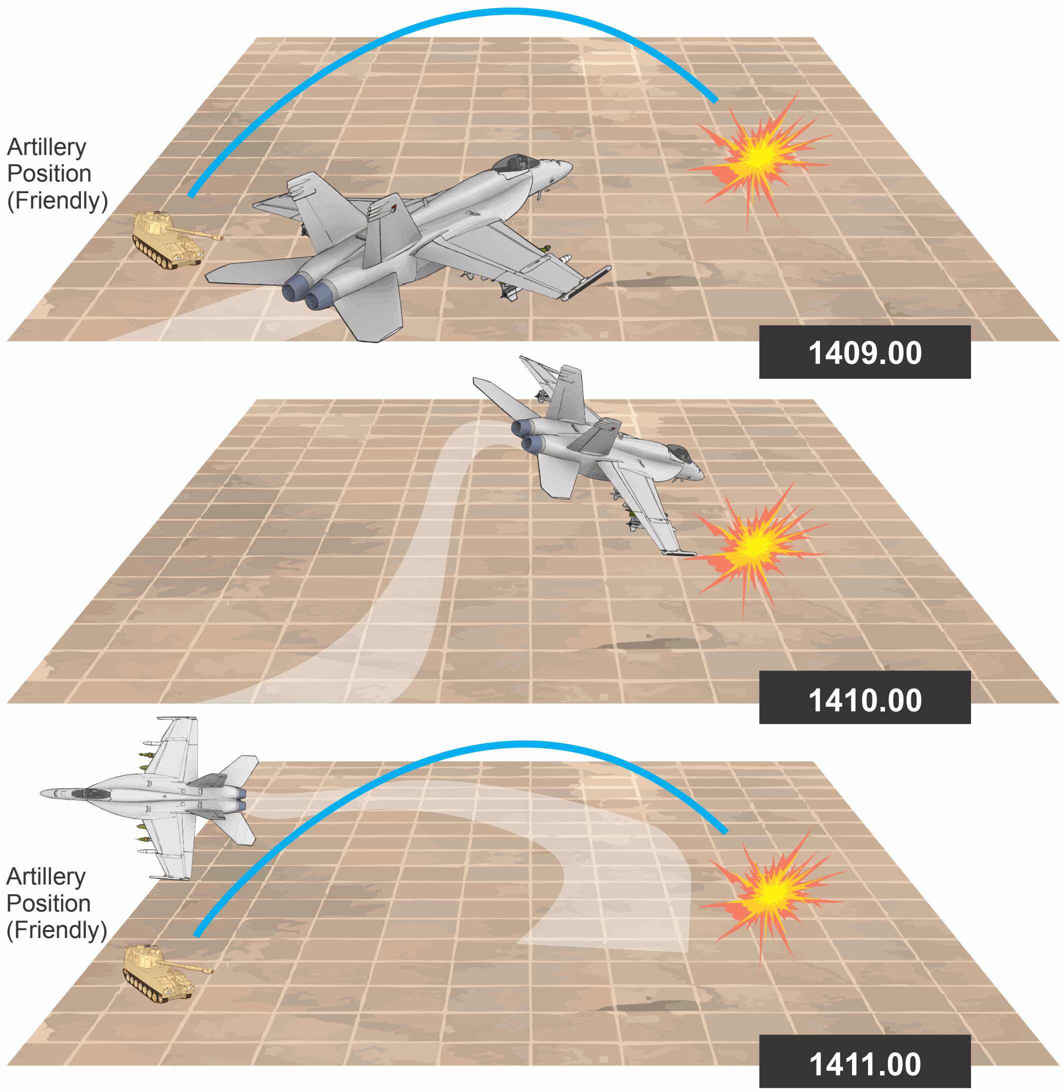
with the TOT/TTT, the CAS aircrew must inform the terminal controller and should consider requesting an alternate TOT/TTT that can be achieved. Aircrews can update the clock on check-in with air control/fire support coordination agencies. Figure III-16 illustrates time separation using a TOT.

(2) **TTT.** TTT establishes a precise number of minutes and seconds that elapse between an established time hack and ordnance effect. This is an accurate, although infrequently used, method of time control and is easy to implement when few participants are involved. Sufficient duration for the FSC/FSO to synchronize IDFs must be considered. Additionally, the JTAC/FAC(A) must consider time required for the aircraft to execute the attack. After the CAS brief, specify the TTT and give the time hack (e.g., "TIME TO TARGET 5+00, READY, READY, HACK"). The JTAC or FAC(A) providing final control normally provides the hack. Aircrew will acknowledge receipt of the time hack.

b. **ACMs.** ACMs are measures employed to facilitate the efficient use of airspace to accomplish missions and simultaneously provide safeguards for friendly forces. The JFC uses the airspace control authority to establish formal ACMs (see Figure III-17). Each

Artillery and Close Air Support Aircraft Time Separation

"TOT 1410, SEAD minus 2 through minus 1 and plus 1 through plus 2."



Legend

SEAD	suppression of enemy air defenses	TOT	time on target

Figure III-16. Artillery Close Air Support Aircraft Time Separation

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 ACO. See JP 3-52, *Joint Airspace Control*, for a detailed discussion of joint ACMs, which include:

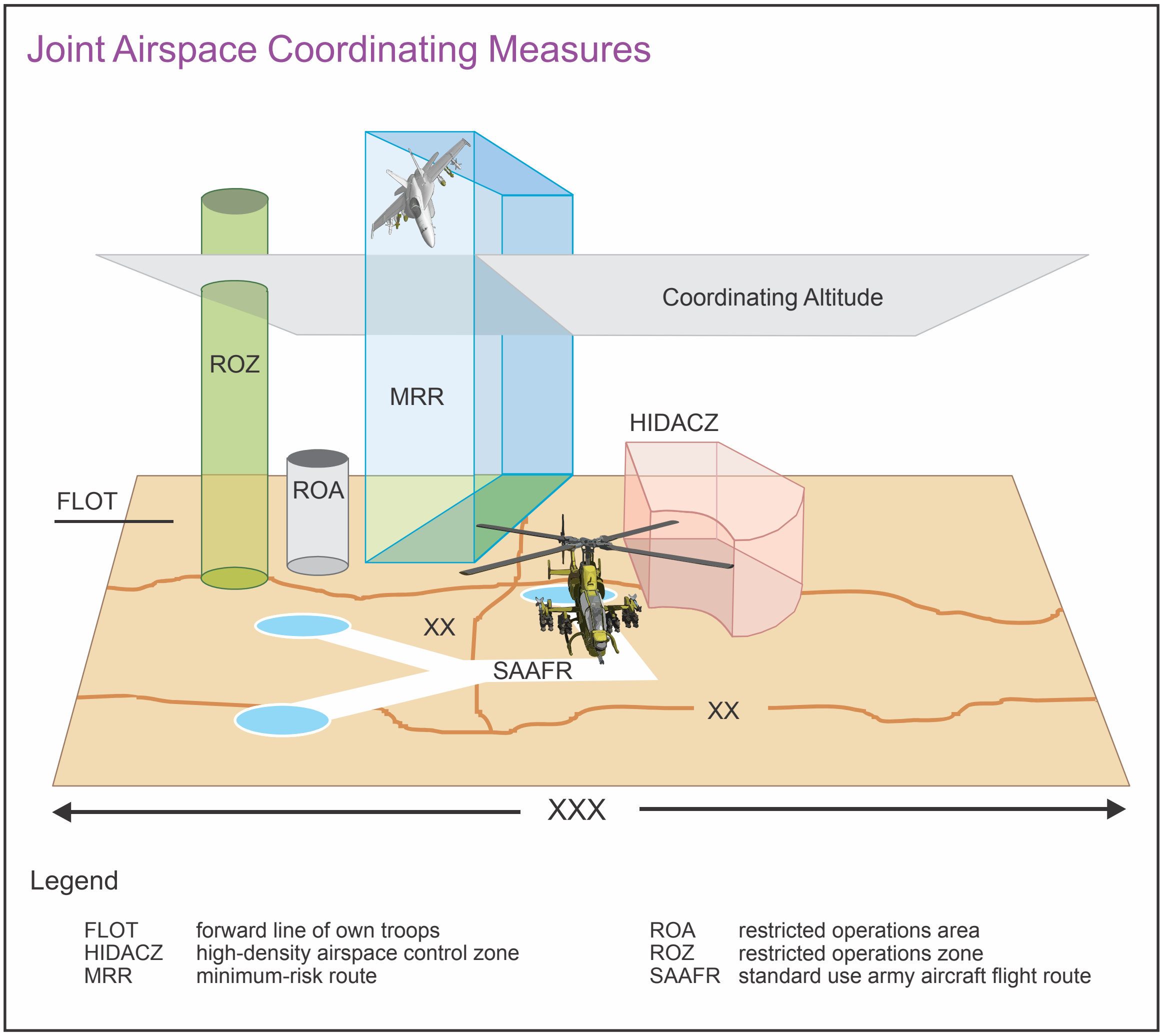


Figure III-17. Joint Airspace Coordinating Measures

(1) **Coordinating Altitude.** An airspace coordinating measure that uses altitude to separate users and as the transition between different airspace coordinating entities.

(2) **HIDACZ.** Airspace designated in an airspace control plan or ACO, in which there is a concentrated employment of numerous and varied weapons and airspace users. A HIDACZ has defined dimensions which usually coincide with geographical features or navigational aids. Access to a HIDACZ is normally controlled by the maneuver commander. The maneuver commander can also direct a more restrictive weapons status within the HIDACZ. In some cases, the operational environment may require airspace and fires densities that exceed the capability of a single HIDACZ controlling authority. One method to avoid this is to establish another ACM (e.g., ROZ, second HIDACZ) above or adjacent to the HIDACZ controlled by another agency or component.

For more information on HIDACZ, see JP 3-52, Joint Airspace Control, *and FM 3-52.1/ AFTTP 3-2.78,* Multi-Service Tactics, Techniques, and Procedures for Airspace Control.

(3) **ROZ.** ROZ is an airspace type with 15 different airspace usages available to generate ACMs. Normally of defined dimensions created in response to specific operational situations or requirements within which the operation of one or more airspace users is restricted. ROZ airspace usages more clearly delineate the actual intended use of the airspace (UA, CAS, etc.).

(4) **MRRs.** An MRR is a temporary corridor of defined dimensions recommended for use by FW aircraft that presents the minimum known hazards to aircraft transiting the combat zone.

(5) **Standard Use Army Aircraft Flight Routes.** A Standard use Army Aircraft flight route is a route established below the coordinating altitude to facilitate the movement of Army aviation assets. Routes are normally located in the corps through brigade rear areas of operation and do not require approval by the airspace control authority, but should be on the ACO to enhance joint interoperability of other airspace users below the CA.

c. **Coordination.** Once a target has been approved, the JTAC/FAC(A) and COC/TOC (or command post) coordinate the CAS attack with affected ground forces. Cross-boundary clearance of fires, friendly ADA, and CAS aircraft ingress/egress routing must be deconflicted and coordinated.

(1) **Cross-Boundary Clearance of Fires.** Boundaries are the basic maneuver control measure used by commanders to designate the geographical area for which a particular unit is tactically responsible. They are restrictive in that no fire support weapons may deliver fires or effects of fires across a boundary unless those fires are coordinated with the affected unit. The FSC/FSO must participate in clearance of fire procedures directly with the cross-boundary COC/TOC (command post), or the common HHQ COC/TOC (command post).

(2) **Friendly ADA.** To avoid friendly fire, COC/TOC should announce "friendly air on station" to subordinate units. TACP/JTAC/FAC(A) and ADA personnel must coordinate CP/IP usage, target location, type and number of aircraft, altitudes, and times on station. The SPINS and ACO should include MRRs or safe return corridors and associated procedures for aircraft to return from CAS target areas.

(3) **Procedural Control Measures.** Procedural control measures provide target orientation to aircrew, align aircraft for the attack or egress, provide separation from other supporting fires, and provide separation from enemy air defense assets. **Procedural control measures include CP/IP selection, offset direction, and FAH.**

(a) **CP/IP/BP Selection.** The JTAC/FAC(A) selects the CPs/IPs/BPs based on enemy capabilities, target orientation, friendly location, weather, aircraft capabilities, and FSCMs. CPs and IPs should be visually significant geographic points whenever possible so that aircrew can visually acquire them in the event of a degraded navigation system or GPS-denied environment. IPs are normally located from 5 to 15 nautical miles from the target for FW aircraft and BPs are 1-5 km for RW aircraft. High altitude aircraft may require IPs in excess of 20 nautical miles from the target. When coordinating the use of stand-off weapons, IP ranges may need to be extended to ensure appropriate weapon delivery parameters. In some cases, stand-off CAS platforms may need to apply required terminal deconfliction parameters to the weapon instead of the aircraft. In this case, the aircrew should communicate an appropriate stand-off IP to the JTAC, ensuring that the weapon will remain deconflicted throughout its entire route of flight.

(b) **Keyhole**

1. Keyhole template is an efficient method for establishing an IP in the absence of control points or when their location does not sufficiently support target engagement (see Figure III-18). When CAS aircraft are passed to a JTAC from a CP, the JTAC should immediately pass an "Echo" point (typically the target) to those CAS players, and then anchor their hold point off of the Echo point with a direction and distance in nautical miles. Aircraft should hold outside the distance given. The standard keyhole method is to label each of the cardinal directions with a letter: A—North, B—East, C—South, D—West, and E—Overhead Target and use radials when cardinal directions are not appropriate. The JTAC selects the IP based on enemy threat capabilities, target orientation, friendly location, weather, aircraft capabilities, and fire support coordination requirements.

"Alpha eight right"

Note: JTAC/FAC(A)s should remain aware that when target arrays change appreciably—unlike when using traditional IPs--so will the hold point for the attacking aircraft when using the keyhole template. This shift of attacking aircraft orbits and hold points must be communicated clearly. Failure to change the echo point when a target area changes can result in deconfliction issues with other airborne players.

a. If the tactical situation dictates that an IP north of the target is necessary, then holding instructions for the CAS players might sound like this:

JTAC: "Stang 11, advise when ready to copy Echo point."
CAS Player: "Stang 11, ready to copy."
JTAC: "Ten-digit grid to follow. NU 87138 50874."
CAS Player: "I copy NU 87138 50874."
JTAC: "Stang 11, proceed to Alpha 8, angels 15, report established."
CAS Player: "Stang 11, established Alpha 8, angels 15."

b. Sometimes a cardinal direction is not appropriate for an IP. In these situations, any radial from the target can be used for holding instructions. For example:

JTAC: "Stang 11, proceed to the 240 at 8, angels 15, report established."
CAS A/C: "Stang 11, established 240 at 8, angels 15."

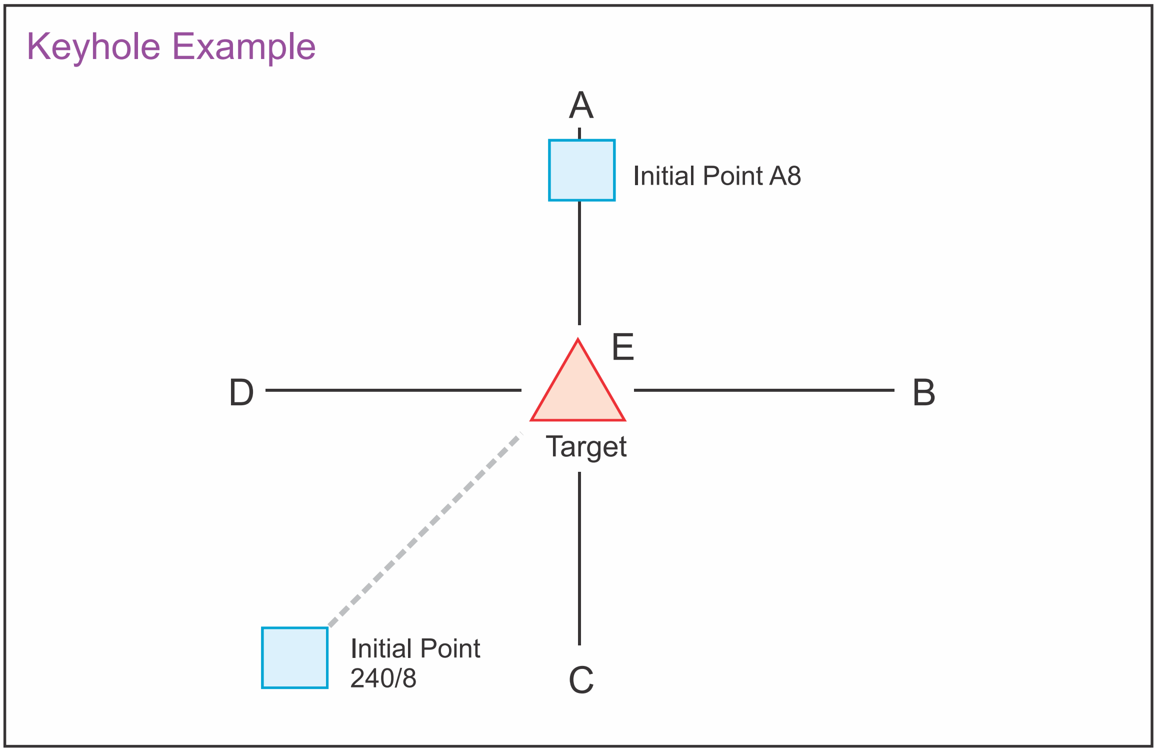


Figure III-18. Keyhole Example

2. This template allows for unlimited flexibility in IP selection and precludes the need to generate IPs for an entire operational area, many of which may never be used. However, by choosing the keyhole method, the JTAC/FAC(A) will probably not have a visually/geographically significant hold point on which attacking aircraft can orient.

a. Overhead: "From the overhead." From the overhead is an attack from an orbit over the target area.

b. For FW level-laydown, or ramp/bunt deliveries, the distance required for the attack should be considered and used in lines 1-3. The airspace required for these attacks does not support "from the overhead." For example, a FW PGM delivery run will typically begin about 8-10 nautical miles from the target.

c. If the aircraft is attacking from an orbit over the target area, then Lines 1-3 can be "from the overhead" or "Lines 1-3 N/A."

(c) **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 III-19). JTACs/FAC(A)s use an offset direction to ease fire support coordination, 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 side of the IP-to-target line where there might be a conflict with a GTL. The offset direction regulates the attack quadrant without assigning a specific attack heading.

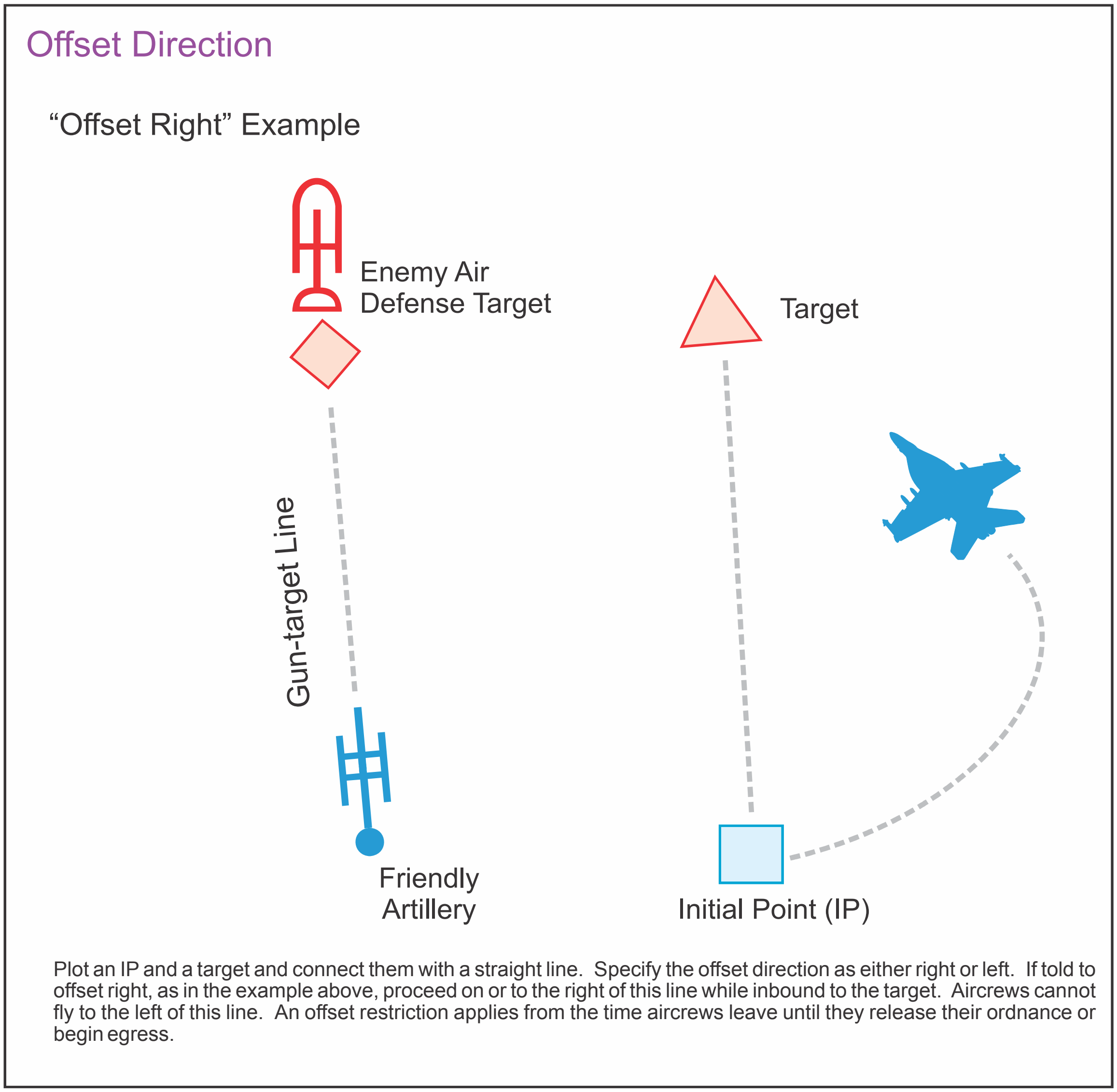


Figure III-19. Offset Direction

(d) **Final Attack Headings.** JTACs/FAC(A)s assign attack headings for several reasons: to increase ground troop safety, aid in aircraft acquisition by the JTAC/FAC(A), aid aircrews in target acquisition, mitigate collateral damage, meet laser safety cone attack restrictions, and facilitate fire support coordination. Controllers may employ FAHs/windows that allow aircrews to maneuver on either side of the attack heading. This gives aircrews more flexibility in prosecuting the target while maintaining the required degree of restriction on the aircraft heading. Attack headings also allow RW aircraft to maneuver over terrain or urban sprawl to enhance delivery while remaining survivable. Attack headings/windows might be particularly useful when the attack aircraft are using coordinate-dependent weapons, as it is possible for the weapon's FAH to differ significantly from the aircraft's heading. If the JTAC/FAC(A) requires a specific attack heading for the weapon (but not the aircraft), that restriction must be stated clearly when the FAH is passed. JTACs/FAC(A)s must weigh the advantages of issuing an attack heading with the disadvantages of restricting aircraft tactics. Final attack headings are not issued when there is no requirement. JTACs should attempt to place as few restrictions as possible on attacking aircraft. Unnecessary or overly restrictive run-in restrictions often increase the time required to attack, decrease the flexibility and survivability of the flight, and increase the likelihood of an aircraft not expending its ordnance because it was outside of parameters. JTACs should limit restrictions to the minimum required; however, any final attack geometries provided as part of the CAS briefing in the form of headings or directions are by definition "restrictions" and therefore must be read back. The following are examples of briefed final attack geometry:

1. Magnetic heading: "Final attack heading 230."

2. Magnetic headings with a cone: "Final attack heading 240-300" or "Final attack heading 270 plus-or-minus 30 degrees."

3. Use of cardinal/sub-cardinal directions: "Razor 51, Broadsword 88, make your attack from northeast to southwest." A JTAC/FAC(A) should be cautious when using this method as no final attack magnetic headings are specified and the attacking aircraft may not be on the exact heading or in the expected sector of airspace for CAS aircraft acquisition or deconfliction. If an exact heading or cone is required, then use of one of the above techniques is recommended.

4. Use of a geographical reference: JTAC/FAC(A) states "Make all attacks parallel to the road."

d. **Synchronization**

(1) **Simultaneous Employment.** One of the most difficult functions performed by a FC/FSCC is synchronizing CAS with surface fires. The intent is to coordinate the timing of air support, supporting arms, and maneuver to achieve the mass of a combined-arms attack. **The goal is to accomplish this without suspending the use of any of the supporting arms or affecting the scheme of maneuver.** An additional goal is to offer a reasonable measure of protection to aircraft from the effects of friendly surface fires. High altitude/standoff weapons (e.g., JDAM) offer the capability to deconflict both in range and altitude from other supporting fires.

(2) **A common time reference is essential** to accomplish the high degree of coordination necessary for effective CAS. All participants (aircrew, JTAC, FAC[A], Marine TACC/Navy, TACC/SACC, ASOC/DASC, FC/FSCC, and IDF elements) must use the same timing method. Refer to the two methods, TOT and TTT, described previously.

(3) **Fires That Support CAS.** There are two primary forms of surface fires that support the conduct of CAS missions: target marking and SEAD. They are often used in combination. It is important to note that a fire support mission may take several minutes to coordinate.

(a) **Marks.** A target mark should be provided for CAS aircraft whenever needed. Target marks should be planned to include sufficient time for CAS aircrews to observe them prior to employment. JTACs/FAC(A)s should strive to provide redundant marks when deemed necessary in case the primary mark fails, is late, or is inaccurate during the terminal phase of an attack. Examples of redundant mark combinations are laser/smoke, IR pointer/tracer, and smoke/talk-on. The target mark can be provided by direct or IDF weapons (heavy machine gun tracer, mortars, artillery, or naval gunfire) or an airborne platform such as a FAC(A). See Figure III-20 for standard marking brevity terms. When one of the above marking methods is not possible, the CAS target may be identified by narrative description provided by the JTAC/FAC(A). This is known as a "talk-on" to target. The JTAC marking their position with devices such as strobe lights, mirrors, or air panels may aid this narrative. Care must be taken to not highlight friendly ground forces positions to the enemy.

1. **Marking by IDF.** Artillery, NSFS, or mortar fires are an effective means of enabling pilots to visually acquire the target. Before choosing to mark by artillery, NSFS, or mortars, observers should consider the danger of exposing these supporting arms to the enemy's IDF acquisition systems, and the additional coordination between supporting arms required for this mission. Caution must be applied when using a WP and/or red phosphorous mark on a crowded battlefield that the mark is not confused with other activities on the ground. Timing for marking rounds is situationally dependent and must be coordinated prior to commencement of the attack. JTACs/FAC(A)s must calculate weapon times of flight and understand aircrew tactics to ensure marks impact at the appropriate time. This lead time ensures that the marking round is in position early enough and remains visible long enough for the JTAC/FAC(A) to provide final control instructions and for the pilot of the attacking 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. When IDF marking rounds are not timely or accurate, JTACs/FAC(A)s should use a backup marking technique or verbal instructions to identify the target to CAS aircrew. If the situation requires precise marks, observers or spotters can adjust marking rounds to ensure that accurate marks are delivered to meet the CAS schedule.

Standard Marking Brevity Terms	
BLIND	No visual contact with FRIENDLY aircraft/ground position. Opposite of VISUAL.
VISUAL	Sighting of a FRIENDLY aircraft or ground position. Opposite of BLIND.
CONTACT	Acknowledges sighting of a specified reference point (either visually or via sensor).
(target/object) CAPTURED	Specified surface target or object has been acquired and is being tracked with an onboard sensor.
LOOKING	Aircrew does not have the ground object, reference point, or target in sight. Opposite of CONTACT.
TALLY	Sighting of a target, nonfriendly aircraft, or enemy position. Opposite of NO JOY.
NO JOY	Aircrew does not have visual contact with the TARGET/BANDIT. Opposite of TALLY.

Figure III-20. Standard Marking Brevity Terms

2. **Marking by Direct Fire.** Direct fire weapons can be used to mark targets. While this method may provide more accuracy and timeliness than IDF marks, **its use may be limited by range and the visibility of the burst from the air and on the battlefield.** FW and RW aircraft can also mark the target with munitions (guns, rockets, missiles, or bombs).

3. **Laser Designators.** For LST-equipped aircraft, designating/marking targets by laser is very effective. If using lasers (ground or airborne) to mark the target, laser designation must be selective and timely as lengthy laser emissions may compromise friendly positions. The CAS aircrew can also confuse the laser source with the intended target. When employing lasers to mark, include the call sign of the lasing entity along with the 4-digit laser code in the marks portion of the CAS brief: "Blackjack laser, code 1688." The JTAC/FAC(A) will use the laser code passed by aircrew set in any LGWs they briefed during the CAS check-in briefing. In the remarks section of the CAS brief, **JTACs/FAC(A)s shall provide FAHs to ensure that the attacking aircraft is in the laser acquisition area and not in a laser safety zone, and shall provide the LTL in degrees magnetic *from the laser designator operator to the target.*** For laser marks, the aircrew will provide **a ten-second warning** to activate the mark. Use the standard laser brevity terms listed in Figure III-21.

Note: For the most recent communications brevity codes and meanings, see the most recent revision of Army Tactical Publication 1-02.1/MCRP 3-25B/NTTP 6-02.1/AFTTP 3-2.5, *Brevity, Multi-Service Brevity Codes.*

4. **FAC(A) Marks.** Some FAC(A) aircraft can mark with WP/high explosive rockets, IR pointer, gun tracers, and/or laser. See Army Tactical Publication 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP 3-2.6, *JFIRE Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower*, for a complete listing of aircraft target marking capabilities.

Standard Laser Brevity Terms	
CALL	MEANING
TEN SECONDS	Standby for LASER ON call in approximately 10 seconds.
LASER ON	Start/ acknowledge laser designation.
SHIFT (direction/TN)	Shift laser/infrared/radar/device energy/aimpoint. Note: Can be used to shift from the offset position onto the target. Also used during multi-aircraft attack to shift laser energy or target assignments.
SPOT	Acquisition of laser designation
CEASE LASER	Discontinue lasing.
DEAD EYE	Laser designator system inoperative.
NEGATIVE LASER	Laser energy has not been acquired.
LASING	The speaker is firing the laser.
STARE (w/ laser code and reference point)	Cue the laser spot search/tracker function on the specified laser code in relation to the specified reference point. Reference point may include the following: steerpoint, geographic reference, bearing and range, or data link point.

Figure III-21. Standard Laser Brevity Terms

5. **IR Pointers.** JTACs/FAC(A)s may use IR pointers and other IR devices to mark targets at night for aircrews that are using NVDs. Unlike laser designators, IR pointer devices cannot be used to guide munitions. Use IR pointers with caution, as they may expose the JTAC to an enemy with night vision capability. JTACs must always be prepared to provide and describe distinguishing characteristic(s) of their IR marker to the aircrew. IR marks should be initiated 20-to-30 seconds prior to the CAS TOT/TTT, or when requested by the aircrew. When working with IR pointers, use brevity terms. Pilots and JTACs/FAC(A)s must be familiar with these terms to avoid confusion (see Figure III-22).

NIGHT INFRARED CLOSE AIR SUPPORT BREVITY TERMS	
CALL	MEANING
SPARKLE	Mark/marking target by infrared (IR) pointer. (Joint terminal attack controller [JTAC] marks the target with an IR pointer. Can be initiated by JTAC or aircrew. Proper aircrew response is CONTACT SPARKLE or NO JOY.)
SNAKE	Oscillate an IR pointer in a figure eight about a target. (Call made by exception for the JTAC to jiggle the IR beam on the target. This aids in distinguishing the friendly position from the target, verifies that the aircrew is looking at the proper IR pointer and can aid in the acquisition of the IR energy. Proper aircrew response is CONTACT SPARKLE, STEADY, or NO JOY.)
PULSE	Illuminate/illuminating a position with flashing IR energy. (JTAC uses pulse mode available on some IR pointers. Can be initiated by JTAC or aircrew. May be used by JTAC to emphasize that an enemy position is being illuminated by flashing IR energy, which is often used to identify friendly positions. Proper aircrew response is CONTACT SPARKLE, STEADY, or NO JOY.)
STEADY	Stop oscillation of IR pointer. (JTAC steadies the beam after a SNAKE or PULSE call. This can aid in verifying that the aircrew is looking at the proper IR pointer.)
CEASE SPARKLE	Discontinue sparkle activity. (JTAC turns the beam off. This can aid in verifying that the aircrew is looking at the proper IR pointer, especially if followed with a SPARKLE call.)
ROPE	Circling an IR pointer around an aircraft to help the aircraft identify the friendly ground position. **Caution:** This technique may damage night vision devices.
CONTACT SPARKLE	Acknowledges sighting of sparkle. Call acknowledging the sighting of a specified reference point (either visually or via sensor). After the SPARKLE call is made, the close air support aircraft should respond with NO JOY or SNAKE. Once the aircrew sees the IR energy and is able to discern between the friendly and target end of the pointer, a CONTACT SPARKLE call may be made.
MATCH SPARKLE	Overlay requested target designator type. (Directive term for a second party to overlay an IR mark on an existing mark.)
Note: ROPE is not recommended for rotary wing aircraft. The brevity terms listed in this figure amplify the IR communications in Army Tactical Publication 1-02.1/MCRP 3-25/NTTP 6 02.1/AFTTP 3-25, *Brevity, Multi-Service Brevity Codes*.	

Figure III-22. Night Infrared Close Air Support Brevity Terms

Note: For the most recent communications brevity codes and meanings, see the most recent revision of Army Tactical Publication 1-02.1/MCRP 3-25B/NTTP 6-02.1/AFTTP 3-2.5, *Brevity, Multi-Service Brevity Codes.*

6. **Combination.** When the tactical situation deems it reasonable, a JTAC/FAC(A) should consider the use of additional marks to augment an IR or laser mark. When IR pointers or laser designators are employed, JTACs/FAC(A)s and CAS aircrew must use proper communications brevity and procedures to ensure CAS aircrews do not confuse the source of the mark or the friendly position with the target end.

WARNING

Attack aircraft may confuse infrared (IR) pointer or laser energy source with the intended target. When using IR pointers or lasers to mark, include IR POINTER or LASER in the marks portion of the close air support (CAS) briefing. CAS aircrew must be VISUAL and TALLY or CONTACT SPARKLE when using a ground-based IR pointer as a mark. JTAC/FAC(A)s must provide final attack headings to place the attacking aircraft in the laser basket for a ground-based laser designation for a laser guided weapon. Laser target line shall also be passed, time and situation permitting.

7. **Marking Friendlies.** Marking friendlies is the least desirable method of enabling a TALLY. Marking friendlies can be confusing and should be used cautiously and only when no other method is available.

(b) **SEAD**

1. **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. SEAD missions do not guarantee aircraft immunity from enemy air defenses. JTACs/FAC(A)s should first evaluate different mission profiles to minimize the aircraft's exposure to the threat envelope from known or suspected antiair threats. If aircraft cannot avoid 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.

2. **Coordination. Surface-delivered SEAD** involves planning and coordination by the FC/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. Before requesting CAS that would require SEAD support, fire support personnel must first consider whether mortars, artillery, or NSFS can range the target and achieve the desired results. Effective SEAD depends on accurate intelligence on the position and type of enemy weapons. SEAD is most effective against fixed threats such as antiaircraft sites and ADA batteries. SEAD is least effective against individual MANPADSs and highly mobile threats due to the difficulty of accurately targeting these systems. The FSC, working with the JTAC and forward observer, may coordinate surface-delivered SEAD with target marking.

For additional information on SEAD, see Chapter V, "Execution" paragraph 2a(6), "Determine SEAD Requirements/SEAD Plan," and JP 3-01, Countering Air and Missile Threats.

15. Close Air Support Aircraft Tactics Planning

This section identifies some basic TTP used by aircrews to conduct CAS. Standardized procedures and tactics provide a baseline for further refinement and improvement. This section describes basic FW and RW CAS aircraft tactics. Tactics are ever changing and must be adapted to the specific situation. JTACs/FAC(A)s must be familiar with these as well as advanced CAS tactics. Aircrew will ultimately decide aircraft tactics but must ensure the tactics used fall within any constraints issued by the JTAC/FAC(A).

a. **FW Tactics**

(1) **All-Altitude Tactics**

(a) **Coordinated Attacks.** Coordinated attacks include multiple flights of aircraft using either combined or sectored tactics in conjunction with some type of deconfliction measure. The JTAC/FAC(A) must approve use of coordinated attacks. One flight lead may be established as the tactical lead of the attacks if all flights/sections agree to work coordinated attacks. An aircraft given the tactical lead does not have TAC responsibilities—rather the tactical lead should ensure deconfliction between aircraft is maintained and recommend attack geometry and timing between flights/sections. Coordinating flights for attacking the same target/target area can add firepower to the attack and help to split target defenses. While the JTAC/FAC(A) and aircrews must conduct the attack using a common frequency, the aircrews can use a separate frequency to conduct inter-flight coordination (e.g., ordnance deconfliction, timing between flight members).

(b) **Type of Attack** (Figure III-23). The type of attack is based on the avenue to the target and target orientation. 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 and timing on target is sequential with the trailing flight taking one minute spacing from the lead flight's TOT.

(c) The following procedural guidelines are considered standard:

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

2. The JTAC/FAC(A) must approve reattacks (after coordination with the ground force commander).

3. If an aircraft enters another flight's sector, the aircrew will immediately notify the other flight, the JTAC/FAC(A), and deconflict or exit that sector.

4. JTAC/FAC(A) and aircrew must coordinate munitions that may enter the other flight's sector before the attack.

Coordinated Attack Types

Type of Attack	Simultaneous	Sequential	Random
Combined Same Avenue of Attack Target	Visual or Hack Simultaneous time on target/time to target	Visual or Hack (Visual spacing or time hack separation)	Not Normally Used
Sectored Acknowledged Sector Target	Visual or Hack Simultaneous time on target/time to target	Visual or Hack (Visual spacing or time hack separation)	Free Flow*

* Must ensure strafe fan/bomb and missile fragment deconfliction.

Figure III-23. Coordinated Attack Types

(d) **Reattacks.** The aircrew's goal is to complete a successful attack on the first pass. Reattacks may be required for the following reasons: multiple targets remaining in the target area, desired effects not created on first attack, and aircraft reconnaissance/BDA. JTAC/FAC(A) must authorize all reattacks. JTACs/FAC(A)s authorize reattacks after assessing the need for a reattack, aircraft vulnerability to enemy fire, and probability of success. The JTAC/FAC(A) 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 as long as PID is obtained or maintained by the JTAC/FAC(A) and/or the attacking aircraft and appropriate coordination is conducted. For any retargeting or attacks on alternate targets, controllers must ensure the affected sorties have appropriate munitions for the desired effects. Additionally, controllers and pilots must ensure appropriate safe distances from friendly forces are considered for any new munitions and fuzes assigned. JTACs and aircrews must ensure follow-on munitions used in immediate reattacks still meet the ground commander's intent and JTAC restrictions before expending ordnance. For reattacks on the same target area, JTAC/FAC(A)s should use their best judgment as to using the originally passed CAS brief, creating a new CAS brief, or providing a correction off of the last target hit.

(e) **Egress.** While operating in a high-threat or hostile 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 of other flights. 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 attack completion, aircrews follow the egress instructions and either execute a reattack, return to the CP/IP for further tasking, or return to base.

(2) **Medium/High Altitude Tactics.** Medium/high altitude tactics are flown above approximately 8,000 ft AGL. **High altitude bombing** can be described as **bombing with the height of release over 15,000 ft AGL.** These tactics are employed when slant range and altitude can be used to negate local threat systems. For visual deliveries, the local weather conditions must include sufficient visibility and ceilings for the desired/required weapons deliveries to be employed. Terrain must also be considered when selecting employment altitudes. More time may be available for target acquisition, but bombing accuracy with unguided munitions may be degraded.

(a) **Advantages of medium/high altitude tactics include:**

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

2. Lower fuel consumption and increased time on station.

3. Reduced navigation difficulties.

4. Improved formation control.

5. Improved mutual support.

6. Allows considerable maneuver airspace and allows aircrews to concentrate on mission tasks instead of terrain avoidance tasks.

7. Communications between aircrews and control agencies are less affected by terrain.

8. Reduces exposure to AAA and man-portable IR SAMs.

9. More flexibility in attack axis selection.

10. Easier timing of TOT.

11. Improved performance of guided weapons using steeper impact angle.

12. Improved LGB self-lasing options and targeting pod capture capability.

13. Increased ability to deconflict aircraft with altitude, in addition to timing and lateral deconfliction measures. Potential to use more aircraft within smaller lateral confines via an aircraft "stack."

(b) **Disadvantages of medium/high altitude tactics include:**

1. Enemy acquisition systems can detect the attack force at long range, allowing the enemy to prepare its air defenses.

2. Requires local air superiority.

3. May require high weather ceilings and good visibility when using laser guided or other weapons requiring visual target acquisition by the aircrew (may not be a limiting factor when the ground commander authorizes use of IAMs).

4. May make it difficult for the JTAC to visually acquire the aircraft.

5. Visual target acquisition can be more difficult from higher altitudes and slant ranges.

6. Greater potential for reduced accuracy of non-guided weapons attributed to wind effects, pipper placement during visual designations (size of pipper relative to target at high altitude), and increased aim-point errors due to increased slant range.

(c) **Ingress.** The higher altitude of the aircraft often makes receiving situation updates from extended ranges feasible. This enables the aircrew to build SA prior to entering the immediate target area. JTACs/FAC(A)s may route CAS aircraft to the target area via IPs, control points, geographic references(GEOREFs), dead reckoning (time, distance, and heading), or a combination of these techniques. JTACs/FAC(A)s should use caution to not send friendly aircraft into uncoordinated adjacent unit airspace or known areas of concentrated enemy air defense. Multiple attack flights can be deconflicted using vertical and horizontal separation.

(d) **CAS Aircraft Observation and Holding Patterns.** When possible, CAS aircraft should be given enough airspace to hold in an area of relatively low AAA activity that provides a good position to observe the target area. JTACs/FAC(A)s should not restrict attack aircraft to specific observation or holding patterns, but should specify the observation or holding area (HA) that will best accomplish the mission. Considerations for observation or HA and altitude selection include: artillery GTLs and maximum ordinate, adjacent unit operations, weather conditions such as sun position and clouds, terrain and threat locations and activity, and other attack aircraft either on station or inbound. Typical holding patterns include the following:

1. **Racetrack:** An oval holding pattern with straight legs of at least 10 miles in length and with standard-rate 180-degree turns on each end. Bomber aircraft may require holding between 10-40 miles from the target, with 20 nautical miles minimum for legs. This pattern can be flown either perpendicular or parallel to the target area. Attacking aircraft may use a perpendicular hold to increase visual SA and allow some sensor scans, while parallel holding (pointed at/going away from the target) is often used to lengthen the time for sensor scans on the inbound leg. JTAC/FAC(A)s should be aware that differing execution of holding patterns could place the aircraft outside allocated airspace, or decrease FMV connectivity. Specific holding instructions should be issued if needed for aircraft deconfliction, airspace constraints, or FMV coverage (if critical). Holding instructions, if needed, might be communicated as: "Hold 180 radial, 10-20 nautical miles, right-hand turns."

2. **Figure 8:** The same as the racetrack pattern except the turns at each end of the pattern are made toward the target area and are 230-degrees of turn instead of 180-degrees, and normally executed holding perpendicular to the target area.

3. **Wheel Orbit:** Circle around the designated target. Appropriate for nonlinear battlefields with pockets of enemy activity.

(e) **Attack. Types of Delivery:**

1. **Level Deliveries:** Used for guided and unguided free-fall weapons. Release points may have bomb ranges outside of visual range. Because of the long bomb ranges and weapons profiles, nose position may not be indicative of where weapons will impact.

2. **Dive Deliveries:** Used for guided, unguided, and forward firing ordnance, these deliveries use dive angles of 5 to 60 degrees. Most modern fighter aircraft delivery systems incorporate some type of continuously computed impact point display, which allows the aircrew to accurately deliver ordnance without having to fly predictable wings-level passes.

3. **Dive Toss:** These deliveries provide increased standoff by using aircraft systems to compute release points similar to loft deliveries. The target is designated in the weapon system's computer by the aircrew at an extended slant range with the aircraft in a dive. The weapon is then released as the aircraft's dive angle is decreased.

(3) **Low/Very Low Altitude Tactics.** Low/very low altitude tactics are flown below approximately 8,000 ft AGL. **Low altitude bombing** can be described as **bombing with the height of release between 500 and 8,000 ft AGL.** Very low altitude can be described as a height below 500 ft AGL. These tactics may be employed when threat system capabilities, weather conditions, or weapon delivery parameters preclude aircraft operating at higher altitudes.

(a) **Advantages of low/very low altitude tactics include:**

1. Decreases enemy acquisition systems ability to detect the attack force at long range, decreasing the enemy's time available to prepare its air defenses.

2. May be used when local air superiority has not been achieved.

3. May be used with low weather ceilings and poor visibility.

4. Degrades enemy ground control intercept radar coverage, denying intercept information to enemy fighters, and forcing enemy aircraft to rely on visual or onboard acquisition systems.

5. May improve target acquisition and accuracy of weapons delivery due to shorter slant ranges at low altitude.

6. May allow easier assessment of aircraft geometry relative to the target/friendlies during CAS TAC.

(b) **Disadvantages of low/very low altitude tactics include:**

1. Navigation is demanding and requires a high level of aircrew skill.

2. Terrain avoidance tasks and formation control become primary tasks, decreasing time to concentrate on mission tasks.

3. Observation of the target area, the marks, and hits from other aircraft are limited prior to the attack, which increases the difficulty of properly acquiring the target during the attack. This difficulty can be offset by a thorough enhanced target description, which requires more time coordinating and holding between attacks. Some observation of the target may be feasible through magnifying sensors or binoculars.

4. Higher fuel consumption and decreased time on station.

5. Terrain may reduce communications effectiveness between aircrews and control agencies, such as the JTAC due to LOS limitations.

6. Attack timing and geometry are more critical than in higher altitude tactics.

7. Exposes aircraft and aircrew to small arms, MANPADS, and AAA.

(c) **Ingress.** Aircrews and mission planners may employ support aircraft and other countermeasures to degrade threat system effectiveness. Aircrews, JTACs/FAC(A)s, 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. During simultaneous CAS with helicopter and FW aircraft, CAS aircrew must be under the control of the JTAC/FAC(A) to transit above or below the coordination altitude. Low altitude FW CAS CPs and IPs will likely require lateral deconfliction with helicopter HAs and BPs. Formations are used to complicate enemy radar resolution and improve lookout capability against enemy fighters. Aircrews plot, brief, and study the ingress routes to gain the maximum advantage from terrain masking. Entry should be delayed into a heavily defended target area until the aircrew has a clear understanding of the mission. The expected threat intensity and sophistication influence the selection of ingress tactics. **JTACs/FAC(A)s and aircrews tailor communications and control requirements to counter the threat.** Normally, control of CAS flights is handed over to the JTAC/FAC(A) at the control point. In a limited communications environment, scheduled missions may be the primary method used to limit the required communications. Proper planning increases the chances for mission success even if there is little or very difficult radio communications after the flight becomes airborne.

(d) **Attack.** During low/very low altitude attacks, many of the same considerations apply as in high/medium altitude attacks. However, aircrews will 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. The final run-in from the IP to the target is the most crucial phase of the CAS mission. Aircrew tasks intensify as the aircrew must follow a precise timing and attack profile. The terrain dictates the type of formation flown by the attack element. Figure III-24 illustrates the attack phase of a typical FW CAS mission.

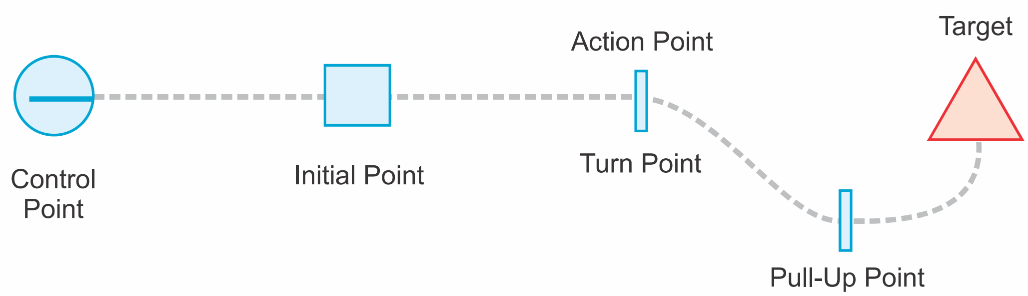
(e) **Types of Delivery:**

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

2. **Loft.** 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 pull-up. Once released, the weapon continues an upward trajectory while the aircrew executes follow-on

Fixed-Wing Low Altitude Close Air Support Attack Phase

Key Actions in a Fixed-Wing Close Air Support (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 control point to cross the initial point (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 joint terminal attack controller (JTAC).
    d. Distance/time to pull-up point (from TP or IP, as required).
    e. Pull-up angle (as applicable).
    f. Apex/roll-in altitude (as applicable).
    g. Release altitude (based on threat, friendly fires, and ordnance).
3. JTAC forward air controller (airborne) provides:
    a. Mark on target 30-45 seconds before time on target/time to target.
    b. Final corrections/directions, given concisely in cardinal direction and distance from the mark, to help the aircrew to find the target.
    c. Clearance to deliver ordnance.

Figure III-24. Fixed-Wing Low Altitude Close Air Support Attack Phase

tactics or egresses the target area. After the weapon reaches the apex of its trajectory, it follows a ballistic path to impact.

3. **Pop-Up.** 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 level or dive delivery.

4. **Dive Deliveries.** Used for both free fall and forward firing ordnance. These deliveries typically use dive angles of 5-to-45 degrees.

(4) **Combination Low/Very Low, Medium, and High Altitude.** Aircrews can **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.

b. **RW CAS Tactics**

(1) US Marine Corps attack helicopters operate as part of a MAGTF in general support or in direct support of a unit or operation for a specific period of time. With this in mind, this section identifies some of the TTP attack helicopter aircrews can use to perform CAS.

(2) US Army attack helicopter units support maneuver commanders as a subordinate maneuver unit. They are given mission type orders and execute these orders as a unit. US Army attack helicopter units can conduct attacks employing CAS TTP when

ARMY ROTARY-WING ATTACK OPERATIONS

US Army describes close combat attack (CCA) as a hasty or deliberate attack by Army aircraft providing air-to-ground fires for friendly units engaged in close combat as part of the Army combined arms team. Due to the close proximity of friendly forces, detailed integration is required. Due to capabilities of the aircraft and the enhanced situational awareness of the aircrews, terminal control from ground units or controllers is not necessary. CCA is not synonymous with close air support (CAS).

(For more information on Army rotary-wing CAS employment, see paragraph 16, "Rotary-Wing Close Air Support 5-line.")

The primary mission of US Army attack reconnaissance helicopter units are (1) reconnaissance, (2) security, (3) attack, and (4) movement to contact. Attack/reconnaissance units conduct two basic types of attack: CCA and interdiction attack. For further guidance on US Army helicopter operations and associated tactics, techniques, and procedures for CCA, refer to Field Manual (FM) 3-04.126, *Attack Reconnaissance Helicopter Operations*. FM 3-04.126 presents the CAS check-in brief and CAS brief, but there is no mention of the remaining CAS information to include the distinction on types of control, definition of troops in contact, risk, estimates, etc.

operating in support of other forces. However, their proficiency will be limited unless they have been trained as part of SOF or have been coordinated in advance.

(3) **Flight Composition.** Unlike FW aircraft, RW sections or flights will often be a mix of aircraft types. For example, an Army flight might consist of an AH-64 and an OH-58, while in the Marine Corps, a mixed section will consist of an AH-1 and a UH-1. Mixed flights provide the RW CAS element with the most flexible mix of sensors, communications capabilities, maneuverability, firepower, and mutual support.

(4) **Operating Altitudes.** The following are altitude ranges for RW aircraft:

(a) **High.** Above 3,000 ft AGL.

(b) **Medium.** 500-to-3,000 ft AGL.

(c) **Low.** Below 500 ft AGL.

(5) **Launch and Departure Procedures.** The appropriate controlling agency issues launch orders through the proper C2 or fire support agency. Attack helicopters can be launched and moved to HAs, forward assembly areas, forward arming and refueling points (FARPs), or directly into an attack or support-by-fire position, depending on mission or current situation.

(6) **En Route Communications.** CAS planners must consider the threat environment and RW CAS TTP in use, when planning for communications connectivity and support. Maintaining communications with RW CAS platforms is often difficult because their operating altitudes can hinder LOS connectivity. Every attempt should be made to overcome these shortcomings with an airborne C2 asset, ground relay nodes, tethered array, or some other method of extending low-altitude communications coverage in order to maintain C2 of RW assets after launch.

(7) **En Route Tactics**

(a) **Purpose.** Ideally, en route tactics (route, altitude, and airspeed selection, terrain flight profile, and formations) allow attack helicopter aircrews to avoid concentrations of enemy air defenses, prevent early acquisition, avoid detection, or allow the attack helicopters to remain outside of the effective range of certain threat systems.

(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, probable point of enemy contact, or areas with a high IR SAM threat, they fly lower and with increased caution to move undetected by the enemy. Aircrews use terrain flight to deny/degrade the enemy's ability to detect or locate the flight visually, optically, or electronically. When flying terrain flight profiles, aircrews may maneuver laterally within a corridor or maneuver area compatible with the ground scheme of maneuver and assigned route structures. Within the corridor, aircrews can use an unpredictable path to avoid detection by the enemy. En route terrain flight profiles fall into three categories: low-level, contour, and nap-of-the-earth (NOE).

1. **Low Level.** Conduct low-level flight at a constant altitude (normally 100-200 ft AGL) and airspeed. Low-level flight reduces or avoids enemy detection or observation.

2. **Contour. Contour flight conforms to the contour of the earth or vegetation to conceal aircraft from enemy observation or detection.** Aircrews use contour flight until reaching a higher threat area. Contour flight is normally conducted from 50-100 ft AGL.

3. **NOE.** 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 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.

4. **Dense Small Arms and Rocket-Propelled Grenade (RPG) Threat.** In an environment where small arms and RPGs are the predominant threat, attack helicopter aircrews will normally elevate in order to stay out of the effective range of the weapons systems, usually operating at medium altitude. Specific altitudes selected will depend on the mission en route. For example, if the mission en route is to conduct visual reconnaissance, the helicopters will select the lowest altitude that will allow them to effectively use their sensors while avoiding the heart of the small-arms threat envelope. When transiting urban areas attack helicopters may elect to transit at roof-top level to minimize exposure time. In general, attack helicopters will avoid urban areas unless they are conducting an attack

5. **Day Versus Night.** Altitudes will normally vary for the same area of operations from day to night time, and will depend heavily on threat, weather, and terrain. In open desert, helicopters will normally decrease their altitude as lighting conditions decay, in order to maintain visual reference with the ground. Over urban areas, attack helicopters can often operate more safely than during the daytime, but will elevate high enough to avoid being belly-lit by cultural lighting, usually operating in the 1,500-3,000 ft AGL block.

(c) **Ingress Tactics.** Ingress tactics apply from arrival at the release point or HA until the target attack phase begins at the BP.

1. **Attack Helicopter Control Points.** In addition to normal CAS control points, attack helicopter aircrews can use special attack helicopter control points.

2. RW CAS can be performed with or without HAs or BPs. JTACs and aircrews select HAs and BPs that are tactically sound, support the scheme of maneuver, and are coordinated with other supporting arms.

a. **HAs.** HAs may be established throughout the battlefield to be used by 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.

b. **BPs.** BPs are maneuvering areas containing firing points (FPs) 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.

2. **Techniques of Movement.** Due to proximity to the threat, aircrews use terrain flight to move during ingress to the BP. If aircrews are close to friendly artillery and mortars, they use terrain flight in conjunction with ACMs to deconflict with artillery and mortar trajectories. Particularly when conducting terrain flight, helicopter movement must be coordinated with the applicable FC/FSCC. Aircrews use three techniques of movement: traveling, traveling overwatch, and bounding overwatch (see Figure III-25).

a. **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.

b. **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 sub-elements. The main element maintains continuous forward 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.

c. **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.

Movement Techniques

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

Figure III-25. Movement Techniques

3. **Communications and Control.** Flexibility allows a variety of communication and control procedures. However, terrain flight and techniques of movement may restrict the JTAC's/FAC(A)'s ability to communicate with low flying aircraft. Typically, communications may not be desirable during the ingress phase. To preserve operations security, aircrews can land to receive face-to-face mission briefs and mission-essential information from the supported commander or JTAC/FAC(A) before leaving the HA. An airborne relay may be used to maintain communications.

(8) **Attack Phase (Within the BP).** The attack phase is the most important phase of the attack helicopter mission. Figure III-26 illustrates an example of RW tactics during CAS attacks.

(a) **Control.** Once the aircrew reaches the BP, the JTAC/FAC(A) or mission commander issues final instructions to the flight. Aircrews select individual FPs and remain masked while awaiting the TOT/TTT or the order to attack. See paragraph 16, "Rotary Wing Close Air Support 5-line."

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

1. **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 or when standing off in a safe area. To prevent being targeted by enemy weapons, aircrews maintain the hovering fire position only for **short periods,** and

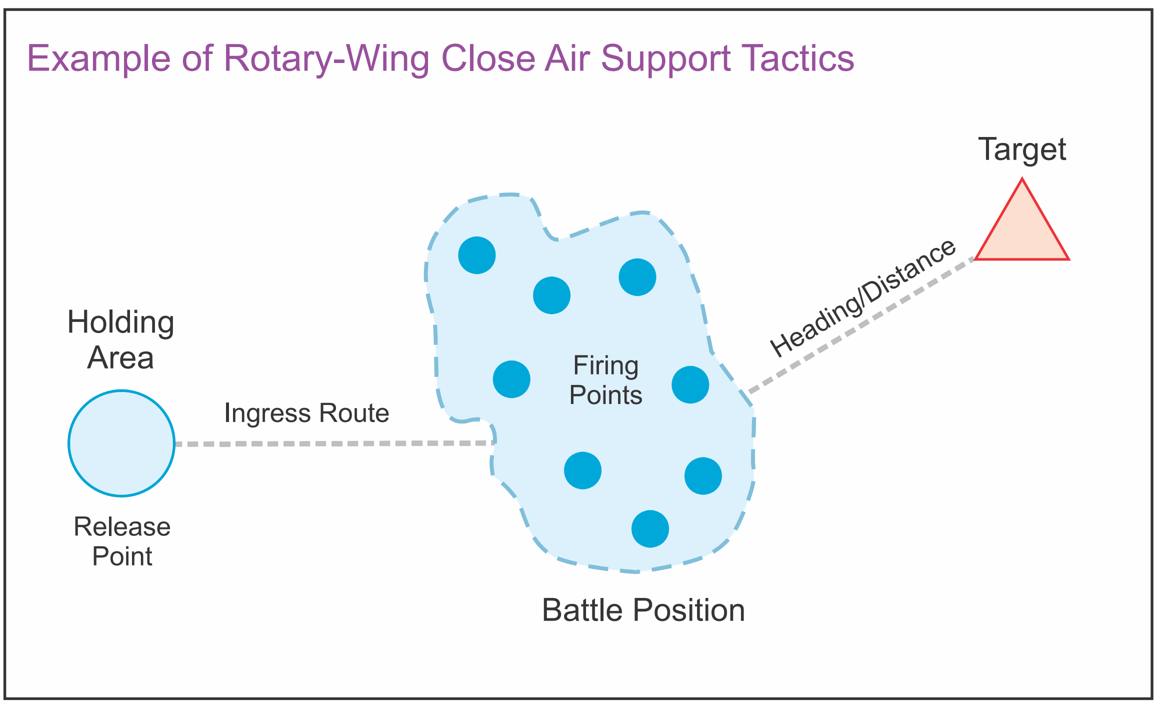


Figure III-26. Example of Rotary-Wing Close Air Support Tactics

deliver indirect hovering fire **hidden from the enemy** by terrain when able. After delivering hovering fire, aircrews **remask or displace.** Hovering fire is the most effective profile for delivering precision guided munitions. Hovering fire may reduce the accuracy of unguided ordnance (rockets, cannon/gun fire) because the aircraft can be less stable in a hover. Often, a wingman will suppress the target with rocket and gunfire while the tactical lead fires PGMs to reduce the vulnerability of the flight.

2. **Running Fire. Running fire is performed when the aircraft is in level, forward flight.** Forward flight may add stability to the aircraft and improve the accuracy of unguided ordnance. Running fire may reduce an aircrew's vulnerability to enemy air defenses by providing a moving target and by producing a smaller signature than a hover would, because of less dust and debris. While performing running fire, aircrews can use direct and IDF techniques. Aircrews deliver direct fire when they have an unobstructed view of the target, and IDF when they cannot see the target.

3. **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.** Using diving fire the aircrew can remain above or outside the threat envelope. Diving fire is often employed by attack helicopters operating in an overhead position. The overhead position allows the aircrew to maintain high SA, look down into urban settings, maintain a constant weapons solution, and deliver more accurate fires. The overhead pattern does leave the attack helicopters continuously exposed to enemy fire. The altitude of an overhead pattern will reduce vulnerability to small arms and RPGs, but increases tracking time and reduces background clutter for an IR SAM shot. Risk versus benefit must always be weighed by the aircrews when considering the overhead pattern.

(9) **Disengagement and Egress.** Following actions on the objective area or when the attack helicopters' time on station is complete, the flight will conduct a check out and egress via planned or assigned routing. Tactical considerations for the egress and return to force in terms of airspeed, altitude, formation, and TTP are the same as for the inbound en route phase. RW attack assets may use a FARP to refuel and rearm, extending their ability to provide support to the troops on the ground. When complete with the mission, the attack helicopter aircrew will make every attempt to provide BDA and a mission report (MISREP) via the AO/ALO's C2 system. The connectivity plan for the low-altitude block will enhance the flow of information from attack helicopters to decision makers allowing for timely decisions regarding follow on sorties and support required, as well as vital information flow on the enemy and friendly force situations.

For an example of RW missions, see Appendix E, "Examples of Close Air Support Missions," Example 7.

16. Rotary-Wing Close Air Support 5-Line

a. The RW CAS 5-line brief (Figure III-27) is a "friendly-centric" brief that is used to quickly orient RW CAS assets to a target. It must be noted that the format of the RW CAS 5-line is the same as an Army attack aviation CCA brief, and the SOF call for fire used with SOF RW assets or AC-130 gunships. The difference between the RW CAS 5-line and other

Rotary-Wing Close Air Support 5-Line Brief
Do not transmit line numbers. Units of measure are standard unless briefed. Restrictions are mandatory readback (*). JTAC may request additional readback.
1. Observer/Warning Order/Game plan "(Aircraft Call Sign) ____________, (JTAC Call Sign) ______________, 5-line, Type (1, 2, or 3) C, MOA (BOC or BOT), (Ordnance Requested)"
2. Friendly Location/Mark "My position_____________ , marked by __________________" (TRP, Grid, etc.) (VS-17, Beacon, IR Strobe, etc.)
3. Target location "Target location, ___________________________" (Bearing [magnetic] and Range [meters], TRP, Grid, etc.)
4. Target Description/Mark "________, marked by_____________" (Target Description) (IR sparkle, Tracer, etc.)
5. Remarks/Restrictions *Final Attack Headings (FAHs) LTL/PTL Surface-to-air threat, location and type of SEAD *ACAs *Danger Close and initials Additional calls requested Additional remarks (GTL, weather, hazards, friendly mark) *TOT/TTT
The RW CAS 5-line should be passed as one transmission. If the restrictions portion is lengthy, it may be a separate transmission.

Figure III-27. Rotary-Wing Close Air Support 5-Line Brief

5-line briefs is that the RW CAS 5-line is still considered a CAS brief, and **transmission of the brief itself does not constitute clearance to fire.** This shall be made clear by a type of control and method of attack clearly stated in the game plan, prior to the 5-line. **JTACs must be aware that when working with Army or SOF RW assets, they may not be familiar with the restrictions of the RW CAS 5-line, and the restriction: "At my command," should be added to the end of the brief to allow the JTAC to control the timing of fires.**

b. By its nature as a friendly-centric brief, the 5-line assumes the RW assets have sufficient SA to the friendlies to locate them and find the target, using them as a frame of reference. If this SA does not exist, a target-centric CAS brief should be used. An example of this is an immediate RW CAS element checking into an unfamiliar operational area with no clearly defined FLOT.

(1) **Warning Order.** The warning order informs the attacking aircrew they are about to receive an attack brief. For RW CAS 5-lines, this warning order should contain the game plan information found in a standard attack brief, type of control, and method of attack, and may include ordnance requested. Interval will generally not apply to a 5-line.

(2) **Friendly Location/Position Marking.** JTAC should pass the friendly observer location and how it is marked if applicable. JTACs should avoid passing friendly grids here, instead using named locations or GEOREFs.

(3) **Target Location.** JTAC passes the target location using any or all of the following information: direction and distance from Line 2; a TRP, GEOREF, or GRG location (or an offset from a TRP, GEOREF, or GRG location); or coordinates. Generally, since aircrew executing a 5-line is "heads-out" looking for the target, coordinates are not the ideal method of target location compared to an offset from a known point.

(4) **Target Description/Marked By**

(a) Target description should be specific enough for the aircrew to find and identify the target, yet concise and brief. Further details may be passed as the aircrew is ingressing. Type, number, orientation, and degree of protection is a good format.

(b) If the target is marked, how it is marked should also be passed.

(5) **Remarks**

(a) The remarks section should include other information necessary for a safe and effective attack. Some items may include:

1. Final attack headings.

2. Surface-to-air threat.

3. SEAD plan.

4. Illumination plan.

5. Gun target line.

6. Laser target line.

7. ACAs.

8. Hazards to flight.

9. Weather in the target area.

10. Danger close.

11. Timing coordination.

(b) RW CAS 5-line briefs assume that the CAS aircraft will push immediately after the receipt of the mission and readbacks. JTACs may use a TOT, but should make this clear when reading the restrictions portion of the brief, to prevent the aircraft from pushing prematurely.

(6) Readbacks for a RW CAS 5-line should include all restrictions.

(7) RW CAS 5-line example with CAS-capable aircrew:

JTAC: "Deuce 31, Broadsword 11, 5-line, Type 2 control, BOT, rockets and guns, my position is checkpoint 295 marked by IR strobe, northwest 200, single technical vehicle marked by IR SPARKLE, make all attacks over my right shoulder, left pull, keep all effects of fires west of MSR Clovis."

A/C: "Deuce 31 copies over your right shoulder, left pull, keep all effects of fires west of MSR Clovis, pushing."

JTAC: "Deuce 31, CONTINUE."

A/C: "Deuce 31 and flight, VISUAL, TALLY, IN."

JTAC: "Deuce 31 and flight, CLEARED HOT."

17. Planning for Bomber Close Air Support

a. **En Route.** Bomber en route times can extend upwards of 12 hours before arriving in theater. Depending on communications equipment, aircraft could arrive on station with threat and situation information that is not current. Voice satellite may not be available for the ground party, but should be used if available. If beyond LOS communications equipment is available, SA regarding ongoing engagements may be passed well before a bomber arrives on station to support ground forces. Every attempt should be made to use secure communications.

b. **Pre-Attack**

(1) **Station Time.** Bombers may remain on station 8 hours or more, depending on air refueling capability in the area and transit time.

(2) **Data Link.** The JAOC may relay information from the JTAC/FAC(A) to the en route bomber via data link. The B-52 and B-1 currently use Combat Track II that may provide access to Link 16 networks via Joint Range Extension Applications Protocol for beyond line-of-sight (BLOS) communications.

(3) **Orbit.** B-1s typically operate in the mid to high 20s while B-2s or B-52s can operate up into the high 30s and even low 40s. Bombers will typically look at the target or at least verify the target location/coordinates passed by the JTAC/FAC(A) using their onboard targeting sensors (radar and/or ATP) from distances as far as 40 nautical miles and as near as 5 nautical miles from the target area, depending on optimum sensor parameters. The B-1 and B-52 use advanced electro-optics (Sniper and Litening ATP) and are able to observe general target areas from this distance, but may require LSS, IR pointer, or Rover to positively identity targets once they turn inbound. The JTAC/FAC(A) should not unnecessarily restrict the orbit location as IAMs may not require a traditional track to the target. Orbit locations should be selected based on proximity to threats and friendly locations or in the interest of maintaining the element of surprise and avoiding aircraft visual/audible detection by the enemy, based on ground forces assessment and recommendation. Consideration must be given to aircraft jet engine noise abatement (day and night) and visual observation of aircraft or contrails if ground forces are trying to

maintain the element of surprise. Generally, bombers avoiding the use of afterburner will not be heard and very difficult to visually detect outside 5 nautical miles from the target area when above 20,000 ft MSL. Depending on the temperature and the relative humidity at altitude, bombers flying typically higher than 27,000 ft are susceptible to producing contrails, which will highlight the flight path of the bomber. Bombers may also have the capability to neutralize threats while en route to the CAS orbit. See Figure III-28.

c. **Attack Phase**

(1) **Target Considerations.** Bombers traditionally employ weapons on given coordinates. Coordinate passage does not provide positive ID of the actual target and careful consideration should be given with respect to the target environment, location of friendlies, and the type of control being employed. Targeting pod usage with video feeds can provide positive target ID in these instances. Both the B-52 and B-1 can generate coordinates using targeting pods, but should provide anticipated accuracy categorization upon initial check-in with JTACs/FAC(A)s.

(a) **Talk-On.** Bombers can self-generate target coordinates and elevation when the target signature is radar or EO/IR significant. JTAC/FAC(A) cueing is crucial for either bomber to locate typical CAS targets.

(b) **CAS in Urban Environment.** Because bombers have a larger turn radius and typically employ at higher altitudes, positive ID of targets in urban environments will be more challenging. The effects of "urban canyons" on target identification can be minimized from higher altitudes and higher lookdown angles. When using IAMs, accurate coordinate collection in urban environments is critical. Maximum use of LSS, IR pointer, and VDL is warranted in these urban settings. In the absence of VDL, the talk-on in such an environment (radar and/or targeting pod) may be extensive. In all cases, careful attention

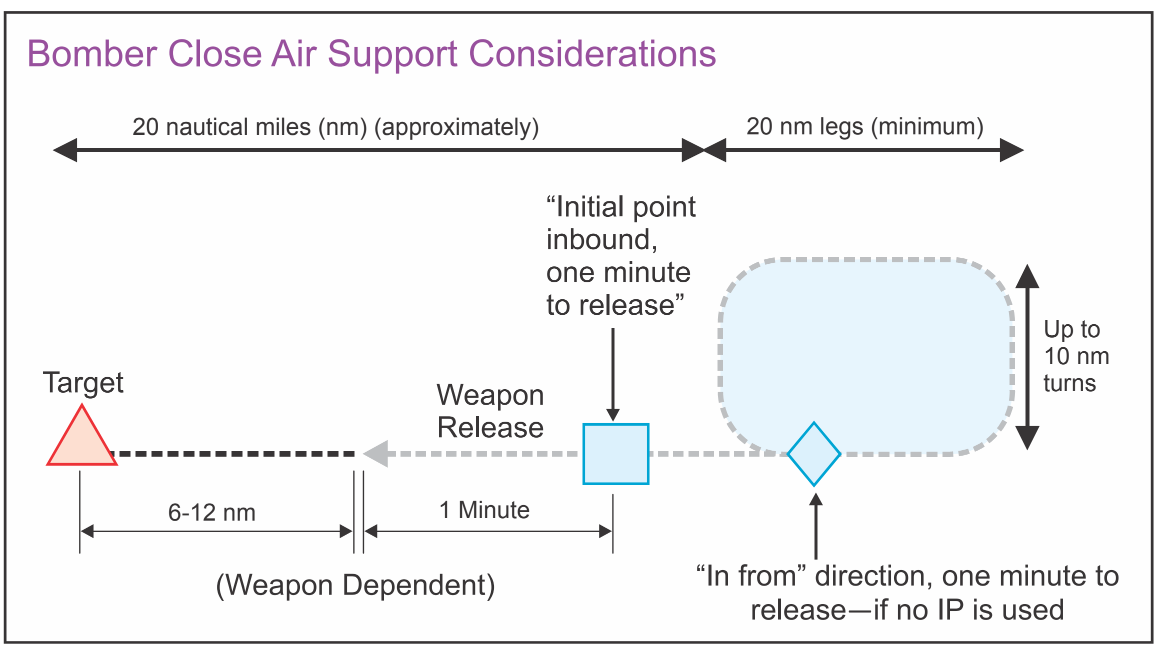


Figure III-28. Bomber Close Air Support Considerations

must be paid to the correct coordinates being passed. TTP for designation and marking devices should be carefully employed to avoid erroneous coordinate collection or grazing unintended targets with an IR pointer or laser spot.

(c) Because of weapon release/launch altitudes, the bomber will normally have a greater standoff range from the target than fighter aircraft. Typical IAM launch acceptability region, i.e., release points, can extend 6-12 nautical miles from the target. Bombers can give a splash time prior to release. This time may vary by plus-or-minus 10 seconds, depending on the weapon type and programmed impact parameters. Communication problems are possible due to terrain and distance from the target. The mission lead or mission commander in the bomber formation will deconflict aircraft and weapons flight paths and assign targets to a particular bomber if multiple targets are to be attacked simultaneously. The mission lead or mission commander will pass deconfliction measures to the JTAC/FAC(A).

(d) **Direct LOS Communications.** Non-pod equipped bombers cannot attack a target with visual cues only, but crew or formation can accept map talk-ons and multiple CAS briefs. The preferred coordinate format is DD-MM.MMMM (degrees decimal minutes). MGRS can be used but additional time from CAS brief receipt to readback may be necessary for coordinate conversion.

Note: The B-1 can accept MGRS and latitude/longitude equally without taking time to convert coordinates.

(2) **Target Marking**

(a) The preferred technique of target marking is via lasing if required/available. Smoke and flares may be very useful in armed overwatch or convoy support and/or initial marking of friendly position if situation warrants.

(b) Crews will never place radar crosshairs or targeting pod on friendly locations while in bomb mode to avoid potential friendly fire incidents.

(3) **Ordnance Employment**

(a) The bomber has the ability to attack several desired points of impact on a single pass using IAMs. Each desired point of impact could be attacked with different ordnance.

(b) The bomber can employ a wide range of weapons per pass, in large numbers if desired, or they can make many passes employing smaller amounts per pass. Bomber crews are trained to weaponeer targets real-time with tabbed data. The JTAC/FAC(A) should pass the desired effects, target area size and true axis, or cardinal direction (if applicable), and composition in the CAS brief remarks. If the JTAC/FAC(A) passes the target centroid (i.e., desired mean point of impact, coordinates for area targets), the crew will build a weapon pattern around this point. The aircrew will confirm that the effects of the selected weapons pattern do not violate risk-estimate distances.

(4) Expect level deliveries for all bomber weapon releases.

d. **Post-Attack Phase**

(1) Reattack times can range from as short as 5 minutes to as long as 20 minutes, depending on the complexity of the reattack (weapon reassignments, weapons system troubleshooting, fire correction/adjustment), threat environment, and quantity/type of weapons employed.

(2) Targeting-pod equipped bombers can provide extensive BDA due to their ability to loiter over the target area, depending upon the threat environment.

For an example of a bomber mission, see Appendix E, "Examples of Close Air Support Missions," Example 6.

18. Planning for Unmanned Aircraft Systems Close Air Support

This section identifies capabilities, planning considerations, and tactics used by UASs to support and conduct CAS operations.

a. **UAS capabilities** vary between different platforms and need to be known for proper employment. Many newer UASs have the capability to be, or already are, armed and can provide extremely accurate fires with laser-guided and GPS-aided weapons. The current remote video terminals used by ground forces allow the UAS FMV to be viewed directly by ground forces.

(1) UAS capabilities may include:

(a) **EO.** Permits color identification; limited utility at night with illuminated/lighted targets.

(b) **IR.** Allows for day or night working in the IR spectrum and allows for some or limited visibility through dust and smoke. (Note: thermal crossover, clouds, and thermal blooming in the target area will degrade performance of IR.)

(c) Near-IR passive night optics and low-light television cameras. Work the same spectrum as NVGs.

(d) **LTD.** Marks for LSTs or provides terminal guidance of laser-guided ordnance; desirable for UASs to have the ability to change LTD PRF codes in flight. (Note: considerations for airframe sensor masking leading to LTD termination can become an issue depending on flight profiles and UA type.)

(e) **IR Pointer.** Permits nighttime marking of targets for NVD-capable platforms or personnel.

(f) **Synthetic Aperture Radar.** Provides detailed pictures of radar significant objects and geo-features, regardless of weather.

(g) **Ground Moving Target Indicator.** Allows for automatic tracking/cueing of sensors onto moving targets.

(h) Chemical, biological, radiological, nuclear, and enhanced conventional weapons detection.

(i) Laser-guided weapons (high off-boresight capability with Hellfire) and GPS-aided munitions.

(j) Increased communications connectivity (possibly including data links) and reachback capability.

(k) Capability to carry various signals intelligence or other pods that can improve overall support to ground units.

(2) **UAS Planning Considerations.** UASs, either FW or RW, operate using similar CAS procedures to manned aircraft, to include airborne laser procedures. There are some unique considerations that need to be addressed when utilizing UASs.

(a) UASs should follow similar procedures given by the JTAC/FAC(A) to manned aircraft, with exceptions made for their unmanned nature, e.g., inability to see and avoid other air traffic.

(b) Communications capabilities/detailed plan for no radio.

(c) Lost link procedures and UAS contingency routes.

(d) Control at the lowest tactical level or at the command level best suited to exploit the UAS FMV, sensors, imagery, communications, and weapons payload capabilities.

(e) Difficult to retask certain UAS in flight over large distances due to low transit airspeeds.

(f) UASs require detailed integration and deconfliction for operations and airspace. Coordination with higher and adjacent units must include UAS operating areas and altitudes. For further guidance on airspace considerations, see JP 3-52, *Joint Airspace Control*.

(g) UASs must adhere to all laser restrictions.

(h) When being supported by armed UA, the required attack profiles or orbits needed to launch weapons have to be planned for to include the deconfliction with other aircraft in the area, in the same manner as any other airborne weapons delivering platform.

(i) A UAS with radio relay payloads in the UHF and VHF frequency range can act as a low-flying, surrogate satellite. This capability allows ground forces to communicate in an urban environment or mountainous terrain, over long distances, using standard man-portable radios.

(j) Weather is a major consideration for UAS flight operations, particularly the launch and recovery. Sensor degradation may occur in less than optimal weather conditions.

(k) UASs that fly low and have a large visual signature or a loud engine noise will alert enemy forces, or may give away friendly positions. Atmospheric conditions must be considered in a UA's flight profile to best utilize the aircraft for its given mission.

(3) **Armed UAS Tactics.** UAS flight crews use either the RW CAS 5-line or the CAS brief (9-line) check-in format, but the standard control points and IP matrix used by current high performance manned strike/fighter aircraft are usually too far away to be of use to an armed UA due to their slow speed (60-250 knots). The UA will generally orbit over the target area for weapons delivery, using the following flight profiles:

(a) Figure III-29 depicts a "wheel" orbit profile used when there is no restriction or required FAH and terrain features or urban development do not mask the target. Orbit size

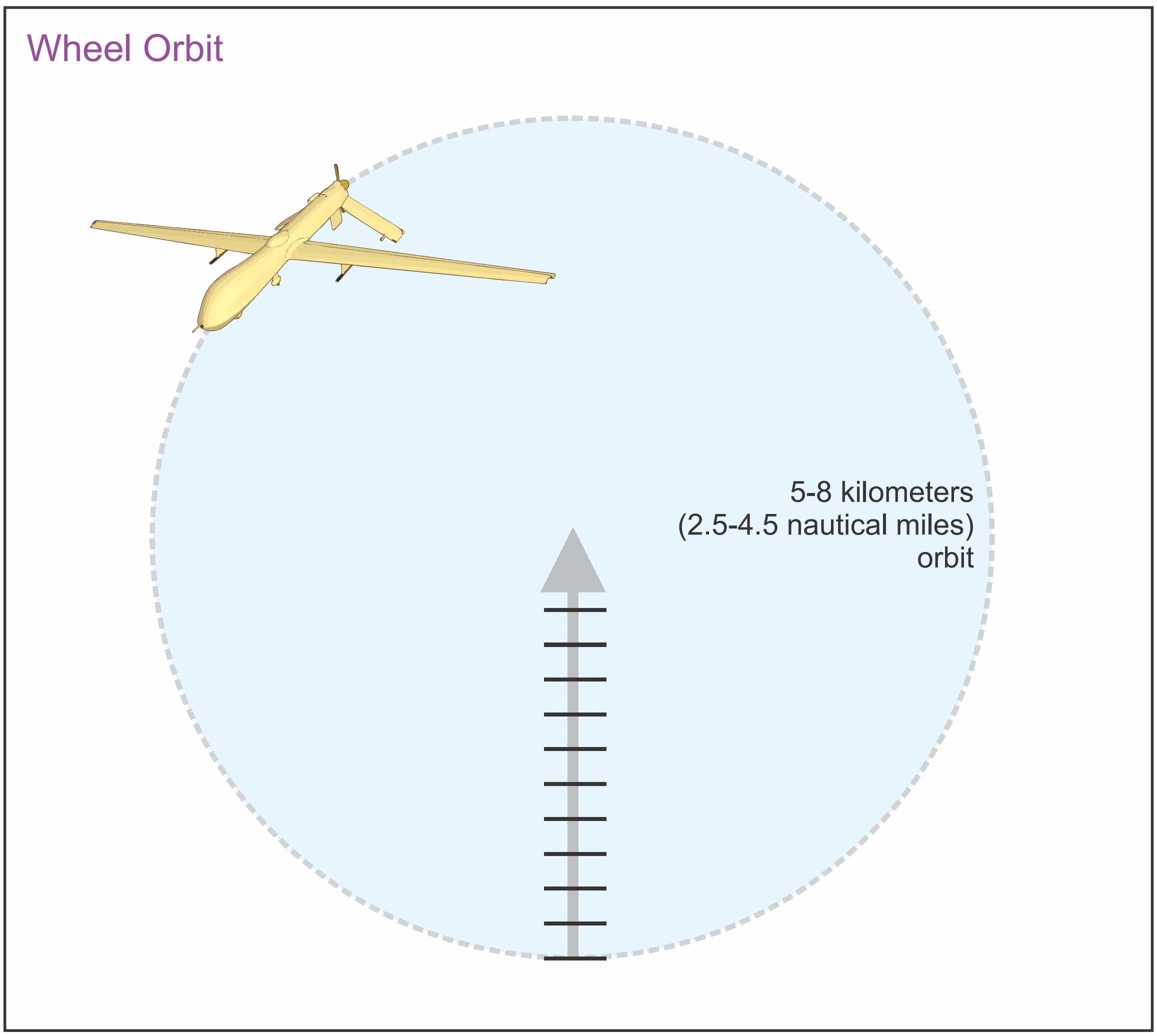


Figure III-29. Wheel Orbit

will vary based on ordnance, sensor capability, and target, but a wheel orbit is typically between 5 km (2.5 nautical miles) and 8 km (4.5 nautical miles) ground range around the target. The orbit distance should allow the UA to maintain PID of the target and remain in position to quickly achieve attack parameters. If terrain or urban development is masking the target during portions of the orbit, the UAS pilot may off-set to minimize masking.

(b) The "figure-8" track depicted in Figure III-30 and the "racetrack" pattern depicted in Figure III-31 may be used when restrictions to FAHs are required for airspace deconfliction purposes or other considerations. These restrictions include friendly positions, collateral damage concerns, terrain/urban development, or if cluttered or congested airspace precludes UAS CAS operations.

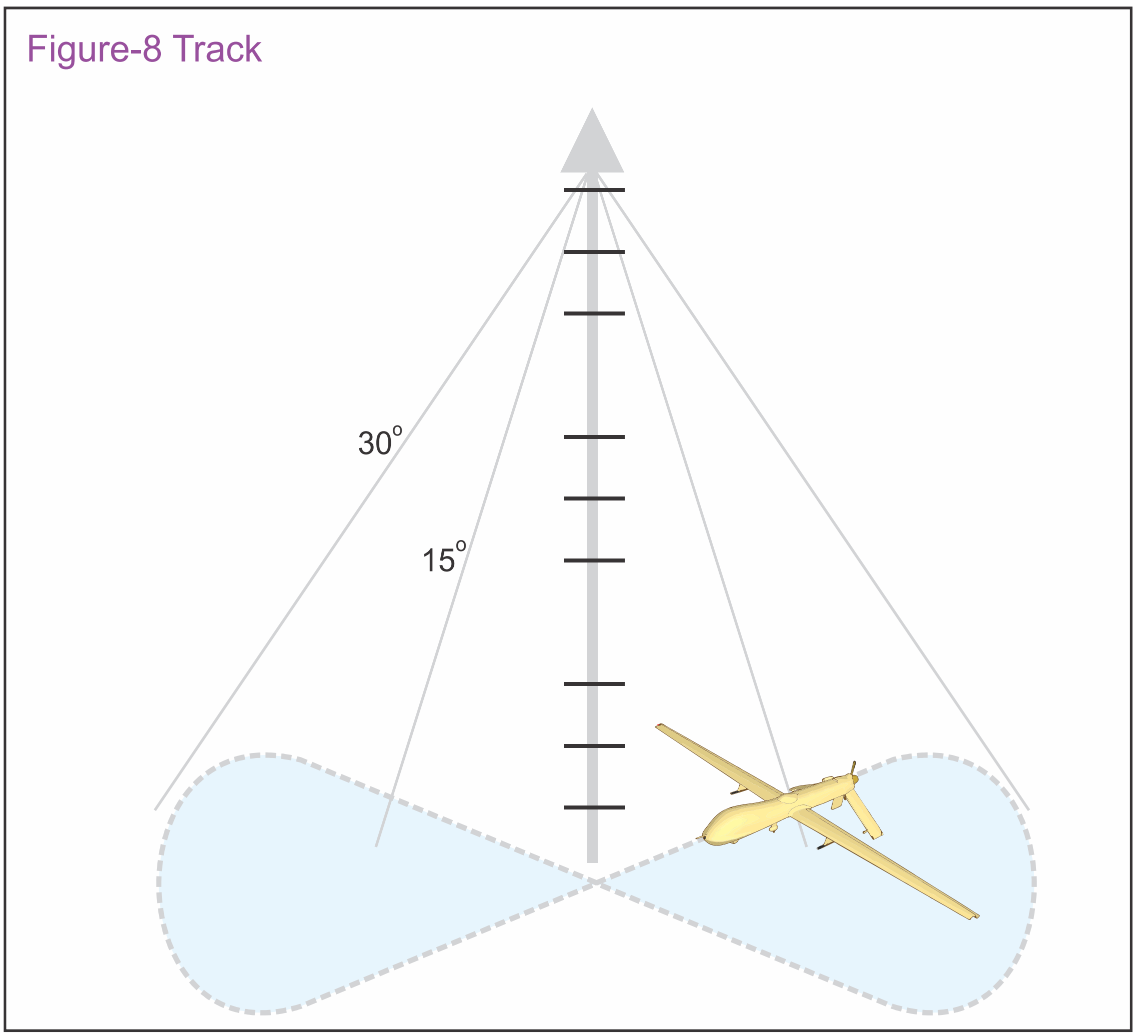


Figure III-30. Figure-8 Track

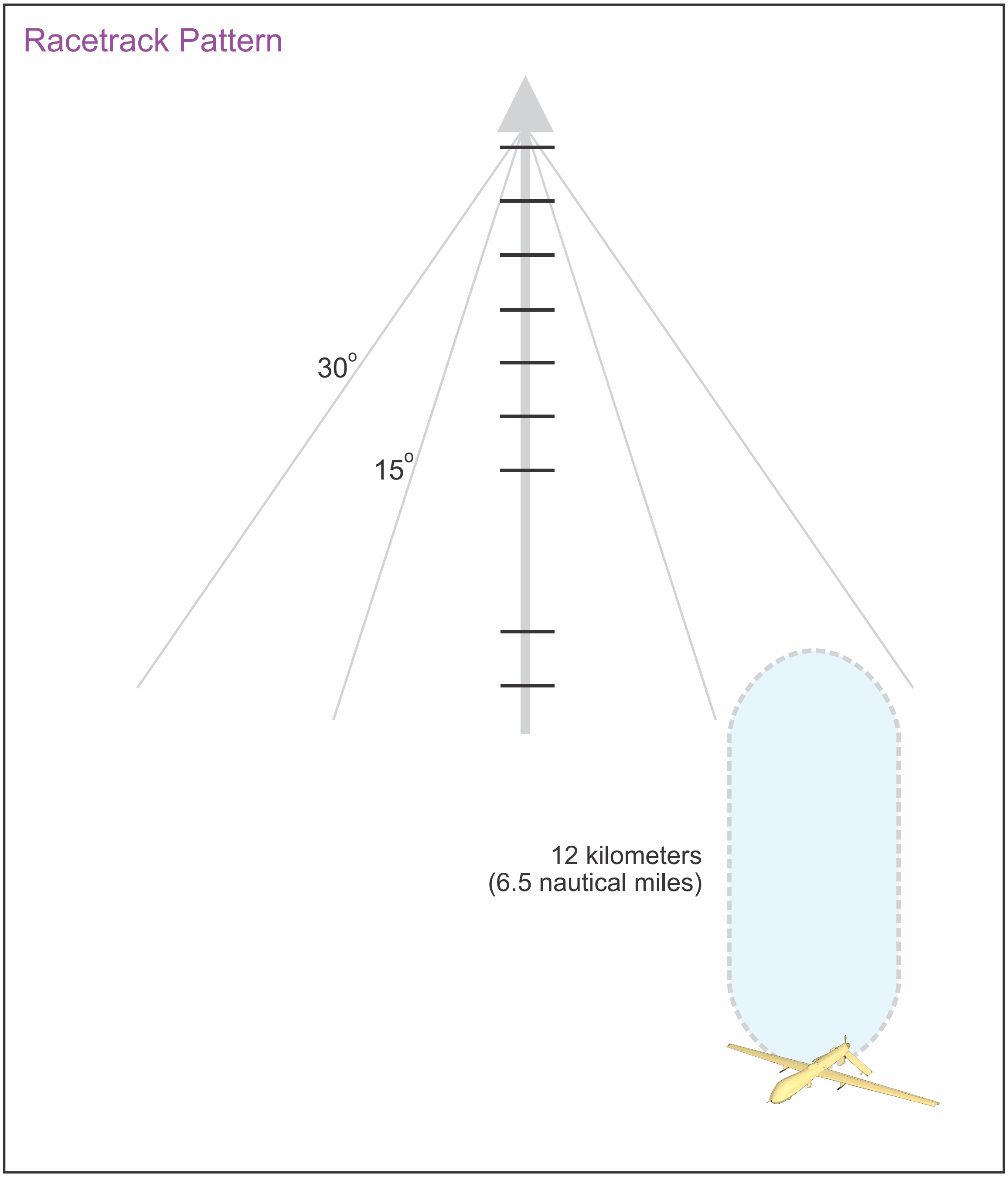


Figure III-31. Racetrack Pattern

9. Planning for Special Operations Forces Gunship Close Air Support and Integration with Other Strike Aircraft

The SOF gunship is a uniquely capable CAS platform. Due to the precision fires, control system and sensor capabilities, ground SA, and flight profile the SOF gunship does not usually require a type of control, "cleared hot," "cleared to engage," or a JTAC/FAC(A) to control their fires. The SOF gunship uses the call for fire in Figure III-32 as its standard format, but will accept a CAS brief for PGM engagements (AC-130W) or when pre-coordinated for gun engagements. If JTAC/FAC(A) is on scene, the SOF gunship will work

Special Operations Forces Gunship Call for Fire

SPECIAL OPERATIONS FORCES GUNSHIP CALL FOR FIRE

1. Observer/Warning Order: "__________ , this is __________,
(aircraft C/S) *(observer C/S)*
Fire Mission, Over."

2. Friendly Location/Mark: "My position ________________
(TRP, grid, etc.)
Marked by _______________________________________, Over."
(strobe, beacon, IR Strobe, etc.)

3. Target Location: "____."
(magnetic bearing and range [meters], TRP, grid, etc.)

4. Target Description/Mark: "Marked by________________, Over."
(target description) *(IR pointer, tracer, etc.)*

5. Remarks: "____."
(threats, danger close clearance, restrictions, at my command, etc.)

<u>As Required</u>

1. Clearance: Transmission of the fire mission is clearance to fire (unless Danger Close). For closer fire, the ground force commander must accept responsibility for increased risk. State "Cleared Danger Close" (with commander's initials) on line 5. This clearance may be preplanned.
2. At my command: For positive control of a gunship, state "At My Command" on line 5. The gunship will call "Ready to Fire" when ready.

Figure III-32. Special Operations Forces Gunship Call for Fire

directly with them. This section covers the TTP used by ground maneuver units and the SOF gunship aircrews.

a. **SOF Gunship En Route Tactics.** Commanders should adjust these procedures as the combat situation develops.

(1) **Sensor Alignment/Gun Tweak.** The SOF gunship should complete airborne sensor alignment and gun tweak (test fire) procedures prior to any mission. Only under

extreme circumstances will a mission be attempted without performing a sensor alignment/gun tweak. Planners will normally allot 30 minutes for sensor alignment/gun tweak.

(2) **Ingress Tactics.** The main consideration in selecting en route tactics is the avoidance of enemy detection and fires. SOF gunship crews conduct an extensive threat assessment using all available intelligence, 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.

(3) **Orbiting.** If no preplanned targets exist, the aircrew will normally proceed to a designated orbit area and contact the ground party (JTAC, FSO, FIST, etc.) to report that it is on station and awaiting tasking.

(4) **Coordination.** The SOF gunship aircrew will make every effort to establish radio contact while en route to speed acquisition of the tactical situation and authenticate the JTAC/FAC(A) or ground party if no JTAC/FAC(A) is on scene. If possible, the ground tactical plan products should be sent to the gunship crews prior to the preflight mission briefs or en route to the orbit location at a minimum.

(5) **SOF Gunship Call for Fire.** SOF gunship aircrews use the SOF gunship call for fire (see Figures III-32 and III-33). In addition to the standard briefing items, the following items are mandatory for SOF gunships: a detailed threat description, marking of friendly locations, identifiable ground features, and the ground commander's willingness to accept danger close. Because the SOF gunship is capable of extended loiter, SOF gunship crews can work a series of targets with a single ground party. In these cases, the call for fire 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.

b. **Attack Phase**

(1) **Capabilities.** The SOF gunship can provide accurate fire support to ground units for extended periods during the hours of darkness. It uses multiple sensors to maintain SA on ground scheme of maneuver. The -H and -U variants have "through the weather" engagement capability.

(2) **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 that may be used to assist in locating friendly forces. The SOF gunship crew will maintain radio contact with the ground forces at all times during firing.

(3) **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:

Adjusting Special Operations Forces Gunship Fire

- If significant miss distance or wrong target, adjust round impact by giving range (meters) and cardinal direction (north, south, east, west).
- Marking/confirming targets can also be accomplished using the laser pointer (Sparkle).
- To move Sparkle, say “MOVE SPARKLE 300 METERS WEST” or “ROLL SPARKLE 100 METERS EAST”.
- Once Sparkle is over target, say “FREEZE SPARKLE” (if you say “CEASE SPARKLE,” the gunship will turn it off).

Don’ts

1. Do not ask the gunship to identify colors at night.
2. Do not reference clock positions.
3. Do not pass run-in headings/no-fire headings (give no-fire areas and friendly troop positions only).
4. Do not correct left/right or short/long.

Figure III-33. Adjusting Special Operations Forces Gunship Fire

(a) **Terrain Features.** Firing down an incline can cause considerable miss distances.

(b) **Burst Pattern.** Consider the lethal areas of fragmentation for the various types of ordnance (105-, 40-, 30-, and 25-millimeter).

(c) Due to the combination of precision and low-yield munitions employed by this platform, ground forces may minimize the risk of injury by taking cover in a danger close situation.

(4) **Parameters for Attacking the Target.** The **type of target,** its **value,** the **proximity of friendly forces,** and the **damage already inflicted** will determine the weapon selection, type ammunition, and the number of rounds required to successfully attack the target. Munitions selection should not be dictated to the SOF gunships, but rather provide the desired effects.

(5) **Procedures.** One factor that distinguishes AC-130H/U SOF gunships from other weapon systems, other than precision night strike capability, are their ability to deliver firepower under conditions of low ceilings and/or poor visibility using radar beacons instead of visual cues for fire control. When employing an AC-130H/U SOF gunship with radar beacons, the JTAC must give all target ranges and bearings from the location of the beacon. The beacon should be located as close as is practical to the perimeter of friendly forces. Shorter offset distances allow for more accurate weapons delivery. For longer offset distances, first-round accuracy may be reduced.

20. Show of Force Considerations

a. **General.** The ground commander may determine that the best COA for the current situation is an escalation of force rather than using lethal fires. The ground commander has many options available to escalate fires, one of which includes the use of CAS aircraft through a show of force. A show of force is an operation designed to demonstrate resolve that involves increased visibility of deployed forces in an attempt to defuse a specific situation. JTACs should remember that show of force is a nonlethal form of airpower employment and does not require many of the restrictions normally associated with munitions or laser employment. While nonlethal, a show of force should have an intended target and a desired effect, and must be conducted in accordance with theater ROE and SPINS.

b. **Reasons for Show of Force.** There are several reasons for a JTAC to request a show of force:

(1) The aircraft is out of munitions or has the wrong type of munitions to be effective.

(2) Friendly forces are too close to enemy forces for safe use of weapons. The current situation does not meet ROE to allow weapons employment.

(3) Friendly forces and/or the pilot are unable to get a precise fix on the enemy's position.

(4) A unit, which the JTAC does not have direct communications with, is in a "troops in contact" or an escalating situation and the JTAC uses a show of force to reassure the unit that there is air support on station.

(5) Civilians have gathered and the ground force commander would like them to disperse. The JTAC can use a show of force over the personnel to attempt to disperse them.

(6) Unidentified personnel are displaying possible hostile intentions, and the ground force commander does not want to escalate to weapons employment. The JTAC can use a show of force as an escalation of force to determine their true intentions or cause them to disperse.

Note: Show-of-force maneuvers typically require the aircrew to leave sanctuary and enter potential threat areas.

21. Digital Information Systems Considerations

a. **Digitally Aided CAS (DACAS).** Digital systems in aircraft and ground based JTAC kits provide several benefits which aide in the conduct of CAS planning and execution. Although verbal radio calls remain the principal means of communication during CAS execution, digital systems can expedite communications and, by extension, the target acquisition process. Digital aids for CAS execution use both BLOS and LOS communication systems. When combined, BLOS and LOS digital capabilities provide aircrew greater SA and typically result in less time spent recording and entering mission execution information into aircraft systems and/or weapons.

(1) **Beyond Line-of-Sight Capabilities.** Examples of BLOS capabilities are networked Link 16 and situation awareness data link (SADL). BLOS links can be non-nodal and provide many network participants with situation awareness information simultaneously. JTACs with access to Link 16 and SADL C2 nodes are able to place land tracks reflecting hostile, friendly, and other points of interest, send free text messages as well as mission assignments, and receive target sorting messages on data links. Doing so allows link capable C2 elements and aircraft to view the information published and expedite the target acquisition process. In some cases, this enables C2 elements and TACPs with data link access to provide SA information to CAS aircraft well before they establish voice communications with the terminal attack controller.

(2) **Line-of-Sight Capabilities.** Complementing the long-range of BLOS links are LOS digital messaging capabilities, i.e., variable message format (VMF), Air Force Applications Program Development (AFAPD), and the Marine Tactical System (MTS). These LOS protocols permit JTACs and aircrew to digitally exchange messages, such as check-in and CAS brief, and can be particularly beneficial in situations involving high operational tempo, language familiarity/issues, or communications jamming. VMF provides the most extensive digital information exchange between similarly capable platforms and ground based terminal attack controller kits. VMF is the near-term, LOS DACAS standard for the TAC phase of CAS missions.

b. **DACAS Advantages.** Some of the advantages of digital systems include automation, speed, and communications accuracy. Increased SA may also be possible when friendly and opposing force information is displayed on user systems. Digital systems may also improve C2 of CAS by providing machine-to-machine tasking and information exchange between joint fires support systems and JTACs/FAC(A)s. When digital systems receive and display aircraft information such as SPI, designated ground target (DGT), or aircraft position and target designation targeting efficiencies may result. As tactical situations permit, terminal attack controllers employing digital systems spend less time developing CAS briefings and realize greater accuracy via computer displayed and generated information. DACAS has the potential to increase tempo, expedite the kill-chain timeline, minimize human error in information transfer, and reduce the risk of friendly fire.

c. **DACAS Limitations.** Some disadvantages of digital communications include truncation and data input errors, increased coordination to ensure interoperability, and increased workload in certain situations. Workload can be increased in a visual environment when information must be typed or read versus voice communications while having to maintain eyes on sensors, targets, or ground threats.

d. **DACAS Setup.** Digitally aided CAS requires particular attention to the setup of digital systems. JTACs must be aware of aircraft capabilities and their JTAC system's communication prerequisites, to enable the timely and effective use of digital communications. Not all aircraft or JTAC systems have the same setup requirements for digital communications (see Figure III-34). Thus, it is important that air and ground system operators understand their digital communication requirements and be prepared to provide that information to others. When practical, the ASOC/DASC should include in the JTAR approval the supporting CAS aircraft's parameters for digital communication.

United States Platform and Kit Digitally Aided Close Air Support Capabilities					
US STRIKE AIRCRAFT	**SADL**	**LINK 16**	**AFAPD**	**MTS**	**VMF**
AH-1 (Acquiring VMF)					
AH-64D			X		
A-10	X	*			X
A/V-8B (Acquiring VMF)				X	
F/A-18 A+/C/D		X			X
F/A-18 E/F/G		X			X
F-16 C+	X	*			
F-16 CM		X	X		
F-15E		X			
AC-130H		X			
AC-130U		X			
B-52 (Limited number with VMF)					X
B-1		X			
US JTAC/JFO SYSTEMS	**SADL**	**LINK 16**	**AFAPD**	**MTS**	**VMF**
FOS					X
PFED					X
TLDHS	X	*	X	X	X
BAO Kit	X	*			X
TACP-CASS	X	*	X	X	X

* JTAC kits, A-10, and F-16C+ can access Link 16 messaging via a compatible communications device.

Legend

AFAPD	Air Force Applications Program Development
BAO	battlefield air operations
FOS	forward observer system
JFO	joint fires observer
JTAC	joint terminal attack controller
MTS	Marine Tactical System
PFED	pocket-sized forward entry device
SADL	situation awareness data link
TACP-CASS	Tactical Air Control Party Close Air Support System
TLDHS	target location, designation, and hand-off system
VMF	variable message format

Figure III-34. United States Platform and Kit Digitally Aided Close Air Support Capabilities

For detailed DACAS setup information, see Appendix D, "Digitally Aided Close Air Support Planning Considerations."

e. Digitally aided CAS systems are not yet fully mature and continue to evolve. Tools like digital messaging, image exchange, and FMV help increase participants SA but do not replace the need for the verbal give-and-take that typically completes the tactical situation picture developed by aircrew and JTACs. Where practical, CAS aircrews and JTACs should capitalize on data-link capabilities and the increased SA that their use may bring to a tactical situation. In some situations, most often driven by gateway availability, the use of data-link (Link 16/SADL) land tracks as "electronic marks" may expedite the target acquisition process. When using land tracks, aircrew and JTACs must familiarize themselves with potential system inaccuracies. CAS participants should also use established brevity terms to indicate the transmission and receipt of digital data (see Figure III-35 for common data-link terminology). The proper use of brevity terms may reduce the incidence of voice transmissions interfering with digital communications. Brevity terms are also useful when working with a mixed force of digital and non-digital CAS aircraft. Using brevity terms clues non-digital players on when to remain silent so as not to impede data transfer.

Common Data-Link Terminology

Term	Definition
	Common Terms
IP address	A discrete Internet protocol four-number group, delimited by periods, used in communications to identify the sending and receiving computer platform(s).
JU	The discrete number, of up to 5 digits, assigned to each platform or component participating in Link 16 activity.
Link Address	Derived from the air tasking order (ATO)-assigned call sign, the link address is the two-digit number contained in the call sign. Numbers ending in 5 are reserved for joint terminal attack controllers (JTACs).
Mission Number	The mission number assigned per the ATO. Note: For training missions not supported by an ATO mission number, a training mission number should be designated and entered into aircraft network.
URN	A discrete number assigned to each radio communication platform in the environment. Many assigned unit reference numbers (URNs) can be found in the joint master unit list. Platforms without a preexisting URN are accounted for during communications planning.
	Data Link Radio Calls
CALL READY FOR DATA	Aircrew or terminal attack controller is to check setup and make sure his station is ready to receive data burst.
CROSS-CHECK	Confirmation via sensor point of interest (SPI) on correct hostile location.
DATA IN 5	Data transmission will be sent in 5 seconds.
DIGITAL TRP	Digital Target Reference Point. Used to direct aircraft sensors to a location, via Link 16 or situation awareness data link (SADL), using J3.5 Land/Point tracks to mark a target or location.
DROP	Directs removing a track from the Link 16/SADL network. This does not require users to remove tracks from internal networks or displays; the track

	originator normally accomplishes the task.
INITIATE	The act of broadcasting (enabling) a track onto the Link 16/SADL network.
PUBLISH	The directive term to broadcast a track onto the Link 16/SADL network from the tactical network.
READ BACK	Terminal attack controller to aircrew call. Aircrew is to read back mandatory lines from 9-line close air support brief. Readback of target coordinates should only take place after the coordinates have been entered into the aircraft system and the read back is from the system, not what the JTAC sent as displayed for review in an aircraft's cockpit.
READ BACK CORRECT	Terminal attack controller to aircrew call. Aircrew has done a correct read back of the 9-line brief.
READY FOR DATA	Aircrew or terminal attack controller is ready to receive data (9-line brief, check in brief, mark point, free text message).
RECEIVED	Data successfully received.
UPDATE	Term to direct the update of a previously initiated Link 16 track. The track number should be referenced.
Brevity Terms	
DATA (object, position)	Standby for data-link message concerning object at stated location.
HOOK	Data-link directive call to cue sensors described point (e.g., point of interest, surface-to-air missile, markpoint, track number).
(type) POINT	Data-link sensor point/track of interest, such as the J12.6 SID 10 data-link message.
TIMBER	The Link 16 network.
TIMBER SOUR	Potential problems with net entry; initiates pre-mission link troubleshooting.
TIMBER SWEET	Confirms receipt of data-link information (opposite of TIMBER SOUR).
TRACK NUMBER (#)	Data-link information file number (commonly called "track" or written as TN).
ZAP	Request for data link information, for example "Zap data" or "Zap point."

Figure III-35. Common Data-Link Terminology

WARNING

Digitally aided close air support (DACAS) has the potential to greatly benefit traditional terminal attack control, but two key warnings must be adhered to when employing DACAS.

–Presence or lack of digital information does not substitute or constitute clearance; and,

–Digital track quality (the displayed value of the system's confidence of the quality of the track) does not necessarily indicate location error (e.g., target location error).

f. **DACAS Terminology**

(1) **DACAS.** The machine-to-machine exchange of required CAS mission data (e.g., aircraft check-in, CAS brief, BDA) between JTAC (or FAC[A]) and CAS platform (or C2 node) for the purpose of attacking a surface target.

(2) **SPI.** The location (horizontal coordinate and elevation) at which a system calculates its sensor is pointed.

(3) **DGT.** A location selected by an aircraft or system for weapons employment. DGTs are made up of the horizontal coordinate and elevation, either calculated on-board the system or relayed from off-board. Selection as a DGT does not imply, nor does it require, that weapons release authority has been given by the terminal attack controller.

(4) **Digital Readback.** The capability for a digital system to confirm that the required elements transmitted by the terminal attack controller have been accepted by the aircraft system or munitions.

(5) **VMF.** A messaging format using K-series messages (e.g., K 2.33 Close Air Support Aircrew Briefing) to transmit data between nodes in a network. The VMF standard is referred to as Military Standard 6017.

(6) **Broadcast.** A message addressed to all stations simultaneously. In VMF DACAS, broadcasts are not acknowledged by the receiving station—no "link acks."

(7) **Unicast.** A message addressed to one station. In VMF DACAS, if the receiving station receives and decodes a message unicast to it, it will issue a link ack.

(8) **Multicast.** A message addressed to more than one but not all stations simultaneously. In VMF DACAS, each receiving station that receives and decodes a message multicast to it will issue a link ack in an order determined by each station's link address.

(9) **Auto Learning.** Broadcast messages enable the receiving stations to auto learn the sender's address data.

g. **DACAS Execution**

Note: At all times JTACs must be ready to conduct TAC using non-digital (voice) means as digital interoperability issues may exist between kits and aircraft.

(1) **Routing Safety of Flight.** May be sent via preplanned free text if coordination is made such that routing and safety of flight instructions are prepared prior to aircraft check-in and all aircraft on station (AOS) are a type, model, and/or series (T/M/S) capable of receiving it. Due to the requirement to expeditiously transmit routing and safety of flight instructions as soon as possible after aircraft check-in, voice communication and not free text shall be used if preplanned free text was not made prior to aircraft check-in, if any changes to the preplanned free text are required, or if there are different T/M/S AOS that will not receive the free text message.

To request the on station report (OSR), the JTAC sends "SEND OSR THIS IS FAC15 LINK 16."

Be sure to include your specific call sign and address. This ensures aircraft without auto-learn can enter JTAC address network page.

(2) **Aircraft Check-In**

(a) Aircrew should send the AOS or on station report (OSR) to the JTAC to establish a digital handshake. The aircrew must be able to expeditiously add the JTAC to the network, collect AOS or OSR data from the wingman, and transmit the OSR back to the JTAC. The JTAC should utilize the AOS or OSR to create an active flight within the kit. (It should be standard for the flight lead to collect wingman data as part of TACADMIN [tactical administration] prior to checking in with the JTAC to expedite the AOS or OSR.)

(b) The aircrew should send an additional free text or voice message that contains additional information that is not contained within the AOS or OSR. (Video downlink, helmet, laser code, etc.)

(3) **Situation Update.** Sent free text. The sender should be brief and include only information that is pertinent. General rule of thumb across aircraft types is no more than 200 characters. The sender should be sure to include double slashes "//" to separate individual portions of the situation report (SITREP). The following example is 159 characters.

Example: POS MANPADS//LIGHT ARMOR WITH INFANTRY//FRIENDLIES VICINITY OP FEETS//81MM SW OF OP//MARK AND CONTROL BS16//IN WITH HEADING ALL ATTACKS//WINDS FROM NORTH 10KTS

(4) **Game Plan.** JTAC sends free text game plan "TYPE 2//BOC." If the JTAC does not have a digital game plan ready they should proceed with voice instructions.

(5) **CAS Brief.** JTAC should utilize digital CAS brief, but be prepared to revert to voice if the digital CAS brief is not received by the aircraft. In addition, the digital CAS

brief does not allow the user to input an altitude into the egress instructions. This should be added into the remarks section.

Example: "EG L 18K TO 20K"

(6) **Remarks/Restrictions.** Can be accomplished via free text or voice.

(7) **Readbacks.** The aircrew will read back all required information verbally.

(a) **Aircraft Position Target Designation (APTD) Information.** The JTAC can request a single APTD from the aircraft in order to display a momentary aircraft position, and the DGT, provided the ground kit displays single APTD data. An APTD request may also be initiated by the ground station resulting in continuous tracking of aircraft position and target designation with updates provided every five seconds. The JTAC should disable the APTD once the designation is verified. Some aircraft, currently the AV-8 for example, are unable to transmit an APTD. However, SADL- and Link 16-only equipped aircraft (F-16C+ and F-15E) can provide similar attack position and target designation information by publishing their SPI (J12.6 message) via Link 16. This request for an APTD is only an additional confirmation method and does not relieve the aircrew from verbally reading back all required items.

(b) JTAC and aircrew should confirm the format of latitude/longitude in use if the transfer of locations (e.g., Line 6) is grossly incorrect on the readback. CJCSI 3900.01C, *Position (Point and Area) Reference Procedures,* dictates the standard format for reporting a geographic coordinate—DDMM.mmmmH DDMM.mmmmH. (D = Degree, M and m = minute, H = Hemisphere.) Rationale: Significant error has been noted when dealing with unfamiliar aircraft that may be using an uncommon format for latitude/longitude.

(8) **Correlation**

(a) In a BOC scenario, correlation is complete after the readback requirement has been met.

(b) In a BOT scenario, correlation should be conducted via voice.

(c) Once correlation is complete, the aircrew can send an APTD to the JTAC. This will show the updated target position on the JTAC's map.

(9) **Conducting the Attack**

(a) **IP Inbound Call.** The aircraft can send a departing IP (DPIP) message to the JTAC in lieu of a voice "IP Inbound" call.

(b) IN Call: A voice IN call remains the primary method of transmission. If briefed, IN can be indicated by a second DPIP following the initial DPIP (on departing IP). Another option, if briefed, is an aircraft-initiated APTD following the initial DPIP (on departing IP). This would be based on prior coordination between JTAC and aircraft. Another alternative is to transmit a preformatted IN free text message.

(c) The JTAC can initiate a continuous APTD track to graphically display the aircraft position and target designation. As this message recurs every five seconds, this functionality should be disabled after the JTAC is satisfied that aircraft or target designation location is confirmed, depending on type of attack and method of engagement. This will avoid impact on necessary voice communications.

(d) Laser brevity communication should only be conducted with voice.

(e) Corrections from visual mark should be conducted with voice communication.

(f) CLEARED HOT/CLEARED TO ENGAGE and ABORT shall be sent via voice communication as a primary method, and may be sent via digital message as a secondary method, immediately after a corresponding voice call is transmitted.

(g) The JTAC should utilize the kit-specific End-of-Mission function to administratively remove mission graphics from the display and send a preformatted BDA free text to aircraft.

(10) **Assessment and Reattacks.** Assess and repeat the attack as required. Reattack instructions can be sent via free text message or voice, depending on timing requirements.

(11) **BDA.** Summary BDA may be sent via a VMF K02.28, via free text, or via voice, if not already sent at the end of each attack.

(12) **Routing and Safety of Flight.** Sent via free text or voice.

h. **Execution Considerations Link-16/SADL.** DACAS conducted BLOS via networked links may require a JTAC to employ two radios or to move between two radio nets: one to access the data-link network and the other for strike primary. Controllers employing Link 16 should have an appreciation of the time required to initiate, and publish to the link, all relevant tracks for TAC operations.

EXAMPLE OF DIGITAL CLOSE AIR SUPPORT COMMUNICATIONS FLOW:

Attack Aircraft: "Reaper 21, Strike 02 checking in 170-190."

Forward Air Controller (Airborne) (FAC[A]): "Strike 02 copy, check data for AO update and hook TN 12345, 3 vehicle convoy stopped at T-intersection."

Attack Aircraft: "Reaper 21, Strike copies AO update and is CONTACT 3 x trucks parked on the southwest corner of a T-intersection."

FAC(A): "Strike 02 good CONTACT. Rally 11 is in the first truck, departing to the north for objective in 5-minutes."

For a more detailed example of a CAS mission executed with VMF and Link-16 capable aircraft, see Appendix D, "Digitally Aided Close Air Support Planning Considerations."

22. Video Downlink Considerations

a. **VDL Systems.** VDL systems provide FMV downlink to the ground units for CAS execution. In CAS, VDLs are used to build aircrew and JTAC SA, provide precise coordination, target verification, friendly fire reduction, collateral damage mitigation, and real time BDA. VDL systems enhance, but do not change standard CAS procedures. FMV feeds should not be used as a single-source target identification method.

(1) Units planning to use VDL need to ensure desired downlink frequencies are on the joint restricted frequency list. When multiple VDL transmitters are operating within an area, deconflict frequencies between transmitters to reduce mutual interference. In multiple aircraft flights, units should attempt to keep the VDL transmitter on, and set to a constant frequency, with the ground station switching frequencies to view desired FMV from the VDL platform. This provides a quicker handshake than turning the VDL transmitter on/off.

(2) **Aircraft Check-In.** Aircrew identify themselves as VDL-capable and confirm downlink frequency with the operator.

(3) **Aircraft Holding Pattern.** Used to maximize visibility of the target area while minimizing LOS loss between the VDL transmit antenna and the ground station. Minimizing aircraft maneuvering, and maximizing wings-level time during the hold, will increase successful video reception. Aircrews should consider orienting the holding pattern so the sensor is viewing the target from the same axis as the operator. This will enhance operator scene interpretation of the FMV and increase talk-on effectiveness (see Figure III-36 for VDL brevity terms).

Video Downlink Brevity Terms	
Term	Definition
CHECK CAPTURE	Target appears to be no longer tracked by sensor. (Informative call from video downlink (VDL) operator to pilot/sensor operator that target appears to be no longer tracked by full-motion video source.)
CHECK FOCUS	Sensor image appears to be out of focus. (Informative call from VDL operator to pilot/sensor operator that full-motion video image appears to be out of focus.)
DECLUTTER	Authoritative request for the pilot/operator to remove targeting symbology to allow the user to see a better picture of the target area (minimize on-screen graphics to prevent an object of interest from being obscured. For sensors with multi-level declutter capability, indicated as Level 1, 2, 3, etc.).
HANDSHAKE	Video data link established. Opposite of HOLLOW. (VDL operator communications to indicate good full-motion video signal and data to VDL.)
HOLLOW	1. Any data link message not received. 2. Lost video data link. Opposite of HANDSHAKE. (Lost full-motion video signal and/or data to VDL. VDL screen freezes or is not updating. If the picture is not rotating or slant range

	is not changing, these are indicators of not updating.)
(expect) EXPECT HOLLOW	A condition will likely exist that limits video data link reception (e.g., maneuvers, terrain). (Informative call from the pilot/sensor operator to VDL operator that a condition will likely exist that limits VDL reception.)
SET	1. Set (or have set) a particular speed. May be indicated in knots or Mach. 2. No longer slewing sensor and awaiting further updates. 3. Overwatch aircraft is in position. (Informative call from pilot/sensor operator to VDL operator indicating no longer slewing the full-motion video source and waiting for further updates.)
SHADOW	Follow indicated target.
SLEW	Move sensor in direction indicated (usually accompanied with a unit of measure). For example, "SLEW left one-half screen." ([LEFT/RIGHT/UP/DOWN or CLOCK POSITION and DISTANCE ¼ SCREEN, ½ SCREEN, FULL SCREEN] - Directive call from VDL operator to pilot/sensor operator to slew the full-motion video source a given direction and distance.)
STAKE	A full-motion video system mark has been set and is used as a frame of reference
SWITCH CAMERA	Switch full-motion video to electro-optical (EO) or infrared (IR). (Request from VDL operator to pilot/sensor operator to switch the full-motion video to EO or IR.)
SWITCH POLARITY	Switch IR polarity to black hot or white hot. (Request from VDL operator to pilot/sensor operator to switch the full-motion video IR polarity to black hot or white hot.)
ZOOM (IN/OUT)	Increase/decrease the sensor's focal length. (Request from VDL operator to change the full-motion video field of view [FOV]. The "Zoom" command is to be given with a 1, 2, 3, or 4 attached to it. The 1, 2, 3, or 4 indicates the number of full-motion video FOVs that the JTAC wants to change in or out. Recommend only 1 full-motion video FOV change at a time, in or out.)

Figure III-36. Video Downlink Brevity Terms

(4) Talk-ons to specific targets start with the aircrew slewing their sensor to target coordinates passed by the operator. The talk-on should begin and end with the sensors in a wide enough FOV to allow the confirmation of the correct target area. Features directly surrounding the target must be confirmed to ensure proper target correlation and to mitigate collateral damage and friendly fire prevention. Operators should develop SA by initially viewing the target area through the sensor in wide FOV, then through narrow FOV, following a "big to small" progression. Once the target is acquired and identified, the sensor may be returned to a wider FOV as a confirmation method.

(5) The operator or aircrew will establish a unit of measure for the talk-on. Avoid using the full screen width or length as a unit measure. Using one-half screen measure allows viewing of previous references when the sensor is slewed or the FOV is changed. Movement directions based on the FMV display (up, down, left, right) are most

effective. Most sensors display a reference for north, but this reference should only be used as an SA tool.

(6) Despite time delays of the FMV feed, operators should initially attempt a running dialog. When the aircrew completes slewing the crosshairs to the directed point, they will respond with the brevity term SET. This technique, deliberately stepping to each point with challenge and response, avoids issues with FMV delays to the display. When the operator identifies the target in the FMV, they should point out the target using descriptive features of the target itself.

(7) Once the aircrew identifies the target, they should slew the sensor to place the target directly under the center of the crosshairs. Once complete, the aircrew will state SET, CAPTURED with any additional confirmatory communications. Operator verifies the correct target is under the crosshairs and responds with CAPTURED.

(8) **Ground references.** The operator directs the aircrew to follow an identified reference until it gets to a specific object or point.

(9) Operators may request aircrew to switch sensors or views through brevity terms. Operators should understand that aircrew will provide the most appropriate video available within the limits of their sensor.

(10) **VDL Limitations.** Continuous FMV between an airborne platform and a ground station is rare. Operators must be able to identify when the feed is lost and communicate that to the aircrew with the brevity term HOLLOW. In addition, aircrew should communicate to operators when they anticipate the feed to be lost due to aircraft maneuvers with the brevity term EXPECT HOLLOW. Operators can identify loss of FMV by monitoring the clock display on video feed. When the image freezes or the clock stops, reception has been lost. Operators should anticipate a loss of reception during target attacks and aircraft threat reactions. Coordinates displayed on the FMV will have varying degrees of accuracy based on platform and sensor type. Operators should query aircrew for coordinate accuracy prior to using those coordinates for targeting purposes.

Note: For the most recent communications brevity codes and meanings, see the most recent revision of Army Tactical Publication 1-02.1/MCRP 3-25B/NTTP 6-02.1/AFTTP 3-2.5, *Brevity, Multi-Service Brevity Codes.*

23. Forward Air Controller (Airborne) Planning

a. **FAC(A).** FAC(A)s can serve as an additional controller for the TACP/JTAC, support a maneuver element without a TACP/JTAC, or supplement the capability of a TACP/JTAC. A FAC(A) must be able to coordinate supporting arms in conjunction with CAS missions, such as L-hour preparatory fires and post-assault fires, without assistance from the TACP/JTAC. The FAC(A) must be capable of executing the desires of the ground commander in daytime, nighttime, and adverse weather conditions; integrating fires on the battlefield, mitigating friendly fire, and conducting detailed planning and integration with the maneuver element.

b. **Pre-Mission Planning**

(1) During mission planning, the TACP/JTAC is responsible for advising the regimental and BN commanders, S-3, and the FSC, on the employment and integration of CAS and FAC(A). The AO/ALO is expected to have a working knowledge and understanding of CAS and FAC(A) aircraft capabilities and limitations. A TACP/JTAC should request a FAC(A) if necessary. Possible reasons for requesting a FAC(A) are if the TACP/JTAC is:

(a) Expecting a large number of CAS aircraft in a small amount of time or restrictive airspace.

(b) Operating in restrictive terrain (urban, forested) where a platform with the same perspective as CAS assets for target talk-ons would aid in the efficiency of CAS missions.

(c) Operating with a limited capability to mark targets.

(d) Expecting difficult communications due to terrain and/or high threat environment.

(e) When operational needs require an aviator overhead who is intimately familiar with the ground commander's intent and scheme of maneuver and versed in CAS TTP, to assist in the battle/operation.

(2) For large operations, the TACP/JTAC should not hesitate to request that a FAC(A) travel to the respective operational planning cell to aid the TACP/JTAC. Having the expertise of the FAC(A) in the planning process will enhance the effectiveness of airpower by providing planning expertise in aircraft capabilities and requirements, weapons effects, and CAS TTP. These benefits of having a FAC(A) involved in the planning process will translate to increased aircrew SA during execution and enhanced airpower effectiveness. Additionally, the FAC(A) will be able to communicate the ground commander's plan and intent to the other CAS assets involved in the operation collocated with the FAC(A)'s squadron.

(3) The FAC(A) aids in the planning process, not only by being an expert at aircraft/weapons capabilities, target/weapon pairing, and CAS procedures, but also by possessing the knowledge of how and when to plan for SEAD, weather effects, personnel recovery, and many other essential considerations or factors. Due to manning and the ATO cycle however, it is unlikely that a FAC(A) will be able to be present during the planning stages of a ground operation. The AO/ALO should make a concerted effort to take advantage of a FAC(A)'s expertise in this area via secure e-mail/phone or chat. When a FAC(A) is unable to participate in the planning process via any means, TACP/JTAC members will be responsible for advising the ground commander on FAC(A) employment, and as such must be well versed in FAC(A) integration TTP.

(4) Detailed integration and coordination prior to execution will provide the TACP and FAC(A) with a template from which to deviate when unforeseen tactical problems arise

during execution. Planners should prepare primary and alternate plans for marking and control enabling a smooth transition if the tactical situation requires a change. Failure to do such detailed integration does not mean the mission will be a failure, only that the FAC(A) and CAS assets involved will be less prepared at check-in and SA will initially be lower. Successful detailed integration and coordination will enhance the potential impact that airpower will have on the battle/operation in support of the ground commander's plan. With this pre-coordination complete, parties need only provide changes or updates when the FAC(A) checks-in during execution. The following individuals and documents will serve as the base sources of information to aid the FAC(A) and TACP in their planning and liaison:

(a) **FSCOORD/FSC.** The ground officer responsible for the integration of all fires in support of the operation. Close coordination and integration between **FSCOORD**/FSC/FSOs and AO/ALOs is critical to mission success. **FSCOORD**/FSC/FSOs and the AO/ALOs will work closely together in the development and dissemination of the following:

1. **Fire Support Plan.** The overall plan to integrate surface- and air-delivered fires, to include POF, groups, series, programs, triggers, etc.

2. **High-Payoff Target List.** The purpose of a high-payoff target list is to list high-payoff targets by phase of the operation.

3. **Communications.** Verification of the COF and air spot nets, and the call signs of the artillery and mortar units. It is critical to establish this communications link prior to commencing the operation.

4. **Target Lists.** Preplanned targets, high-value targets, and other targets of interest.

5. **Fire Support Assets.** General support, reinforcing, general support-reinforcing, and direct support artillery positions and AOFs, multiple launch rocket system, mortar units positions and AOF, counterfire radar sites, and displacement schedules.

6. **FSCMs.** Verification of all active and planned coordination measures.

7. **SEAD SOP.** The plan for suppressive fires including targets requiring suppression, suppression assets, fire plans, and standard calls for fire.

8. **Laser Employment Plan.** Available assets and expected employment guidelines. Verify laser code assignments and de-confliction as per the ATO.

(b) **OPORD.** The OPORD is a directive from the commander issued to subordinate commanders to coordinate the execution of an operation. A thorough understanding of the OPORD, its annexes and appendices, will provide the FAC(A) planner much of the information required to successfully plan for the mission. The following sections and respective information should be read and understood:

1. **Operations Section**

a. Friendly Situation. The status and missions of higher, adjacent, and supporting units.

b. Maneuver Control Measures. Unit boundaries, operational areas, and phase lines.

c. Main Effort. Where the main effort and weight of support will be concentrated during all phases of the operation.

d. Reconnaissance Units. The initial and planned location, mission, fire support assets, communication nets, target marking capabilities, and means of friendly identification of these units.

e. SOF team locations.

f. ROE restrictions.

2. **Intelligence Section**

a. Priority intelligence requirements.

b. Target intelligence.

c. Possible and probable enemy COAs.

d. Intelligence estimates.

e. Collection plan.

f. Ground order of battle.

g. Air order of battle.

h. Missile order of battle.

3. **Fire Support Section**

a. Scheme of maneuver.

b. Fire support plan.

c. ROE.

d. Preplanned air support (preplanned scheduled and on-call missions).

e. Air targets.

f. Air target overlays (depicts planned air targets, FSCMs, and unit boundaries).

g. Artillery fire plan.

h. Artillery targets.

i. Initial position area/fire capabilities overlay (depicts initial position areas assigned to artillery units, unit boundaries, and their fire capabilities).

j. Artillery target overlays (depicts artillery targets, groups, series, FSCMs, and unit boundaries).

k. Artillery fire support tables.

l. Naval surface fire plan.

m. Fire support coordination overlay (depicts applicable FSCMs to include unit boundaries).

4. **Communications-Electronics Section**

a. Communications system assets.

b. Planned nets, including tactical data links from operations task link.

c. Communications-electronics operating instructions /AKAK/AKVH/AKTV authentication procedures.

d. Communications security (COMSEC) procedures.

5. **Air Operations Section**

a. Terminal air control procedures.

b. FAC(A) procedures.

c. MISREP procedures.

d. Target marking for air attack.

e. Interdiction and armed reconnaissance.

f. CAS briefing.

g. Attack helicopter brief.

h. Assault support.

i. Armament.

j. ACMs.

k. Tactical routing.

6. **Theater/Operation SOPs.** These documents will supplement the information that is found in the OPORD. There may exist memorandums of agreement/understanding or tactical directives that FAC(A)s will need to be familiar with, and adhere to, where applicable.

7. **ATO.** The ATO contains the JFACC's plan for providing the air support required in the OPLAN/OPORD. FAC(A)s must read the ATO, the ACO, and the SPINS thoroughly to derive the following information:

a. CAS and FAC(A) assets available (mission number, T/M/S, ordnance, time on station, etc.).

b. Routing (RW and FW).

c. Control points.

d. Airspace coordinating measures.

e. Expected operational area.

f. Tanker availability/locations/times.

g. Code words.

h. Communications plan.

i. FSCMs.

j. FARP/FOB locations.

8. **Automated Communications-Electronics Operating Instructions (ACEOI).** The ACEOI provides the daily communications plan including monitored nets, frequencies, call signs, and encryption/authentication tables.

24. Tactical Air Coordinator (Airborne) Planning

a. **Introduction.** The TAC(A) is an airborne extension of the ASOC or DASC. The TAC(A)'s authority is determined by the CRC, ASOC, DASC, Navy TACC, or Marine TACC. The TAC(A)'s authority and responsibility can range from simple radio relay, all the way to having launch, delay, and divert authority over other assets. In order to be effective, TAC(A)s must conduct detailed planning and integration with all supported units, including aviation, ground, and C2 units. TAC(A)s should be familiar with the same documents required for FAC(A) preparation (OPLAN/OPORD, ATO, ACEOI, etc.). The following section lists some of the potential responsibilities of TAC(A)s:

(1) Coordinate offensive air support.

(a) Provide CAS briefs and TOTs.

(b) Provide handoffs to terminal controllers.

(c) Provide and relay situation updates and BDA.

(d) Provide aircraft and fire support coordination.

(e) Process and relay JTARs.

(f) Serve as temporary FAC(A) (if qualified). (Note: TAC[A]s should never perform both missions simultaneously. Realize, it will take a relatively significant amount of time for the TAC[A] to transition to and from the FAC[A] and TAC[A] roles.)

(g) Serve as a deep battle coordinator.

(2) Coordinate and execute C2 of designated assets.

(a) Extend range or enhance communications for the CRC, ASOC, DASC, FSCC, TACP, Navy TACC, Marine TACC, etc.

(b) Control a section of airspace by procedurally controlling assets into and out of the area.

(c) Deconflict fires and assets.

(d) Execute delegated responsibilities (e.g., launch, delay, divert) in the absence of the appropriate C2 agency.

(3) Coordinate assault support operations.

(a) Coordinate and relay casualty evacuation missions.

(b) Process and relay assault support requests.

(c) Support helicopter-borne operations.

(d) Coordinate reactive SEAD packages and their conduct.

(e) Coordinate surface-to-surface fires.

b. **Pre-Mission Planning.** TAC(A)s are usually geographically separated from the units they are supporting. Despite this, TAC(A)s should be included in the mission planning process by receiving OPLANs and coordinating on-station times and other facets of support operations. On-station times must be planned to ensure TAC(A)s can accomplish the mission and execute within the intent of the supported commander. At a minimum, TAC(A) on-station times should be planned to cover critical portions of missions if the TAC[A] cannot be airborne for the entire duration of the mission.

25. Joint Fires Observer Planning

a. In order to maximize the effectiveness of the joint fires available to the ground commander, the JTAC and JFO should be employed as a team, with the JFO acting as an extension of the JTAC. While JFOs provide timely and accurate targeting data for controls to the JTAC, the JTAC maintains TAC authority. The JFO or the JTAC can issue an abort at any time, to prevent friendly fire or for safety of flight.

b. **Planning.** For successful JFO employment, it is imperative that both the JTAC and JFO participate in the planning process. The concept of employment (COE) should include the responsibilities associated with FSTs. The JTACs and JFOs should pay particular attention to the ROE/SPINs and ensure the communications plan is supportable, executable, and understood by the JFO, JTAC, AO and other fires agencies.

26. Planning for Multinational Operations

a. NATO and partner nations have and continue to use JP 3-09.3, *Close Air Support*, as a basis for conducting CAS. See also Allied Joint Publication-3.3.2, *Air Interdiction and Close Air Support,* and Allied Tactical Publication-3.3.2.1(C), *TTP for Close Air Support and Air Interdiction*. Some differences still remain between US joint doctrine and US-ratified allied joint doctrine, but these differences are being addressed routinely.

b. Although the integration of CAS in multinational operations does not require any change in procedures, it is incumbent upon the JFC to understand the capabilities of the JTACs/FAC(A)s in the field. The Joint Fire Support Executive Steering Committee JFO/JTAC/FAC(A) Standardization Team has accredited several partner nations (some of which are NATO members) and plans future accreditation of several others. These accredited countries have agreed to the JFO/JTAC/FAC(A) memorandums of agreement for standardized JFO/JTAC/FAC(A) training (i.e., "forward air controllers," using NATO terminology).

c. The JTACs/FAC(A)s of participating countries are trained by the contributing countries and adhere to standards such as accreditation by the Joint Fire Support Executive Steering Committee JFO/JTAC/FAC(A) Standardization Team. Adhering to the NATO standardization agreement will enhance the JFC's confidence in the JTAC's/FAC(A)'s abilities and should be considered when authorizing TAC.

27. Requesting Close Air Support

Air support requests are used to identify the supported commander's requirements for CAS and other supporting air missions. **There are two types of CAS requests: preplanned and immediate. Preplanned air support requests may be resourced with either**

scheduled or on-call air missions. Immediate air support requests are supported with on-call missions or by redirecting scheduled air missions that are already on the ATO.

a. **Preplanned Requests.** Those CAS requirements foreseen early enough to be included in the first ATO distribution are submitted as preplanned air support requests for CAS. As soon as the requirements for CAS are identified during the planning process, planners submit air support requests for CAS per the JAOC battle rhythm. Only those requests submitted in sufficient time to be included in the joint air tasking cycle planning stages and supported on the ATO are considered preplanned requests. Planners can prepare preplanned requests by using DD 1972 (Joint Tactical Air Strike Request [see Appendix A, "Joint Tactical Air Strike Request"]) or D670 Air Support Request. These forms may be digitally transmitted using AFATDS. Digital is the preferred method of transmitting/receiving air support requests (e.g., JTAR).

(1) **Precedence.** Each preplanned request is assigned precedence by the requestor, which orders the requests in descending order of importance. It is refined at subsequent levels of the request process according to the commander's priorities. Detailed preplanned requests that retain a high precedence through the various echelons of command will likely result in a scheduled mission line on the ATO.

(2) **Amount of Detail.** The amount of detail the requestor is able to include in the request is critical. If possible, **the requesting unit should identify the target, location, TOT, and other mission data (e.g., desired effects, FSCMs).** This information will provide more effective coordination and a higher likelihood that the aircraft will have the proper weapons load for the assigned target.

(3) **Timeliness.** A high level of detail is not always available prior to the ATO cutoff time. In these cases, preplanned requests can still **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**. The requesting commander should provide a time frame, probable target type, and place where the need for CAS is most likely. The important thing to remember for preplanned requests is to get the request in, per the JAOC battle rhythm, to accommodate the joint air tasking cycle planning phases (phases 1-3). Then, as the situation develops, **update the request with the ASOC/DASC referencing the original request number as needed.**

(4) **Submission.** Planners at each echelon consolidate their requests for CAS and submit them to the next HHQ, along with other air support requests. There, the commander and the staff consolidate all requests and approve or disapprove them. Disapproved requests should be sent back to the requesting unit with an explanation. Approved requests are re-prioritized and assigned a new precedence in accordance with the ground commander's desires (see Figure III-37).

(5) **Coordination.** Approved and prioritized requests are forwarded to the JAOC for inclusion into the ATO planning cycle.

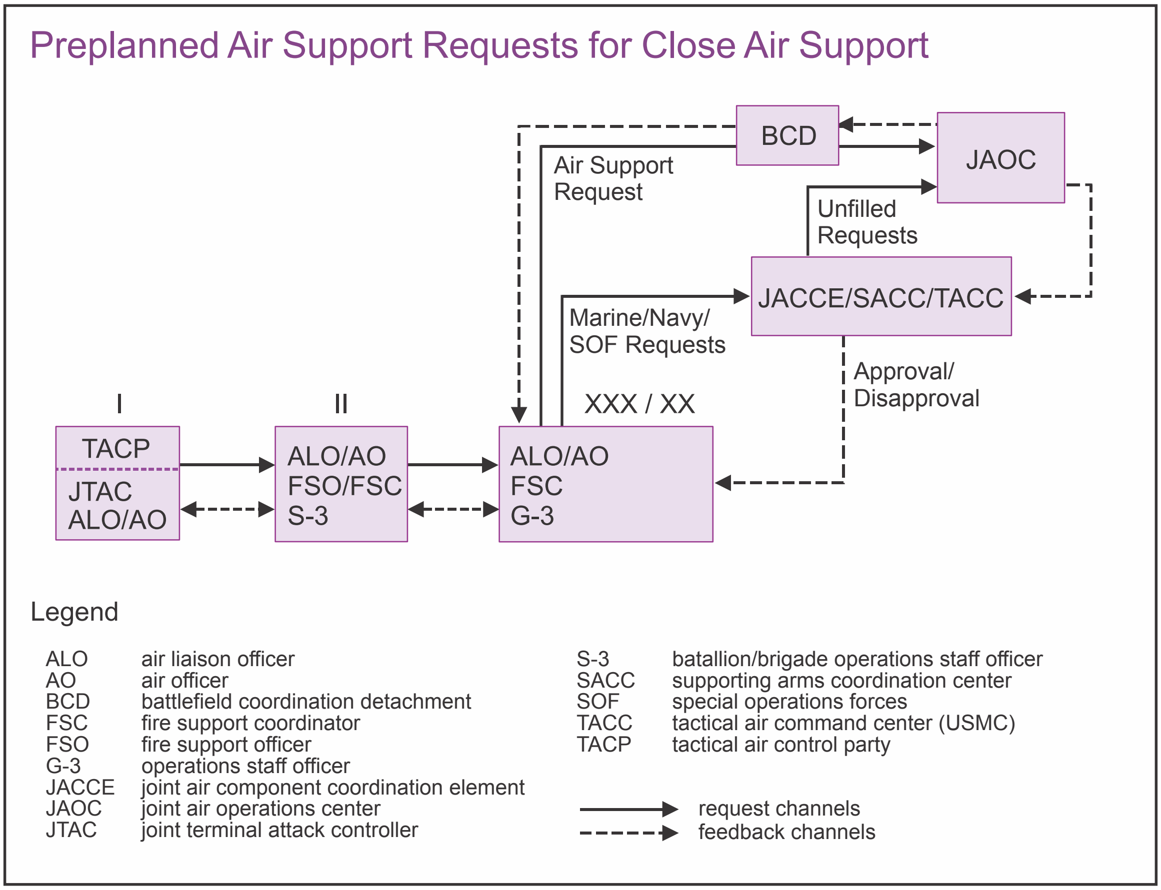
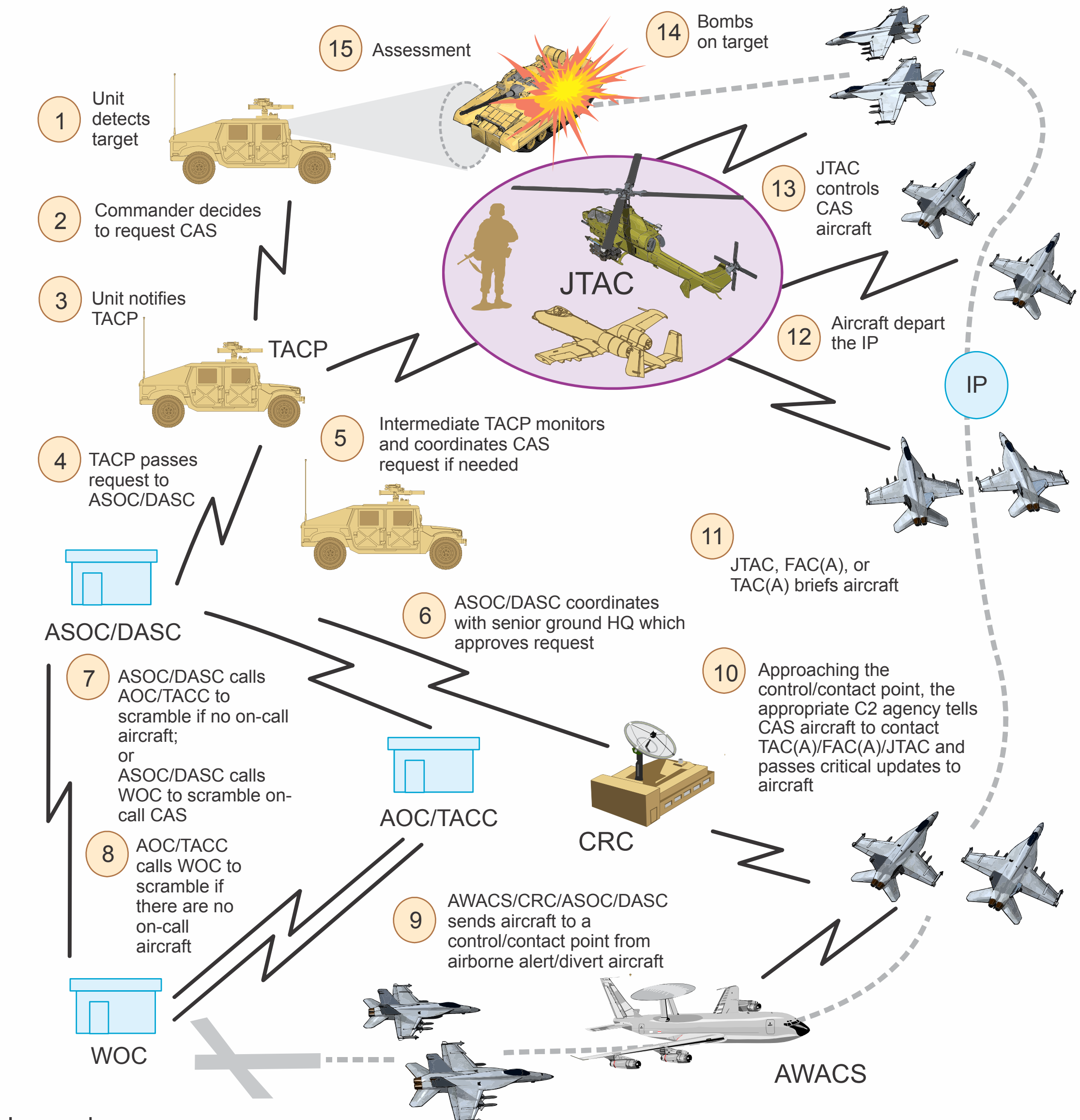


Figure III-37. Preplanned Air Support Requests for Close Air Support

b. **Immediate Air Support Requests.** Immediate air support requests arise from situations that develop outside the planning stages of the joint air tasking cycle. It is important to understand that air assets available to satisfy immediate air support requests already exist in the published ATO. Because these requirements cannot be identified early on, tailored ordnance loads, sensors, or platforms may not be available for specified targets. To resource an approved immediate request, the senior ground echelon (e.g., corps, division) AO/ALO may advise the G-3 to redirect scheduled CAS missions, to task on-call missions, or to forward the requests to the JAOC. During stage 5 (Execution Planning and Force Execution) of the joint air tasking cycle, the JFACC staff (e.g., ASOC) may need to redirect missions to support immediate air support requests for CAS (see Figure III-38).

(1) Conventional Force Submission. Immediate air support requests are forwarded to the appropriate command post by the most effective means available, voice or digital (see Figure III-39). Commanders anticipating contact may submit immediate requests that will result in missions dedicated to the maneuver force for near-term planning. Immediate air support request/JTAR can be sent and processed digitally using AFATDS. The most responsive air support for troops in contact may require immediate requests sent directly from the TACP (JTAC, ALO, AO) to the ASOC/DASC using JARN or TAR/helicopter request (HR). The AO/FSC/ALO at each intermediate HQ monitors the flow of requests. Based on the commander's intent, and after considering whether organic assets are available to fulfill the request, they approve or deny the request. Denial involves sending Section

Immediate Air Support Request Process for Close Air Support Using the Joint Air Request Network



Legend

AOC	air operations center	HQ	headquarters
ASOC	air support operations center	IP	initial point
AWACS	Airborne Warning and Control System	JTAC	joint terminal attack controller
C2	command and control	TAC(A)	tactical air coordinator (airborne)
CAS	close air support	TACC	tactical air command center (USMC)
CRC	control and reporting center	TACP	tactical air control party
DASC	direct air support center	WOC	wing operations center
FAC(A)	forward air controller (airborne)		

Figure III-38. Immediate Air Support Request Process for Close Air Support Using the Joint Air Request Network

II data of the JTAR back to the requestor. Silence by intermediate HQ implies consent to the request.

(2) **SOF Submission.** SOF HQ communications capabilities are usually adequate to link directly to component communications nets that can scramble or divert CAS aircraft as required.

(3) **Priority.** For immediate requests, each JTAR is assigned a priority. They should use the numerical designation below to determine priority (e.g., define the tactical situation).

(a) Emergency #1. Targets that require immediate action and supersede all other categories of mission priority.

(b) Priority #2. Targets that require immediate action and supersede routine targets.

(c) Routine #3. Targets of opportunity. Targets which do not demand urgency in execution.

(4) **Situation Update.** When submitting a JTAR, the JTAC or requesting agency will provide a current situation update to the ASOC/DASC.

For more information on the situation update, see Chapter V "Execution," paragraph 2b (3), "Situation Update."

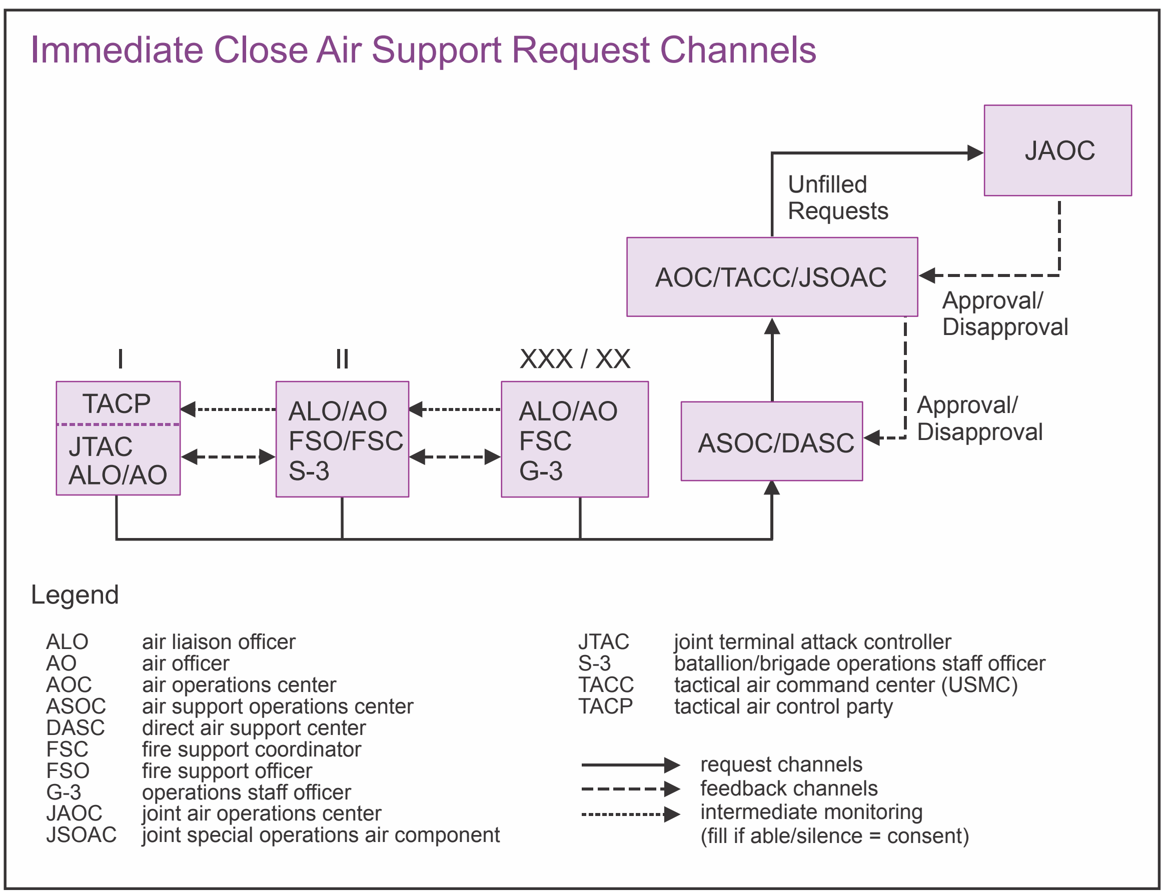


Figure III-39. Immediate Close Air Support Request Channels

(5) **Request Format.** The JTAR (DD 1972) is used for requesting CAS through the ASOC/DASC. However, digital air support requests are the preferred method of requesting air support through fire support channels.

(a) **Mission Data.** For preplanned requests, mission data can be passed through maneuver force or ASOC/DASC communications 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.

(b) Mission data is passed using the JTAR Section III format to the requesting unit. At a minimum, mission data will include:

1. Line 20—Mission Number.

2. Line 21—Call Sign.

3. Line 22—Number and Type of Aircraft.

4. Line 23—Ordnance.

5. Line 25—Estimate TOT.

6. Line 26—Control Point.

7. Line 27—Initial Contact (who the aircrew will contact first).

8. Line 28—Call Sign and Frequency of Final Control Agency.

CHAPTER IV
PREPARATION

> *"The man who is prepared has his battle half fought."*
>
> **Miguel de Cervantes, *Don Quixote*, 1605**

1. Introduction

a. Preparation consists of activities by the unit before execution to improve its ability to conduct operations including, but not limited to, the following: rehearsals, movement, and observations (see Figure IV-1).

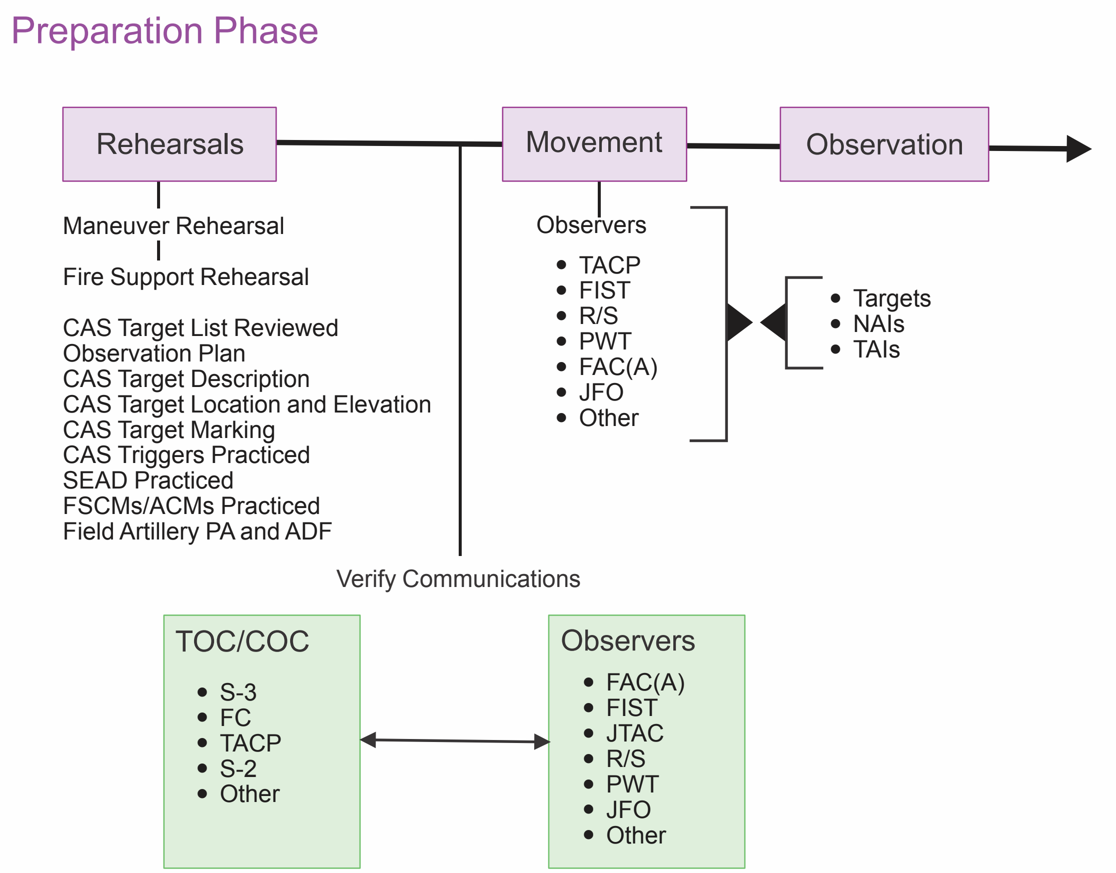
b. Once the plan is formulated and approved by the commander, it should be rehearsed. This includes primary and redundant connectivity and control methodology. Observers must be identified and their communications capabilities verified. Consideration must be given to the methods of tactical movement throughout the battlefield. **The overall observation plan should be feasible, executable, and tactically sound.** Preparation by the TACP/JTAC, fire support assets, and maneuver staff is critical to the synchronized execution of joint fires.

c. Coordination between echelons and preparation that precedes execution are just as important as plan development. Staff preparation includes assembling and continuously updating estimates (e.g., continuous JIPOE) with the goal of providing accurate situational updates for commanders. Whether incorporated into a formal process or not, the staff's preparatory activities such as JIPOE, targeting, fire plan refinement, etc., continue throughout preparation and execution.

d. Preparation includes COE briefs, COE mission rehearsals, OPORDs, brief-backs, equipment and communications checks, SOP reviews, load plan verification, pre-combat checks/pre-combat inspections, and weapons test-fire.

2. Rehearsals

a. **The rehearsal is one of the most overlooked aspects of maneuver and fire support planning.** It provides attendees the opportunity to visualize the battle, ensure total comprehension of the plan, promote responsiveness, and identify areas of confusion, friction or conflict that may have been overlooked. This visual impression helps orient individuals to both the environment and other units during the execution of the operation. Moreover, the repetition of combat tasks during the rehearsal leaves a lasting mental picture of the sequence of key actions within the operation. The extent of the rehearsal is limited by imagination, the tactical situation, time, and resources available. **The types of rehearsals include combined arms rehearsal and fire support rehearsal.**



Legend

ACM	airspace coordinating measure	PA	position area
ADF	automatic direction finding	PWT	precision weapons team
CAS	close air support	R/S	reconnaissance/surveillance
FAC(A)	forward air controller (airborne)	S-2	intelligence staff officer
FC	fires cell	S-3	operations staff officer
FIST	fire support team	SEAD	suppression of enemy air defenses
FSCM	fire support coordination measure	TACP	tactical air control party
JFO	joint fires observer	TAI	target area of interest
JTAC	joint terminal attack controller	TOC/COC	tactical operations center/ combat operations center
NAI	named area of interest		

Figure IV-1. Preparation Phase

b. Local SOPs should identify appropriate rehearsal types and techniques as well as standards for their execution. This section focuses on the key areas that CAS participants should focus on, be prepared to discuss/cover in the rehearsal, and leave the rehearsal understanding.

c. **Combined Arms Rehearsal.** The combined arms/maneuver rehearsal is normally conducted by a maneuver unit HQ and performed after subordinate units have issued their OPORD. The following CAS-related areas should (at a minimum) be covered and/or rehearsed during the combined arms rehearsal.

(1) **Commander's Intent for Fires and CAS.** The commander's intent for fires should include intent for CAS. During the planning phase, the AO/ALO should advise the commander with respect to threat, aircraft availability, and potential weapons loads to ensure a viable, obtainable intent is developed. Requests for CAS should clearly describe the desired effects to meet the commander's intent. JAOC planners should then tailor aircraft and weapons loads to create the desired effects. Often, there is no separate "intent for CAS" defined; however, the commander's intent for fires is inclusive for all fires of which CAS is an integral part.

(2) **Priority of CAS Fires.** POF for each phase of an operation must be identified. For CAS sorties, a projection of "who" will get CAS, "when" it's expected, "what" the commander's desired end state is, and "where" the primary and alternate observers are located needs to be understood. Additionally, at the conclusion of the rehearsal, participants should have a thorough understanding of the following:

(a) Verification of grid coordinates/locations for critical targets, primary and alternate observers, unit locations (defense), FPFs, and projected movements (by phase) for offensive operations.

(b) Triggers for targets and target engagement criteria.

(c) FSCMs/ACMs and how they facilitate fire and maneuver.

(d) Verify SEAD plan.

(e) Communications connectivity.

(f) Verify CAS target marks, and if necessary, friendly marking.

(g) Terminal attack control types to be utilized.

(h) Which JTAC/FAC(A) will provide TAC of aircraft conducting CAS.

<u>1.</u> Availability of FAC(A).

<u>2.</u> Plan for effective use of excess CAS sorties (i.e., use of kill boxes/handoff to another sector or FAC(A), etc.).

<u>3.</u> BDA/MISREP collection procedures.

(3) After the rehearsal, the participants must be able to effectively communicate the plan to subordinate personnel prior to the beginning of the operation. Specific AO/ALO responsibilities include providing key information concerning all aspects of air support for the ground commander. During the combined arms rehearsal, the AO/ALO or FSO will address the following:

(a) Confirm commander's intent for CAS.

(b) Number of CAS sorties expected.

(c) Type aircraft.

(d) Weapons load information.

(e) CAS on-station times.

(f) CPs and IPs.

(g) ACMs/FSCMs.

(h) SEAD plan.

(i) Target marks/laser plan.

(j) Friendly marking procedures.

(k) TACP battlefield employment.

(l) TACP battlefield recovery.

(m) TACP communications plan.

(n) Approved/disapproved CAS requests.

(o) Terminal attack control types.

d. **Fire Support Rehearsal.** Fire support rehearsals focus on the execution of the ground maneuver commander's essential FSTs and the FSEM, the effectiveness of FSCMs, and the timing and synchronization of all fire support efforts with maneuver. Fire support rehearsals serve to refine the fire support plan, ensure understanding by all personnel in the FC/FSCC, and confirm the feasibility of the current plan. The fire support rehearsal is the most critical part of the preparation phase of an operation. The AO/ALO/JTAC is responsible for providing key information concerning all aspects of air in support of the ground commander. The following areas should be covered and/or rehearsed during the fire support rehearsal:

(1) Rehearse CAS execution with ground maneuver element, FSC/FSCOORD, and JTAC.

(2) Identify and confirm that FSCMs support the scheme of maneuver and fires.

(3) Verify consolidated target list to include CAS targets.

(4) Verify coordinate locations for critical targets using the proper map datum.

For further guidance on coordinate datum planes, refer to CJCSI 3900.01C, Position (Point and Area) Reference Procedures.

(5) Verify that each CAS target has a clearly defined task, purpose, method, and effect and that targeting priorities are clearly delineated.

(6) Verify trigger points for each target and target engagement criteria.

(7) Review ROE/PID requirements.

(8) Rehearse actions when CAS triggers are met.

(9) Rehearse primary/alternate observation points.

(a) Identify observers—Primary/alternate observers: JTAC, FAC(A), forward observer, JFO, FIST, PWT, ISR, scouts.

(b) Identify force protection.

(c) Identify infiltration/exfiltration routes.

(d) Identify CAS triggers.

(e) Identify displacement criteria.

(f) Review weather considerations.

(g) Review night procedures.

(h) Review FSEM and attack guidance matrix for CAS targets (found in tab F of appendix 19 of annex C of the operations order).

(i) Confirm observation plans.

(10) Identify closest friendly locations.

(11) Verify friendly marking procedures.

(12) Verify likely CAS attack tactics (high/medium altitude, low/very low altitude).

(13) Rehearse engagement procedures for CAS targets.

(14) Rehearse communications connectivity.

(a) Confirm call signs.

(b) Review primary/secondary JTAC.

(c) Confirm code words.

(d) Conduct radio checks—COF, TACP, company/BN TAC, TAD, air request net, and NSFS.

(e) Confirm cryptological/ COMSEC requirements and procedures.

(f) Review authentication procedures.

(15) Verify attack guidance for each target (unit[s] to fire, shell fuze combination, number of volleys, number and type of aircraft available, and standard conventional loads).

(16) Verify/deconflict the movement plan specifying when and where firing units will move:

(a) Primary AOF.

(b) Positioning areas.

(17) Verify the method of engagement ("at my command," TOT, or "when ready").

(18) FSCMs/ACMs:

(a) Schedule or on-order call to shift boundaries and FSCMs.

(b) Formal.

(c) Informal.

(19) Identify CPs/IPs and general aircraft flow.

(20) Rehearse SEAD plan procedures with firing unit FDC.

(21) Rehearse CAS target marking procedures.

(a) Review the integration/deconfliction plan of air and surface fires.

(b) Review IDF assets available.

(c) Review marking, SEAD plan, and method of control.

(d) Review IDFs asset positions.

(e) Review gun target lines for planned targets.

(f) Review minimum/maximum ordinate(s).

(g) Review shell/fuze combination.

(22) TOT/TTT.

(23) Review type of CAS control for CAS targets:

(a) Type 1, 2, or 3.

(b) Identify observer and controller connectivity.

(c) Review clearance procedures for CAS targets.

(d) AO/ALO/FSO/S3-Air/NGLO recap critical fire support, CAS, and naval surface fire events.

(e) Make refinements as necessary.

(f) FSCMs discussed/understood.

(g) Discuss IDF system position areas. CAS changes or updates made during combined arms or fire support rehearsals should be forwarded to the ASOC/DASC as soon as possible in accordance with established ATO planning cycle timelines. Changes or updates that cannot be included in the ATO must be passed to the aircrews as soon as possible to increase the chances of success.

3. Pre-Combat Preparations

a. Pre-combat checks and pre-combat inspections allow personnel to prepare for a mission and provide the leader/supervisor an opportunity to ensure the operational readiness of personnel and equipment.

b. The following pre-combat checklists are a guide to help personnel to prepare for pre-combat inspections. Pre-combat checks can be broken down into the following areas:

(1) **Mission Essential Knowledge.** Ensure personnel in each subordinate element understand the mission, end state, scheme of maneuver, and fires.

(2) **Mission Essential Equipment.** Ensure all required equipment is full mission-capable and properly accounted for, in accordance with supply procedures. Recommended items for a JTAC include NVDs, an IR laser pointer, laser rangefinder/designator, IR strobe light, chemical lights, GLINT tape, VS-17 panels, spotting scope, multi-band radio, radar beacon, pyrotechnics (smoke/illumination), access to an M203 grenade launcher with illumination and smoke rounds, compass, mirror, tactical tablet, common objective graphics, authentication/crypto materials, and GPS. If any portable tactical targeting systems are to be used, the terminal attack controller should ensure the imagery products associated with these programs are up to date. The JTAC must plan for redundant communication and marking tools.

(3) **Mission Essential Coordination.** Ensure distribution of graphics and/or overlays depicting:

(a) Scheme of maneuver.

(b) FSCMs.

(c) ACMs.

(d) NAIs and/or TAIs.

(e) Decision points and triggers.

(f) Aircraft CPs and IPs.

(g) Helicopter HAs, BPs, and/or landing zones.

(h) Countermobility/obstacle plan.

(i) Friendly marking procedures:

1. Day.

2. Night.

(j) Target list, target overlays, and schedules of fire with:

1. POF/priority of CAS.

2. Priority targets.

3. SEAD targets.

4. Preparatory fires.

5. FPFs.

6. Groups and series.

7. Target blocks.

8. Laser-guided munitions/designator codes.

(4) **Aviation Preparation.** See Appendix B, "Sample Close Air Support Aircrew Mission Planning Guide," for sample aircrew mission planning guide.

(5) **FAC(A) Preparation.** If a FAC(A) is unable to participate in the planning process, it is incumbent upon both the TACP and FAC(A) to coordinate prior to mission execution. Face-to-face briefs are ideal, but at a minimum the FAC(A) and TACP should exchange information electronically prior to mission execution. Transmission to the FAC(A) of the required planning products and information will ensure that they at least have a baseline of knowledge for execution of the FAC(A) mission. Regardless of liaison method, the FAC(A) should be provided the following information in order to clarify the information contained within the OPLAN/OPORD/ATO and any particular requirements of the supported ground unit. A prioritized list of essential information to be passed between the TACP and the FAC(A) includes, but is not limited to:

(a) The ground commander's intent.

(b) Ground force scheme of maneuver.

1. Essential tasks that must occur to ensure mission success (specified and implied).

2. Expected friendly locations and marking (ID) plan.

3. Essential friendly coordinating documents (GRG, etc.).

(c) Threat scheme of maneuver.

1. Most likely enemy COA.

2. Most dangerous enemy COA.

3. Known or anticipated threat.

(d) Fire support/targeting plan.

1. Target priorities/precedence.

2. Established FSCMs.

3. Expected target arrays.

4. Asset integration plan.

(e) Communications plan.

1. Terminal control nets.

2. Air request nets.

3. TACP administrative nets.

4. Ground force nets.

5. Code words.

(f) Fire support assets.

1. Established position areas of artillery.

2. Tasked ATO assets.

a. FW/RW CAS/FAC(A).

b. UAS.

c. Tanker assets.

(g) Airspace plan (established ACMs).

1. Routing plan.

2. Planned CPs/IPs/HAs/BPs/ROZs.

(h) Terminal control plan.

1. FAC(A) plan.

a. JTAC responsibilities.

b. FAC(A) responsibilities.

c. Mission approval process.

2. Marking/guidance plan.

a. SEAD SOP.

b. Laser plan.

3. TACP capabilities.

a. TACP equipment.

b. TACP limitations.

(i) Intelligence plan.

1. Enemy order of battle and equipment.

2. Enemy signature/recognition.

3. UAS ROZs.

4. ISR integration plan.

(j) Supporting documents/information.

1. Map overlays/graphics.

2. FARP locations.

3. Fires SOP.

(k) In turn, the FAC(A) should provide the following information to the TACP:

1. Time on station.

2. ATO breakout; assets coming to the operational area as well as operating nearby.

3. Loiter time.

4. Initial holding point desired.

5. Weapons that will be carried.

6. Communication plan recommendations.

7. Limitations that would affect the prebriefed game plan.

8. System capabilities in the form or type of targeting pod/advanced targeting pod.

9. FMV capability.

10. Coordinate generation capability (with associated TLE).

(6) **TAC(A) Preparation.** TAC(A)s must be familiar with the OPLAN/OPORD, applicable theater/operation SOPs, ATO, and ACEOI. TAC(A) must liaise with the ASOC or DASC and the supported elements. This liaison can be conducted electronically. If possible, face-to-face coordination should be conducted. The TAC(A) must know the level of authority the commander will grant them and when and how it will be granted. This authority could include the ability to launch or delay alert assets, and the ability to divert or delay airborne assets. The TAC(A) must obtain the following information (at a minimum) from the supported element:

(a) Ground scheme of maneuver.

(b) Ground commander's intent.

(c) FSCMs.

(d) Expected operational areas.

(e) Expected supported unit locations.

(f) Initial positions of JTACs and other fire support observers.

(g) Fire support plan.

(h) Attack guidance matrix or target precedence list.

(i) Fire support assets available.

(j) SEAD plan.

(k) FAC(A) employment plan.

(l) CAS assets available.

(m) CAS asset priority.

(n) FAC(A) assets available.

(o) Tanker assets available.

(p) FARP locations.

(q) Routing.

(r) Control points and IPs.

(s) BPs and HAs.

(t) Communications plan and nets.

(u) Code words/procedure words (prowords).

(7) **JFO Preparation**

(a) Plan, coordinate, and synchronize CAS and other fire support assets; request as needed.

(b) Review commander's intent for fires.

(c) Plan/submit JTARs (DD 1972).

(d) Update locations for preplanned targets.

(e) Update/FSCMs/operational graphics.

(f) Plot IPs, CPs, ACMs, FSCMs, etc.

(g) Plan/coordinate SEAD execution procedures.

(h) Assist in the planning of organic UASs.

(i) Verify target marking procedures.

(j) Verify friendly marking procedures.

(k) Review ATO to determine available air support assets.

(l) Coordinate timing of air assets, surface fires, ATO, and FSEM.

(m) Review SPINs.

(n) Review Type 1, 2, and 3 control guidance.

(o) Verify communication plan (to include COMSEC).

(p) Confirm call signs and code words.

(q) Confirm nets (BN fires/mortar, BN FSC, air request, TAD).

(r) Confirm JTAC frequencies.

(s) Confirm JFO frequencies.

(t) Confirm SATCOM.

(u) JTAC/JFO capabilities (e.g., VDL, lasers, Precision Strike Suite-Special Operations Forces [PSS-SOF], and SATCOM).

(v) Confirm authentication procedures (authentication table, Ramrod, etc.).

(w) Confirm digital communications.

(x) Perform communication checks on all nets and devices.

(y) Review target lists with FSC, JTAC, and firing units.

(z) Ensure all supported and supporting units have the same GRGs.

4. Communications

a. During the preparation phase, and often in conjunction with the pre-combat inspections, communication links are checked and verified. This ensures that primary and backup voice and digital systems are checked, crypto material is current, time is synchronized, and code words, brevity codes, authenticators, passwords, and call signs are available and current. Ensure systems are fully operational and connectivity is established. Often unit SOPs will delineate connectivity checks (e.g., "...each station will perform a communications check on TAR/HR on the half hour reporting in precedence order"). Additionally, any extra measures such as day/night friendly marking procedures and visual or sound signals, are practiced.

b. **Check and Verify:**

(1) Command Nets:

(a) Company.

(b) BN.

(c) Regiment/brigade.

(d) Division command.

(2) Fire Support Nets:

(a) COF.

(b) Mortar COF.

(c) FSC nets.

(d) Air spot.

(3) Air Nets:

(a) TAR/HR.

(b) JARN.

(c) TAD.

(d) TACP local.

(e) TATC.

(f) NSFS ground spot.

(g) NSFS air spot.

(h) Shore fire control party.

(i) Data links and networks.

c. **Cryptographic Keys/Call Signs/Code Words/Prowords/Passwords/Brevity Codes.**

(1) Crypto verified and loaded.

(2) Time synchronized.

(3) Copies or excerpts of call signs available.

(4) Code words and brevity codes for current plan reviewed.

(5) Prowords posted or noted for communicators.

d. **Friendly Day/Night Marking Procedures.** Equipment available and correctly displayed/checked.

(1) IR pointer lights/pointers.

(2) Strobe lights (visual and/or IR).

(3) Air panels.

(a) VS-17 panels.

(b) Thermal panels.

(c) Chemical lights.

(d) GLINT tape.

(e) Laser designators and their associated codes. Information for planning and coordinating laser designator use should include laser designator location (i.e., observation post location), laser codes, and laser-target line, at a minimum.

(4) Pyrotechnics.

(a) Smoke.

(b) Star clusters.

(5) Radar beacons and codes.

(6) Tagging devices (Grenadier Brat, etc.).

5. Digitally Aided Close Air Support Preparation

a. **Supporting Documents.** The following documents provide information to plan and execute DACAS and should be studied prior to execution.

(1) Operation task (OPTASK) link with combat net radio (CNR) segment, via JICOs.

(2) SPINS. Special instructions document that governs aviation operations. Changes or additions to the ATO and ACO will be covered in the SPINS.

(3) ATO. This contains what aircraft missions are being supported.

(4) ACO. This contains all planned airspace coordination measures in effect.

(5) Respective Service Unit Reference Numbers (URNs) (Service Specific Document or Joint Master Unit List). As noted above for VMF DACAS, when establishing VMF digital communications, DACAS systems may automatically learn each other's URNs. However, while auto learning is a benefit, it does not mitigate confusion when two aircraft show up with the same URN on a channel.

(6) Digital communication plan with digital TACP local network information.

b. **Ground Kit Recommended Software.** It is recommended one or more of the following coordinate refinement and multi-use office software programs be loaded onto DACAS systems:

(1) PSS-SOF (Target coordinate refinement).

(2) DPSS-SM [Digital Precision Strike Suite-Scene Matching] (Software that combines more recent imagery with PSS-SOF DPPDB).

(3) Precision Fires Image Generator with handheld synchronization (to create precision fires images for use on smaller, more mobile systems).

(4) FalconView (PSS-SOF DPPDB management).

(5) Microsoft Office.

c. **JTAC DACAS Mission Checklist**

(1) Military ruggedized tablet mission computer/SLATE [small light ancillary type equipment].

(2) Batteries fully charged.

(3) Map data loaded.

(4) Assigned target block number range set.

(5) Assigned CAS request block number range set.

(6) Updated mission data to include control points, FSCMs, friendly tracks Comm nets set up.

(7) DPPDB loaded.

(8) Appropriate power supply or battery adapter.

(9) Radios configured.

(10) Radio cable(s).

(11) External GPS antenna as required.

(12) GPS fill.

(13) Digital communications checked.

(14) Mission routing configured.

(15) LRF and adapter cable.

(16) Quick reference guide.

(17) Keyboard and mouse, as desired.

d. **Preplanned (Canned) Free Text Messages.** It is recommended that JTACs prepare preloaded free text messages to aid in rapid digital communication for standardized communication transmissions. Free text messages may be sent via VMF and, for those kits capable, Link 16 and SADL. When developing the following messages, the JTAC should have a common denominator of the array for J28.2 message sets configured to what air platforms are anticipated in the operational area. For example, if the operational area will get F-16CM, A-10C, and F-18 aircraft (all Link 16 compatible), then the JTAC should use the minimum number of characters per line and line numbers to pre-mission configure the following message sets. Due to aircraft display limitations and the inability to use special characters, the use of "//" is recommended in free text messages to separate data or statements to enhance aircrew readability. The recommendation is for the JTAC to preformat free text messages to allow for standardized transmissions of other required information such as situation update, Type 2, etc., to enhance both expediency and accuracy. When sending free text, a good practice is to end the communication with the sending station's call sign, i.e., "Danno 25 sends" or "DO25 sends". These messages may enhance digital communications flow and are not mandatory to use. The following free text messages are a sample of those that may be saved for ready use:

(1) "SEND OSR THIS IS FAC15 LINK 15" (AOS or OSR, K 02.34 message)

(2) JTAC gear capabilities "LASER//IR//ROVER//PSS-SOF//DACAS"

(3) SITREPS. Example: "POS MANPADS//LIGHT ARMOR WITH INFANTRY//FRIENDLIES VICINITY OP FEETS//81MM QS 295 195//MARK AND CONTROL BS16//NO CLUSTER//IN WITH HEADING ALL ATTACKS//WINDS FROM NORTH 10KTS"

(4) Game plan example: "TYPE 2//BOC//"

(5) "OSR RECEIVED"

(6) "FREE TEXT RECEIVED"

(7) "READY FOR READBACK"

(8) "STANDBY"

(9) "MESSAGE RECEIVED, STANDBY." Used when the aircrew needs time to review the CAS brief tasking; it provides immediate feedback to the JTAC that the CAS brief was received.

6. Movement and Positioning

a. **Movement.** The AO/ALO ensures TACP movement is in accordance with the maneuver unit's observation plan. Most TACP operations require movement to forward assembly areas, observation posts, or BPs during the preparation phase of an operation. The maneuver unit OPORD will normally specify formations and techniques of movement. This allows the commander to position elements where they will optimize the unit's operational area and facilitate execution of the scheme of maneuver.

b. **Positioning.** The AO/ALO recommends initial observation positions of TACPs to the commander. The AO/ALO and the commander must consider three aspects in the TACP positioning decision: security, observation, and communications.

(1) **Security.** A TACP cannot provide its own security. The TACP is positioned within the maneuver unit's area where it can optimize its observation capability yet maintain its survivability and communications capability. The maneuver unit commander considers the factors of METT-T when selecting a position.

(2) **Observation.** The selection of an observation position is critical to the ability of the TACP to effectively control CAS. The position permits observation of targets. Landmarks and prominent terrain features should be avoided, as the enemy probably targets them.

(3) **Communications.** TACP's primary means of communication is tactical radios. The TACP is positioned to allow communications with the commander, HHQ (TACP), and the CAS aircraft.

c. **Reconnaissance.** If time and the tactical situation permit, take advantage of the opportunity to conduct reconnaissance of the battlefield. Confirm when observation positions offer visibility of engagement areas, enemy avenues of approach, and dead space. Verify communications connectivity.

CHAPTER V
EXECUTION

> *"It is firepower, and firepower that arrives at the right time and place, that counts in modern warfare."*
>
> **B.H. Linddell Hart,**
> ***Thoughts on War,* 1944**

1. Introduction

CAS execution, as depicted in Figure V-1, begins with a target nomination from the supported commander and involves two processes that are continuous and overlapping in nature: JTAC/operations center coordination and CAS target engagement. This chapter discusses the considerations required for the detailed integration of CAS with the fire and maneuver of the supported unit.

2. Close Air Support Target Engagement

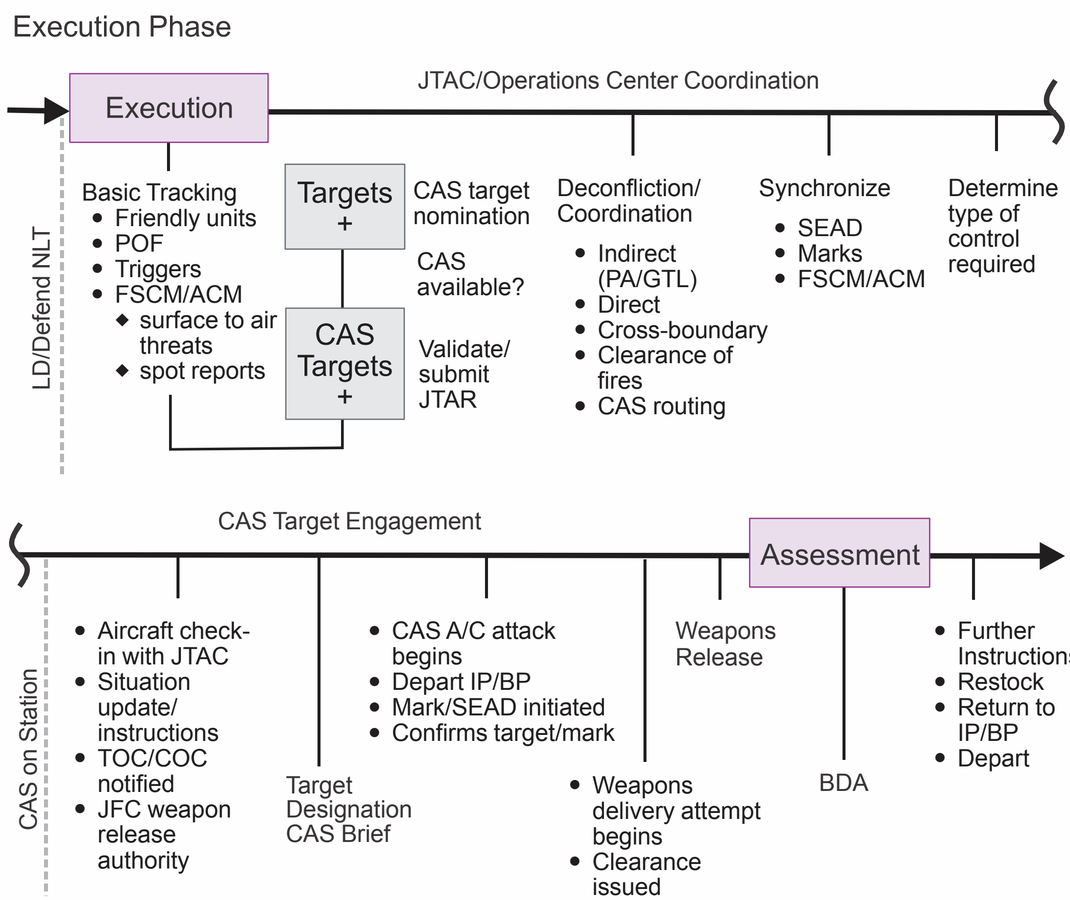
This section will provide standard procedures for CAS execution. While theaters or specific commands may have unique requirements, JTACs, FAC(A)s, CAS aircrews, and fire supporters should be familiar with the standard formats used in passing key information between CAS participants.

a. **JTAC Actions for Developing a CAS Brief.** Once a ground commander has nominated a CAS target, the JTAC should accomplish the following tasks to prepare for CAS engagement. These steps should begin with the target and work backwards. This sequence allows the JTAC to build a game plan, CAS brief, and remarks/restrictions in a logical order. Each step, however, will affect the others and may result in an iterative process. For instance, SEAD requirements may influence plan development.

(1) **Develop Targeting Data**. Planning for a CAS attack should begin with the target and work backwards. There are five main pieces of information a JTAC needs to begin the CAS attack planning: target elevation, target description, target location, friendly location, and commander's desired effects on the target.

(a) **Target Elevation (Line 4).** The default target elevation is in ft MSL. It can be given in ft height above ellipsoid, but must be specifically stated. Elevation is the most difficult aspect to judge accurately. Targeting software is the most accurate method to derive elevation; however, terrain association can generally be accurate enough except in very steep terrain and/or in urban environments. If practical, mitigate elevation errors with steeper bomb impact angles.

Close Air Support Execution



Legend

A/C	aircraft	JTAC	joint terminal attack controller
ACM	airspace coordinating measure	JTAR	joint tactical air strike request
BDA	battle damage assessment	LD	line of departure
BP	battle position	NLT	no later than
CAS	close air support	PA	position area
FSCM	fire support coordination measure	POF	priority of fires
GTL	gun-target line	SEAD	suppression of enemy air defenses
IP	initial point	TOC/COC	tactical operations center/ combat operations center
JFC	joint force commander		

Figure V-1. Close Air Support Execution

(b) **Target Description (Line 5).** Line 5 should be a concise, accurate description of the target (e.g., "Five APCs in the open"). The JTAC FAC(A) should avoid using overly complicated descriptions or labels that will not be understood by aircrews. However, JTACs/FAC(A)s should be specific with the actual target. For example, if the commander's intent is to kill a high value target that happens to be inside a building at the time, Line 5 should be "HVT in 2-story building," vice "2-story building." The target is the personnel, not the building itself.

(c) **Target Location (Line 6).** JTACs/FAC(A)s must consider the accuracy of Line 6 required to achieve ground commander's intent versus the time required to generate a more accurate coordinate. Some of the factors to consider when determining the level of target coordinate accuracy required are the delivering platform system capabilities, the proximity of friendly troops, the ordnance available, the need and difficulty of target acquisition anticipated, collateral damage concerns, and method of engagement. A Type 2 BOC with LGB ground-lase will require a much less accurate coordinate than a Type 2 BOC JDAM mission where a direct hit will be necessary to meet ground commander's intent. Methods to determine target location include:

1. Terrain Association with Map. Least accurate, but efficient and effective depending on the situation.

2. LRF Coupled with GPS and/or Compass. More accurate than terrain association, but still has limitations related to magnetic bearing. This method can take longer than terrain association but may yield a more accurate location. Caution must be taken in environments where GPS jamming is likely. If GPS jamming is suspected, target data development should be accomplished via another method.

3. Targeting Software. Most accurate method, dependent on updated and accurate software to function properly.

4. Aircraft or multisensor imagery reconnaissance (MIR)/ISR asset-derived coordinates.

(d) **Friendly Location (Line 8).** The location is given in a cardinal/sub-cardinal direction and distance in meters from the target to the closest friendly position (e.g., "Southwest 300"). The observer or JTAC may not be the closest friendly to the target.

(e) **Commander's Desired Effects.** The desired effects may be determined through dialogue with the ground commander. JTACs should provide the commander with a realistic expectation of ordnance effects, based on the likely aircraft loadout and professional expertise.

(2) **Request Air Support**

(a) Once a rough location for the target has been determined and commander's desired effects are known, JTACs should request air support at the earliest possible opportunity due to the transit time required for CAS aircraft to arrive on station. Do not delay the request to refine the coordinate at this time. Extreme caution should be taken when using "generic" or previously generated coordinates for the air request. Friendly Fire events have occurred when JTACs utilized friendly locations in the air request as initial routing points for CAS aircraft. Friendly locations should never be utilized as the target location in a JTAR.

(b) **JTAR Accuracy.** Ideally, the controlling agency (e.g., ASOC, DASC, Marine or Navy TACC, TAC[A]), briefs the aircrew before contact with the JTAC/FAC(A) using the information from the JTAR, Section 1, Block 8 (see Appendix A, "Joint Tactical

Air Strike Request"). The brief must be accurate, concise, and executed quickly. Map datum must be considered when determining target grid coordinates. The mission brief should not change once an aircrew leaves the IP/BP inbound to the target.

(3) **Develop Game Plan**. The game plan, at a minimum, will contain the type of control and method of attack. In addition, the following can be part of the game plan or passed in remarks: the ground commander's intent, the ordnance effects desired, or the ordnance and fuze combination required, if known. Aircraft interval can also be specified by the JTAC. If specified by the JTAC, and the aircrew desires to have a different interval, it can request a different interval. However, aircraft interval plays a significant role in SEAD, target marking, and ground lasing missions and may be specifically required to create desired effects in minimum time. The JTAC's intent is not to dictate aircraft tactics, but to offer a plan that meets the commander's intent. Developing the game plan in the following order provides a logical flow working backwards from the target:

(a) **Determine Desired Effects**. The first step in developing a game plan is to determine the ground commander's desired effects and how to create them. Factors to consider are target composition (hard or soft target), target array (point target or dispersed), target location (in the open or enclosed), collateral damage, and distance from friendlies. Consideration should be given to the type of aircraft and standard conventional loads that will be likely to show up in support, the aiming system, delivery mode, threat, and required time to employ, in order to select the most appropriate weapon and a proposed optimum combination of ordnance and fuzing. JTACs and FAC(A)s should have a working knowledge of ordnance effects as well as risk-estimate distances (REDs) and the conditions under which those numbers were derived. Consult JFIRE REDs and determine whether friendly troops are at risk. If so, consult with the ground commander and weigh the risks of all potential courses of action before employing ordnance. JTACs may relay to aircraft the desired weapons effects and, as applicable, desired ordnance and fuzing. Aircrew may suggest alternate ordnance and fuzing, based upon the ground commander's desired effects.

(b) **Select Type of TAC**. Type of TAC is based on several factors that include the type of ordnance employed, the JTAC's ability to observe either the aircraft or the target, the best method to mitigate risk, and the speed of target engagement.

(c) **Select Method of Attack (BOT or BOC).** The optimum method of attack is chosen based on which method allows the quickest target engagement and is dependent on the target type, how the target will be acquired, and the situation.

(d) **Plan Aircraft Interval.** JTACs can request specific impact intervals based on target, threat, friendlies, artillery/SEAD/laser deconfliction, ordnance, restrictions, weather, etc. The aircrew, in coordination with the JTAC, is responsible for deriving its own tactics in meeting the ground commander's intent.

1. Simultaneous Timing. All aircraft will deliver ordnance to create simultaneous effects. This method minimizes CAS aircraft exposure to threats and minimizes the amount of time the enemy will have to react to the attack. This is the optimum method of attacking multiple targets, especially mobile targets that may flee once

the attack commences. Primary limitation of this method is the inability to correct or abort between impacts and might decrease aircraft mutual support during the attack.

Note: LGWs require different laser codes in order to conduct simultaneous attacks.

2. Sequential Timing. Aircraft will attack one at a time with a specific interval between each aircraft. The interval between aircraft is based on several factors, including the time to acquire the subsequent aircraft and judge nose position, the time of flight of the weapon, the time to clear obscurations or fragmentation effects from previous impacts, and the time needed to assess effects and decide on subsequent attacks. Rules of thumb for aircraft interval are:

a. Thirty seconds for Type 1 controls of unguided ordnance

b. About one minute for LGBs delivered from medium altitude

c. More than two minutes to decide on follow-on attacks for PGMs delivered from medium to high altitude.

(e) **Develop Sensor Plan.** JTACs should plan for allocation of the multiple sensors that may be available for a CAS attack. See paragraph 3, "Multisensor Imagery Reconnaissance and Intelligence, Surveillance, and Reconnaissance in Close Air Support," for more information.

(4) **Determine/Coordinate Mark/Aid to Correlation**

(a) BOC

1. No mark required for attacking aircraft. Line 7 is "no mark."

2. If terminal guidance is used for LGWs, Line 7 will state the call sign of the entity providing terminal guidance with laser with the associated PRF code (e.g., "Blackjack laser, code 1688").

(b) BOT – Line 7**—**the mark is specific to the attacking aircraft

(c) BOT and third party contributor correlation

1. **Third Party Contributor.** Due to the expanding technological capabilities of manned and unmanned platforms, weapons, and sensors, JTACs may employ a wide array of third party contributors to aid in target location, precise coordinate generation, terminal guidance, BDA, and intelligence collection. A third party contributor is any individual who is integral to the success of the CAS attack, based on the contributor's ability to provide target location, target marking, terminal guidance, or BDA. Therefore, correlation is also required with third party contributors. A third party contributor may be used to support either BOT or BOC attacks. Examples of third party contributors are remote observers (JFO, scout sniper, FIST, etc.), airborne platforms that can provide terminal

guidance (laser equipped UAS, RW, and FW platforms), as well as airborne platforms that can generate target location information or provide target marking.

2. Considerations

a. Aircrews generally use a combination of sensors and visual lookout to acquire marks and targets. JTACs should be generally familiar with aircraft sensor capabilities and employ marks that take advantage of those capabilities. For instance, when strafing, a FW aircraft may use a LST to track a JTAC's laser energy, and then create a system target designation to provide cueing to the target in their heads up display for visual acquisition.

b. JTACs must always be prepared for a back-up marking plan. In addition, JTACs must be ready to use marks of opportunity on the battlefield. Anything the JTAC can find to cue aircraft sensors and aircrew eyeballs to the target may be useful as a mark.

3. Types of Marks and TGO

a. **Laser Handoff.** Using an LTD to provide energy for an aircraft's LST. Aircraft LST display provides cueing to aircrew. LTD may be ground-based or from another aircraft.

(1) Advantage

(a) High confidence in target correlation if appropriate geometries are used.

(b) May be used day or night.

(2) Disadvantage

(a) Requires LTD and LST.

(b) Requires coordination and geometry setup to ensure aircraft LST does not track ground LTD.

(c) Ground LTD laser marksmanship is often challenging. Low grazing angles often may cause beam skipping or laser spillover may occur. Spot jitter can also be an issue due to ground laser operators potentially being under fire.

(3) In order to ensure aircraft LST acquisition of a laser mark and complete correlation prior to an aircraft arriving at its weapons release solution, it may be necessary to coordinate a target acquisition pass prior to the aircraft beginning its attack run. This is often a factor when employing stand-off ordnance. Laser marks may also be used without a target acquisition run.

(4) For ground lasing missions, FAHs shall be passed when using laser handoff as a marking technique to ensure that aircraft are in the laser acquisition area. LTL shall be passed.

b. **Match Sparkle.** Directing the aircrew to overlay their IR sparkle onto an IR sparkle that is already on the target. The aircrew will be heads-out matching sparkles, using its NVGs and slewing its sensor/sparkle. The aircrew will then look inside to see what is in its sensor FOV. CAS aircrews must be VISUAL and TALLY or CONTACT SPARKLE when using a ground-based IR pointer as a mark.

(1) Advantage

(a) Quick.

(b) JTAC has visual confirmation of what the aircrew is correlated on.

(2) Disadvantage

(a) Night only.

(b) Requires coordination to ensure aircrew is positioned to acquire the correct end of the IR sparkle.

(c) With multiple IR sparkles near a target, it may be difficult for the JTAC to discern if the sparkles are actually on the target due to perspective and “blooming” of NVGs.

(d) When the enemy is equipped with NVGs, the use of IR sparkles may expose the operator and/or result in a loss of surprise.

c. **Sparkle Walk-On.** Walking an aircraft’s IR sparkle onto a target using verbal commands.

(1) Advantage

(a) Does not require ground operator to expose their position to an NVG-capable enemy.

(b) JTAC has visual confirmation of what the aircrew are correlated on.

(2) Disadvantage

(a) Night only.

(b) Enemy equipped with NVGs may become aware they are being targeted.

(c) Due to differing perspectives, it can be very difficult for a JTAC to verbally talk an aircraft's sparkle onto a target.

d. **Ground IR Sparkle.** When marking with ground-based IR pointer, aircrews shall visually verify the friendly position, either through friendly position marking (e.g., IR strobe), or through "roping" the aircraft, "snaking" the target, etc.

(1) Advantage—quickly orients NVG-equipped aircrew to target.

(2) Disadvantage

(a) Night only.

(b) When the enemy is equipped with NVGs, the use of IR sparkles may expose the operator and/or result in a loss of surprise.

(c) Low grazing angles may cause skipping and spillover.

(d) Requires coordination to ensure that aircrew acquire the correct end of the IR sparkle.

e. **Video Downlink Talk-On**

(1) Advantage—allows JTAC to see the aircraft sensor picture.

(2) Disadvantage—requires VDL receiver.

f. **TRP/GEOREF Point Offset**

(1) Advantage

(a) Readily available if aircrew are familiar with the TRP or GEOREF.

(b) Day or night.

(c) Provides a common starting point for talk-ons.

(2) Disadvantage - Requires aircrew to be familiar with the TRP or GEOREF.

g. **IDF Mark**

(1) Advantage

(a) Day or night.

(b) Does not require the JTAC to expose their position.

(c) Provides a starting point for talk-ons.

(2) Disadvantage

(a) Takes time to coordinate.

(b) Accuracy of most IDFs means that a correction from the mark will generally be required.

(c) Indirect fires must be deconflicted from CAS assets.

(d) Sensor field-of-view may be an issue for aircrew using sensors to acquire the mark. If the mark is outside of the sensor field-of-view, the aircrew will not see it.

(e) Obscuration from IDF marks must be considered when employing LGWs.

(f) Illumination on deck at night will wash out aircrew NVGs.

(g) Sacrifices surprise.

h. **Direct Fire.** Uses direct fire weapon systems firing at a target to cue the aircrew. Tracers, or shooting the ground short of a target, are techniques that may better cue the aircrew. M203 grenade rounds, especially smoke rounds, can be used very effectively as marks.

(1) Advantage—readily available.

(2) Disadvantage

(a) Depending on target composition, direct fire weapons effects may penetrate the target and continue on (e.g., a tank round penetrates a wall and continues on to hit another wall). As the effects may impact beyond the intended target, and out of view of the JTAC, this may lead to confusion between the JTAC and the aircrew as to what is being marked.

(b) Hard for RW to acquire visually during the day. Firing into the ground short of the target may kick up dirt, which may be more visible to the aircrew. This technique must be balanced with the undesirable need to purposely not shoot the target.

(c) Hard for FW to acquire visually day or night. FW aircrews may be able to see direct fire impacts on their sensors, subject to the impacts being in the FOV.

(d) JTACs should be aware of vertical surface danger zones associated with direct fire weapons and consider this when planning attack geometry.

i. **Link-16/SADL Handoff.** Aircraft equipped with Link-16/SADL may select ("hook") a track that has been created on the Link-16/SADL network. This cues aircraft sensors to the location of that track.

(1) Advantages—aircraft en route to a target area can receive Link information well before checking in with the TACP, allowing them to gain SA early.

(2) Disadvantages

(a) Not all aircraft are Link-16 capable.

(b) Most ground-based digital CAS systems are not capable of creating a track on the Link-16 network without a gateway.

(c) Interoperability across the joint force.

j. **Radar Beacon Offset**

(1) Advantage—day or night, all-weather.

(2) Disadvantage

(a) Requires radar beacons not commonly carried.

(b) Very little aircrew and JTAC training on the uses of radar beacon bombing.

k. **Night Considerations**

(1) Limited visibility and differing perspectives make it difficult to correlate at night. If available, JTACs should consider using advanced optics such as PVS-17s or thermals to increase their capability.

(2) Battlefield illumination may also be used to illuminate targets. Illumination should be planned to be offset from the target in order to avoid blooming out aircrew NVGs.

(3) IR illumination may also be effective for aircrew using NVGs. IR illumination can be delivered by IDF or aircraft.

l. **Marks of Opportunity.** Anything on the battlefield that can be used to cue aircraft SA to the target, such as other fires in the area, burning structures, vehicle traffic, etc.

(5) **Develop Attack Geometry.** JTACs must consider many factors when determining attack geometry and make an educated compromise among these factors.

(a) **Final Attack Heading (FAH).** See Chapter III, "Planning and Requesting," paragraph 14c(3)(d), "Final Attack Headings," for more information on FAHs. When using cardinal directions for the attack heading, aircraft FAH should be +/- 45-degrees of the cardinal/sub-cardinal direction (i.e., if north to south, then aircraft FAH should be 180 +/- 45, or 135-225).

(b) As a technique, FAHs should not be planned over friendly positions (i.e., occupied HAs, BPs, OPs). However, on linear battlefields where aircraft traditionally hold behind friendly positions, JTAC/FAC(A)s should be aware that attacking aircraft must often overfly friendly positions en route to the target area.

1. JTACs/FAC(A)s should be aware of the off-axis capability of RW and UAS platforms. This could mean that RW and UAS platforms are not pointed at the target, but the munition will follow the briefed geometry. In this case, it may be more appropriate to give a munition attack azimuth as opposed to a FAH.

2. JTACs/FAC(A)s must be aware of the effects of short or long hits along the bomb-fall line or weapon-to-target line. In general, FAHs should be planned to be as close to parallel to the FLOT as possible.

(c) Deconfliction from other fires—lateral or vertical deconfliction may be necessary if de-confliction through time is not possible.

(d) Laser geometry.

(e) Target disposition/orientation.

1. For linear target sets, FAHs should generally be planned along the long axis of the target set.

2. Movement direction—attack along expected axis of target movement if able.

3. Obstacles

a. Urban Canyon. Optimally, plan to attack along urban canyons.

b. Terrain. Significant terrain, such as mountains, may influence FAHs, due to terrain masking targets or interfering with delivery profiles.

(f) Weather

1. Winds. Crosswinds >30-knots may affect probability of laser acquisition for LGBs. Priority for LGB FAHs is tailwind, then headwind, then crosswind.

2. Sun/moon position and angle.

a. FAHs that force an aircraft to attack into the sun, or a bright moon that is low on the horizon, makes it difficult for aircrews to acquire targets. This is especially true for FW diving and RW attacks.

b. FAHs that allow aircraft to attack out of the sun may provide increased protection from IR MANPADS.

3. Cloud decks in the target area may affect FAHs.

a. JTAC visual acquisition of aircraft.

b. Aircraft acquisition of the target/mark.

c. Laser terminal guidance.

(g) Preplanned ACMs/FSCMs/other restrictions

(h) JTACs determine IP/BP and egress plan to support attack geometry (lines 1,2,3,9). JTACs should strive to use control points for ingress and egress that do not make it necessary for aircraft to make inordinately large turns in order to abide by FAHs.

(6) **Determine SEAD Requirements/SEAD Plan**

(a) Plan for SEAD when attacking aircraft cannot avoid exposure to a threat, based on expected aircraft delivery profile and the threat's maximum effective range. Depending on the threat system, SEAD planning may be extremely complicated and require detailed integration with EW systems and fires agencies.

(b) When planning IDF SEAD, the SEAD timeline should be planned to suppress the threat from the first aircraft's entry into the threat's maximum effective range until after the last aircraft's exit from the threat's maximum effective range (see Figure V-2). If attack geometry does not allow for this, interrupted suppression may be utilized. Refer to Army Tactical Publication 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP 3-2.6, *JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower,* and AFTTP 3-1, *Threat Guide,* for maximum effective ranges of surface-to-air systems. Consideration must be given to the ability to deconflict via altitude. In the example of Figure V-2, based on a strafe profile, altitude deconfliction may not be possible if the SEAD target is in close proximity to the CAS target. In this case, a non-standard SEAD mission with a gap in the middle may be required.

(c) IDF SEAD and CAS may both prosecute the same threat, but consideration must be given to obscuration caused by SEAD impacts. Effects of SEAD must not prohibit successful CAS attacks.

Indirect Fire Suppression of Enemy Air Defense Timing Equation Rule of Thumb
IDF SEAD duration = time first aircraft enters threat's max effective range until time last aircraft departs threat's max effective range.
Assumptions: IDF SEAD planned for the portion of the attack that terrain masking and altitude sanctuary are not available.
FW CAS 8nm/min (A-10 5nm/min)
RW CAS 4km/min
Example: Fixed wing section strafing attack, 1 min separation, Threat has 5nm max effective range, threat collocated with CAS target. - Assuming 8nm/minute, the lead aircraft will enter the threat range approximately 45 seconds prior to TOT. The second aircraft will exit the threat range approximately 1+45 after lead's TOT - Suppression should be planned as nonstandard, -1+00 until +2+00, impacting every 30 seconds.
Legend CAS close air support FW fixed wing IDF km kilometer max maximum min minute nm nautical mile RW rotary wing SEAD suppression of enemy air defenses sec second TOT time on target

Figure V-2. Indirect Fire Suppression of Enemy Air Defenses Timing Equation Rule of Thumb

(d) EW SEAD—modern radio frequency (RF) threat systems may also require EW support in order to effectively employ CAS, requiring detailed planning and coordination.

(e) Threats may also be mitigated:

1. Laterally—use of standoff PGMs.

2. Vertically—aircraft maintain altitude sanctuary using over-flight rules of thumb.

3. Terrain masking

a. LOAL Hellfire.

b. FW pop deliveries.

For examples of SEAD integration, see Appendix E, "Examples of Close Air Support Missions," Examples 1 and 7.

b. **CAS Execution Template.** By its very nature, the execution of CAS differs in every tactical situation. The following considerations and recommendations are meant to be a guide for execution of CAS, so that both CAS aircrew and JTACs have a standard, repeatable format to expect in the highly dynamic CAS environment. The execution template is a technique used to organize the flow of events from when an aircraft first checks in with a JTAC, through a CAS brief and attack, to when the aircraft checks out.

(1) **Routing/Safety of Flight.** JTAC/FAC(A) should immediately advise newly checked-in aircraft of other AOS, their call sign, operating altitude, and frequency, as soon as possible. JTAC/FAC(A) should be prepared to deconflict assets (i.e., aircraft from aircraft, aircraft from surface fires, and aircraft from known hazards). JTAC/FAC(A) should advise aircrew of available airspace and desired IP/hold point locations for the attack. At initial aircraft check-in, AO/JTAC shall respond with, in order:

(a) **Aircraft Routing/Holding Instructions.** Upon initial contact, each controller shall at least give "maintain" instructions in order to establish control of aircraft (see Figure V-3 for an example of routing calls).

Example Routing Calls	
"Proceed xxxx and report established"	Call for aircrew to proceed to a location/elevation and verbally report when established
"Maintain xxxx"	Directive call for aircrew to hold at the specified location/altitude
"Report passing xxxx"	Call for aircrew to verbally report passing the specified altitude

Figure V-3. Example Routing Calls

"Razor 53, maintain Chevy-Dodge 14-15"

1. If unsure of aircraft's current position and altitude, JTAC must request this information prior to giving routing/safety of flight instructions to avoid potential conflicts.

"Hawg 23, say current position and altitude"

2. If using an unbriefed keyhole template for holding, the JTAC must pass the center of the keyhole to the aircraft prior to passing holding instructions.

"Latch 65, keyhole in effect, Echo point is November Uniform nine one eight three five seven, proceed Alpha ten, angels 14-16."

(b) Other AOS. If no other aircraft, that should be stated

"Latch 65, proceed Chevy-Dodge, hold 13-15, you are the only aircraft on station."

(c) Any other info necessary for safety of flight

1. Immediate threats

"Deuce 21, proceed Emily to Adder maintain below 1500 ft AGL, there is a ZSU-23-4 vicinity of compound 34, you are the only aircraft on station."

2. Significant weather/terrain

(d) To maintain SA to where aircraft are during routing, JTACs may request status calls from aircrew.

(e) Routing and safety of flight examples:

"Razor 57, proceed Frog-Gambler angels twenty-five, at Frog-Gambler, descend and hold sixteen block eighteen, report established; hold your check-in, attack in progress."

"Deuce 23, proceed HA Betty, stay below 2K ft MSL en route, gun position 12 is hot, gun target line three four zero. You are the only air on station, send your check-in."

(2) **CAS Aircraft Check-In.** Aircraft check-in procedures are essential for establishing the required flow of information between the CAS aircrews and control agencies. Controlling agencies should update all CAS assets on the current situation en route to the target. Consequently, it is important for the JTAC/FAC(A) to brief the current situation to the ASOC/DASC allowing CAS aircraft to arrive with the most current information available.

(a) JTACs should be directive about when they want the aircraft check-in.

Example: "Latch 65 send your check-in"

(b) There may be a reason to delay taking or to abbreviate the aircraft check-in such as an attack in progress, JTAC not ready to copy, or JTAC waiting for aircraft to contact a different terminal controller prior to passing the check-in. If aircraft are on the ATO and the JTAC/FAC(A) has a copy of the ATO, the CAS asset may check-in "as fragged" and subsequent transmissions may be minimized. Authentication procedures will be used if deemed necessary. The CAS check-in briefing format is found in Figure V-4. This briefing may be shortened for brevity or security ("as fragged" or "with exception"). Capabilities examples include FAC(A), sensors, Link-16, etc. JTACs and CAS aircrew should strive to minimize multiple unnecessary check-ins. If the JTAC is planning on passing the aircraft to another controller, consideration should be given to waiting to speak to the JTAC that will be working with the aircraft to give the full CAS check-in.

Example: "Latch 65, hold your check-in, attack in progress"

Example: "Latch 65, Broadsword 11 will take your check-in once you contact him on Amber"

(c) Authentication. If not using secure communications, authentication should be used to determine if a station on the net is friendly.

(d) Depending on the situation, a JTAC may ask for only those parts of the check-in he currently needs.

Close Air Support Check-In Briefing
(Aircraft transmits to controller) Aircraft "____________," this is "____________" (e.g., "Heartless 52, this is Rumble 31") (JTAC c/s) (Aircraft c/s)
1. Mission Number _____________. (e.g., "Mission number 1541") (ATO assigned MSN #)
2. Number and type of aircraft: __________. (e.g., "2 by F/A-18C")
3. Position and altitude: _________. (e.g., "Currently 20 nm north of Ford, block 20-21")
4. Ordnance: _______. (e.g., "500 rds of 20mm, 1 by GBU-12, 1 by GBU-38 each aircraft, laser codes Rumble 31-1688, Rumble 32-1731, instantaneous and delayed fuzing for GBU-12s and GBU-38s")
5. Playtime or Time on Station: ________. (e.g., "We have 25 minutes time on station")
6. Capabilities: FAC(A), Type of Sensors, Link-16, VDL code, SITREPs on board, map version or GRGs, UAS Lost Link Procedures/Route: (e.g., "Rumble 31 is FAC(A) capable. Both aircraft are ATFLIR, and CAT II coordinate generation capable. Timber Sweet, Rumble 31 VDL code 4927. Rumble 32, VDL code 4977. We have SITREP C and micro-GRG 15-17 onboard.")
7. Abort code: _______. (e.g., "Abort code none, Ready to copy your updated SITREP.")

Figure V-4. Close Air Support Check-In Briefing

Example: "Latch 65, hold your full check-in, say ordnance and play-time."

Example: "Venom 15, do you have Papa Hellfire aboard?"

(e) MNPOPCA—The mnemonic "MNPOPCA" is useful for remembering the order of the check-in. (See Figure V-4.)

1. **M**ission number.

2. **N**umber and type of aircraft.

3. **P**osition and altitude.

4. **O**rdnance. If not stated by the aircrew, JTACs should ask for the following:

a. Laser code for LGBs.

b. Model of Hellfire.

c. Bomb fusing options—instantaneous/airburst/delay.

5. **P**laytime/time on station.

6. **C**apabilities. If not stated by the aircraft, the following items may be asked for by the JTAC.

a. VDL capability and code(s).

b. Current SITREPs/situation update codes.

c. Map/reference graphic version.

d. FAC(A) capability.

e. Sensor type and capability.

f. VMF/Link-16 (Timber).

7. **A**bort code.

a. If secure communications are in use, an abort code is not required. If not stated, "ABORT, ABORT, ABORT" is considered the standard to abort.

b. If communications are unsecure or need to be switched from secure to unsecure, then an abort code should be passed based on SPINS/SOP for area (e.g., authentication matrix, Ramrod).

c. If abort code is passed, JTAC should read back abort code to ensure accuracy.

8. If the JTAC/FAC(A) is unfamiliar with any of the aircraft's capabilities, they should ask questions in plain language at this time in order to avoid developing and issuing unsupportable instructions.

(3) **Situation Update**

(a) The situation update brief is a tool used to increase all players' SA to the level required by the tactical situation. The brief must be missionized based on the JTAC's expectations of the use of the CAS asset. Elements that can be included are: enemy activity, surface-to-air threat activity, friendly situation, remarks, weather and hazards. Figures V-5 and V-6 are format examples of a situation update.

<table>
<tr><th colspan="3">Situation Update Example 1</th></tr>
<tr><th>Situation Update Line</th><th>Close Air Support (CAS) Situation Update</th><th>Battlefield Handover (BHO)</th></tr>
<tr><td>Threat</td><td>- General locations of surface-to-air threats not already covered.
- Time of last observed surface-to-air fires may also be passed.</td><td>- General locations of surface-to-air threats not already covered.
- Time of last observed surface to air fires may also be passed.</td></tr>
<tr><td>Targets</td><td>- General enemy disposition.
- Avoid giving a list of grids. Specific targets and locations will be addressed in CAS briefs.</td><td>-General enemy disposition.
Include ground combat element (GCE) targeting priorities.
- Include target location grids, may require breaking up the transmission.
- GCE attack guidance matrix and target priority list.</td></tr>
<tr><td>Friendly</td><td colspan="2">- General friendly situation and scheme of maneuver.
-Use geographic references, phase lines, checkpoints, etc. Technique is to use general terms: "all friendlies are east of the 94 easting."
- Friendly grids should not be passed if it can be avoided. If necessary, use no more than 6 digits.
- Should include all friendlies that may be a factor during time on station (TOS), not just joint terminal attack controller (JTAC).
- Include all CAS assets, ordnance, and TOS remaining for BHO.</td></tr>
<tr><td>Artillery</td><td>- Indirect fire assets that may be a factor during TOS, may include general direction of fire.</td><td>- Firing unit location, call sign, frequency, status.</td></tr>
<tr><td>Clearance Authority</td><td colspan="2">- May be omitted if the speaker has control.
- If there may be confusion due to multiple voices on tactical air direction, roles should be clarified: "Savage 13 has control and is located in the COC, my JFO call sign E4B is located with Charlie company, and is up this net."

- Define who has which elements of brief, stack, mark, and control.
- If not already prebriefed, a game plan for the approval of fires should be passed for BHO.</td></tr>
<tr><td>Ordnance</td><td colspan="2">Expected ordnance required to achieve ground commander's intent.
Any restrictions to ordnance allowed such as no cluster bomb units, or low CD bombs only.</td></tr>
<tr><td>Remarks and Restrictions</td><td>-Additional radio calls that will be included for the whole TOS.
- JTAC capabilities (laser, infrared sparkle, video downlink, etc.)
- Intent for aircraft (CAS, multisensory imagery reconnaissance, etc.)
- Hazards (weather) or other remarks.</td><td>- Additional radio calls that will be included for the whole TOS.
- Hazards (weather) or other remarks.
- At the conclusion, a positive passing of the appropriate elements of brief, stack, mark, and control should occur.</td></tr>
<tr><td colspan="3">Example Situation Updates:</td></tr>
<tr><td colspan="3">CAS: "Current surface-to-air threat is a SA-6 at KJ 123 456, just west of MSR Tampa; target is light armored company attempting to flank us to the north and two companies dug in three klicks to our west, break."
"Friendlies are two companies in the vicinity of OP 2, one on the high ground and the other in a blocking position to the east. I am with the company on the high ground. There is also a Recon team at the northwest tip of Black Mountain, arty is firecapped at Firebase 5E, firing generally west, break."
"Savage 13 has control. Plan on using your GP bombs to disrupt the light armor. Winds on the deck are 10-knots out of the west. Savage is laser and IR capable, advise when ready for game plan."</td></tr>
</table>

Figure V-5. Situation Update Example 1

Situation Update Example 2		
Situation Update Line	**Close Air Support (CAS) Situation Update**	**Battlefield Handover (BHO)**
Threat	- General locations of surface-to-air threats not already covered. - Time of last observed surface-to-air fires may also be passed.	- General locations of surface-to-air threats not already covered. - Time of last observed surface-to-air fires may also be passed.
Enemy Situation	- General enemy disposition. - Avoid giving a list of grids. Specific targets and locations will be addressed in CAS briefs.	-General enemy disposition. Include ground combat element (GCE) targeting priorities. - Include target location grids, may require breaking up the transmission. - GCE attack guidance matrix and target priority list.
Friendly	- General friendly situation and scheme of maneuver. -Use geographic references, phase lines, checkpoints, etc. Technique is to use general terms: *"all friendlies are east of the 94 easting."* - Friendly grids should not be passed if it can be avoided. If necessary, use no more than 6 digits. - Should include all friendlies that may be a factor during time on station (TOS), not just joint terminal attack controller (JTAC). - Include all CAS assets, ordnance, and TOS remaining for BHO.	
Artillery	- IDF assets that may be a factor during TOS, may include general direction of fire.	- Firing unit location, call sign, frequency, status.
Clearance Authority	- May be omitted if the speaker has control. - If there may be confusion due to multiple voices on tactical air direction, roles should be clarified: *"Broadsword 11 has control and is located in the COC, my JFO callsign Mustang is located with Charlie company, and is up this net."* - Define who has which elements of brief, stack, mark, and control. - If not already prebriefed, a game plan for the approval of fires should be passed for BHO.	
Hazards	Towers, MSA, Weather—to include surface winds, etc.	
Remarks and Restrictions	-Additional radio calls that will be included for the whole TOS. - JTAC capabilities (laser, infrared sparkle, video downlink, etc.) - Intent for aircraft (CAS, multisensory imagery reconnaissance, etc.) - Other remarks.	- Additional radio calls that will be included for the whole TOS. - Other remarks. - At the conclusion, a positive passing of the appropriate elements of brief, stack, mark, and control should occur.
Example Situation updates:		
CAS: *"Current surface-to-air threat is an unlocated ZSU 23-4, last seen west of MSR 5; enemy situation is a light armored company attempting to flank us to the north and two companies dug in three klicks to our west, break."* *"Friendlies are two companies in the vicinity of OP 2, one on the high ground and the other in a blocking position to the east. I am with the company on the high ground. There is also a STA team at the northwest tip of Blue Mountain; 81mm mortars are firecapped south of OP 2, firing generally northwest, break."* *"Winds on the deck are 15-20 knots out of the northwest, I have a videoscout, but no laser, request IN with a heading for all Type 2 controls. I plan on using you to disrupt the light armor, advise when ready for game plan."*		

Figure V-6. Situation Update Example 2

1. The length and depth of the situation update must be balanced with the need to pass game plans and CAS briefs in order to create timely and desired effects. Not all elements must be passed to all aircraft. The objective of the situation update is to build the oncoming aircrew's SA to the level necessary to conduct the expected mission. Situation updates that are read too quickly, are excessively long, or pass unnecessary information waste time and decrease SA. JTACs should break up the situation update into manageable transmissions. A situation update that is rattled off to aircrews that are just arriving into a dynamic scenario will most likely not be copied. For example, in a situation where the JTAC is in a troops-in-contact situation, has requested air support, has done thorough coordination with the fires approval chain, and is simply waiting for aircraft to check in to execute a BOC attack, the situation update would be relatively short. On the other hand a JTAC giving a situation update to an aircrew that is preparing to conduct urban MIR overwatch of a friendly patrol, may require a more detailed brief.

2. JTACs/FAC(A)s, when able, should pass their update to the ASOC/DASC who will pass it to the attack aircraft. The situation update may be passed to a TAC(A) or FAC(A) to relieve the workload if multiple aircraft are expected. Upon initial check-in with the JTAC/FAC(A), aircrews should state whether they have the latest ground situation.

3. Situation Update Codes. Situation updates may be given alphanumeric identifiers or time stamps and passed from the TACP to the appropriate C2 element. The C2 element will then pass these coded/time-stamped updates to CAS aircraft, allowing for higher aircrew SA upon check-in, and alleviating the need for the JTAC to pass a full situation update. Changes to the situation update may be passed by the TACP as aircraft check on station. If appropriate, JTACs may pass specific AO situation updates as well.

(b) Only those lines that apply should be passed. The situation update is also a format recognized for battlefield handover between terminal controllers (i.e., JTAC to FAC[A]). The format should be adapted to the mission and only those items required to accomplish the expected mission should be passed. Passing redundant or non-essential information increases time to kill and should be avoided.

(4) **Game Plan.** A concise means to inform all players of the flow of the upcoming attack. Minimum information shall include type of control and method of attack. Avoid repeating information that will be given in other parts of the CAS brief, remarks, and restrictions. Additional information may include ground commander's intent, collateral damage concerns, ordnance requested, desired effects, fuzing, interval, and number of digits to expect in line 6, if appropriate.

Example: "Deuce 21, Type 1, bomb on target; advise when ready for 9-line."

Example: "Latch 65, Type 2, bomb on coordinate, one GBU-38 instantaneous fusing each aircraft, simultaneous impact, 8-digit grid to follow; advise when ready for 9-line."

Example: "Venom 15, Type 3, bomb on target, I need all BRDMs and enemy personnel in the vicinity destroyed; advise when ready for 9-line."

(a) If there are questions regarding aircraft capabilities, ordnance, tactics, etc., these should be cleared up, using plain language, prior to confirmation of the CAS briefing.

(b) Game plan is utilized for attacks involving single or multiple elements. When conducting coordinated attacks, the plan should be briefed to all players, followed by single element as appropriate.

Example: "Latch 65 and Venom 11, in order, advise when ready for game plan."

(c) To frame a multiple element engagement, use the term "in order" to establish the order in which the aircrew should respond to the JTAC's calls. In the below example, Latch 65 should acknowledge prior to Venom 11. This cadence order should match the order in which the JTAC is planning on executing the attack.

1. For multiple elements, the following information should be included:

a. Type of coordinated attack

(1) Type of attack: Combined or Sectored

(2) Attack timing: Simultaneous, Sequential, or Random

b. Flow of attack

(1) If combined, the order and method of separation (e.g., visual, timing, altitude) that the elements will use.

(2) If sectored, which general target area each element will be responsible for, and what will be used to define the sector (e.g., GEOREF, gridline).

Example: "Latch 65 and Venom 11, this will be a sectored simultaneous attack, Latch 65 to the east, Venom 11 to the west. Latch 65, advise when ready for game plan."

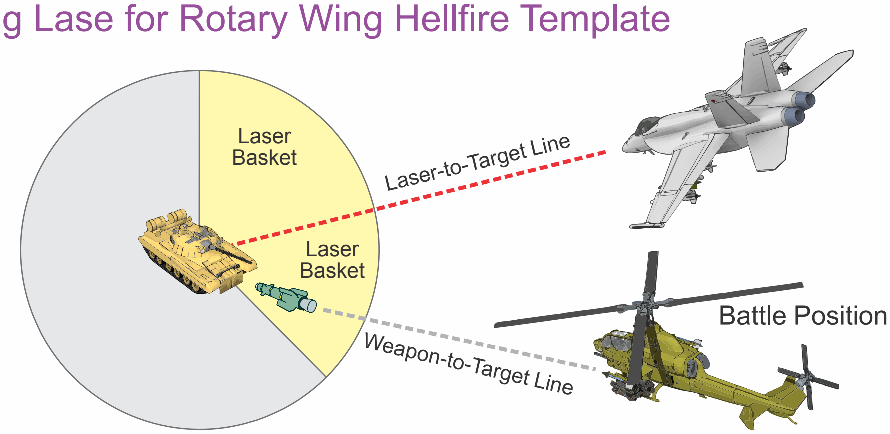
2. The JTAC/FAC(A) should read the first element's entire plan, CAS brief, remarks and restrictions prior to the second element's plan in order to maintain good communication cadence. All aircrew should be paying attention to the plans and CAS briefs given to other elements. If both elements are attacking the same target, the JTAC/FAC(A) has the option of issuing a CAS brief to the first element, and simply issuing changes to the same CAS brief for the second element.

Example: "Razor 55 and Deuce 23, this will be a combined sequential attack with Razor flight attacking first, followed by Deuce 23 two minutes in trail of Razor 56's impacts. Razor 55, advise when ready for game plan."

3. When briefing coordinated attacks, the JTAC may state, "Hold all readbacks," in the remarks portion of each CAS brief, so the JTAC transmits briefs for all elements prior to receiving readbacks. The JTAC should then request readbacks when ready. The JTAC may also get readbacks immediately following the attack briefs to each element if this better fits the JTAC's/FAC(A)'s habit pattern.

4. Third -Party Lasing. When using an off-board element to host an LGW, the JTAC shall identify the lasing entities' call sign and the laser PRF codes for the intended weapons in Line 7. Off-board platforms providing laser to other elements require detailed coordination among all players. Templates for FW and RW lase are provided in Figures V-7 and V-8 below. JTACs shall also ensure they correlate with the lasing platform.

Fixed Wing Lase for Rotary Wing Hellfire Template



Lock-On After Launch Shot	Lock-On Before Launch Shot
JTAC correlates target with FW. FW: "Latch 61 CAPTURED 1112 set." [Note 1] JTAC: Pass 9-line to RW. RW: Read back lines 4, 6, and restrictions. Lasing platform sets tempo. Shooter sets laser comm. RW maneuvers for shot. RW: "Venom 11, weapon-target-line 270, time of flight 14 seconds." RW: "1 minute." (When 1 minute from "Rifle") FW maneuvers to designate (+/- 60° of the WTL). RW: "In position." FW: "Standby xx seconds." [Note 2] (or) "CAPTURE." RW: "Venom 11, TEN SECONDS." FW: "TEN SECONDS." RW: "Venom 11, IN, heading 270." JTAC: "Venom 11, CLEARED HOT." RW: "Rifle, time of flight 14 seconds." RW: "LASER ON." [Note 3] FW: "Latch 61, LASING 1112." FW: "Impact." RW or FW: "SHIFT/CEASE LASER." [Note 4]	JTAC correlates target with FW. FW: "Latch 61 CAPTURED 1112 set." [Note 1] JTAC: Pass 9-line to RW. RW: Read back lines 4, 6, and restrictions. Lasing platform sets tempo. Shooter sets laser comm. RW maneuvers for shot. RW: "Venom 11, weapon-target-line 270, time of flight 14 seconds." RW: "1 minute." (When 1 minute from "Rifle") FW maneuvers to designate (+/- 60° of the WTL). RW: "In position." FW: "Standby xx seconds." [Note 2] (or) "CAPTURE" RW: "Venom 11, TEN SECONDS." FW: "TEN SECONDS." RW: "LASER ON." FW: "Latch 61, LASING 1112." RW: "Venom 11, SPOT." RW: "Venom 11, IN, heading 270." JTAC: "Venom 11, CLEARED HOT." RW: "Rifle, time of flight 14 seconds." FW: "Impact"

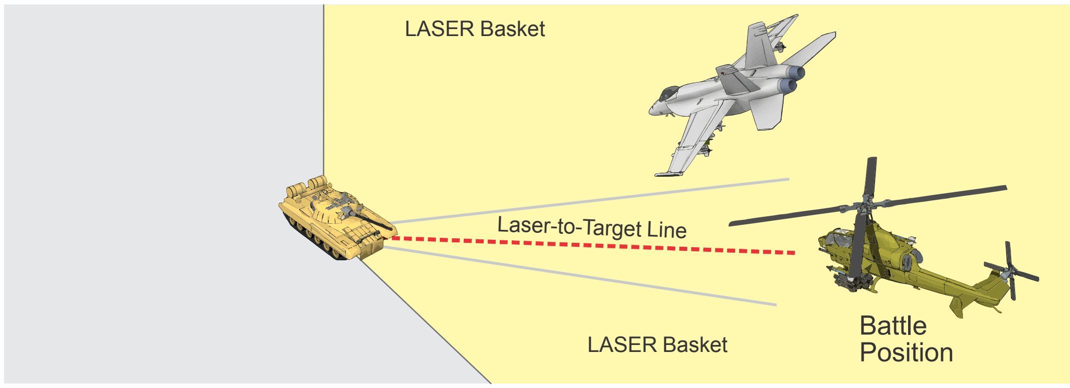
NOTES:
(1) Correlation with lasing platform may occur before or after the passage of game plan and 9-line to the releasing platform.
(2) Call to allow FW maneuvering for designation solution.
(3) RW will call "LASER on" before or after "CLEARED HOT," depending on laser delay requirements and missile time-of-flight.
(4) Multiple Hellfire shots will have a minimum of 8 seconds between them to allow for shifting of the laser to additional targets.

Legend

FW	fixed wing	RW	rotary wing
JTAC	joint terminal attack controller	WTL	weapon-to-target line

Figure V-7. Fixed-Wing Lase for Rotary-Wing Hellfire Template

Rotary Wing Lase for Fixed Wing Template



Continuous Lase	Delay Lase
JTAC correlates target with RW. RW: "Deuce 21, CAPTURED 1776 set." [Note] JTAC: Pass game plan and CAS brief to FW. FW: Read back lines 4, 6, and restrictions. Lasing platform sets tempo. Shooter sets laser comm. FW begins run-in. FW: "Razor 51 IP inbound." RW maneuvers to designate. FW: "Razor 51, IN heading 230, TEN SECONDS" JTAC: "Razor 51, CLEARED HOT." FW: "Razor 51, one AWAY, LASER ON, time of fall 24 seconds." RW: "Deuce 21, LASING 1776." RW: "Impact" RW or FW: "SHIFT/CEASE LASER."	JTAC correlates target with RW. RW: "Deuce 21, CAPTURED 1776 set." [Note] JTAC: Pass game plan and CAS brief to FW. FW: Read back lines 4, 6, and restrictions. Lasing platform sets tempo. Shooter sets laser comm. FW begins run-in. FW: "Razor 51 IP inbound." RW maneuvers to designate. FW: "Razor 51, IN heading 230" JTAC: "Razor 51, CLEARED HOT." FW: "Razor 51, one AWAY, time of fall 24 seconds." FW: "TEN SECONDS." RW: "TEN SECONDS." FW: "LASER ON." RW: "Deuce 21, LASING 1776." RW: "Impact" RW or FW: "SHIFT/CEASE LASER."

NOTE:
Correlation with lasing platform may occur before or after the passage of game plan and 9-line to the releasing platform.

Legend

CAS	close air support	JTAC	joint terminal attack controller
FW	fixed wing	RW	rotary wing
IP	initial point		

Figure V-8. Rotary-Wing Lase for Fixed-Wing Template

(5) **CAS Brief**

(a) JTACs/FAC(A)s will use a standardized briefing to pass information rapidly. The CAS brief (Figure V-9), also known as the "9-Line Brief," is the standard for use with FW and RW aircraft. The CAS briefing form helps aircrews in determining whether they have the information required to perform the mission. The brief is used for all threat conditions and does not dictate the CAS aircraft's tactics. The attack brief follows the numbered sequence (1-9) of the CAS briefing form. Elements of a CAS brief will not be passed piecemeal over several minutes and out of sequence. The first 9 lines are understood and line

9-Line Close Air Support Briefing Format

Format 16. Game Plan and CAS 9-Line Briefing

Do not transmit line numbers. Units of measure are standard unless briefed.

Lines 4, 6, and any restrictions are mandatory readback.* JTAC may request additional readback.

JTAC: "____________, advise when ready for game plan."

JTAC: "Type (1, 2, 3) control method of attack (effects desired/ordnance, interval). Advise when ready for 9-line."

1. IP/BP: "____"
2. Heading: "____"
   (degrees magnetic, IP/BP-to-target)

   Offset: "____
   (left/right, when requested)
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/Terminal Guidance: "________________________________"
   (description of the mark; if laser handoff, call sign of lasing platform and code)
8. Location of Friendlies: "________________________________"
   (from target, cardinal direction and distance in meters)
9. "Egress: ____"

Remarks/*Restrictions:

LTL/PTL
Desired type/number of ordnance or weapons effects (if not previously coordinated).
Surface-to-air threat, location and type of SEAD.
Additional remarks (gun-target line [GTL], weather, hazards, friendly mark).
Additional calls requested.

*Final attack headings (FAHs)/attack directiion.
*ACAs
*Danger close and initials (if applicable).
*TOT/TTT

Note: For off-axis weapons, weapons final attack heading may differ from aircraft heading at the time of release. Aircrew should inform JTAC when this occurs, and ensure that weapons FAHs comply with restrictions given.

Figure V-9. 9-Line Close Air Support Briefing Format

numbers do not need to be passed. However, if lines 1-3 were abbreviated, the elevation transmission should begin with “Elevation.”

Example: “From the overhead. Elevation, four-hundred fifty feet …”

Note: Allied Tactical Publication 3.3.2.1, *TTP for Close Air Support and Air Interdiction,* directs that NATO FACs will pass line titles for each line in a CAS brief.

When working with NATO FACs/JTACs, aircrews should expect to hear line titles being passed prior to each item in the CAS brief. This is a measure to reduce confusion when some CAS participants are non-native English language speakers. Consideration should be given to passing line titles during times where language barriers, communications jamming, or other conditions exist that may lead to confusion.

(b) CAS brief can be prefaced by: ***“Razor 53, advise when ready for 9-line.”*** JTACs should ensure they are ready to pass the CAS brief prior to asking the aircrew.

(c) The CAS brief should be read in three transmissions of three lines each, at a moderate pace. Information that is read too quickly increases confusion and delays time to kill when it has to be repeated.

(d) **Line 1–IP or BP.** The IP is the starting point for the run-in to the target. For RW aircraft, the BP is where attacks on the target are commenced. Items for Line 1 are:

1. IP or BP by name

2. Hasty BP

“Hasty BP, center grid Papa Uniform One-two-three-four, 2x2”

(e) **Line 2—Heading and Offset.** The heading is given in degrees magnetic from the IP to the target or from the center of the BP to the target. JTACs/FAC(A)s give an offset (offset left/right) if a restriction exists. The offset is the side of the IP-to-target line on which aircrews can maneuver for the attack. Give 3 digits sequentially ***“One eight zero.”***

(f) **Line 3—Distance.** The distance is given from the IP/BP to the target. For fixed wing aircraft, the distance is given in nautical miles and should be accurate to a tenth of a nautical mile. For attack helicopters, the distance is given in meters from the center of the BP and is accurate to the nearest 100 meters.

(g) **Line 4—Target Elevation.** The target elevation is given in feet MSL. Target elevation is needed for cueing sensors and for weapon/targeting solutions for CAS platforms which require it.

1. Read as sequential digits. It is also recommended to include the word “feet” after the digits to break up elevation from Line 5.

2. MSL is understood; if using any other datum, it must be stated, e.g., ***"Three six five feet height above ellipsoid."***

3. If lines 1–3 were abbreviated, the elevation transmission should begin with "elevation."

(h) **Line 5—Target Description.** The target description should be specific enough for the aircrew to recognize the target. The target should be described accurately and concisely using plain language. If target sorts are required, they should be given later as part of amplifying information so as not to disrupt the flow of the CAS brief.

(i) **Line 6—Target Location.** The JTAC/FAC(A) provides the target location in 3 specific manners:

1. Options for Line 6.

a. Grid Coordinates. If using grid coordinates, JTACs/FAC(A)s shall include the 100,000 square meter identification.

b. Latitude and Longitude. Care should be taken to clearly communicate which specific format is being used as transposition errors or misinterpretation can result in significant coordinate error and greatly increase the risk of potential collateral damage.

c. Offset from a Known Point. Direction and distance from a geographical, man-made feature, navigational aid, or mark.

2. Because of multiple coordinate systems available for use, the datum that will be used must always be specified in the preplanned JTAR. If an aircrew is responding in an immediate CAS role, and the datum used is not World Geodetic System 1984, then the datum will be confirmed in the aircraft check-in or situation update (unless otherwise specified in SPINS).

For further guidance on coordinate datum planes, refer to CJCSI 3900.01C, Position (Point and Area) Reference Procedures.

3. The following target location considerations should be used in line-6:

a. For an area target, give the location of the target's center or location of the greatest concentration.

b. For a linear target, give the location of intended impact point, orientation, and the distance to each end, either in line 5 or in the remarks section of the CAS brief, if required.

c. Multiple Target Format. When issuing multiple lines 4 and 6, read one standard CAS brief, then provide additional targets, using lines 4, 6, and 8 only, prior to remarks.

d. If a higher fidelity grid is passed other than 6 digits, the game plan could include the number of digits to expect in the CAS brief. This could also be passed prior to Line 6 or during the situation update. There should be a noticeable pause between the easting and northing when reading MGRS grids to aid in copying.

4. The number of digits in a grid coordinate is the level of precision of the grid, not a measurement of accuracy.

5. When passing latitude/longitude in Line 6, say the cardinal direction of the latitude prior to providing the degrees (e.g., North XX).

6. The following are considerations to target locations being passed in a method other than coordinates for Line 6:

a. For an offset from a known point, the offset point should be established by the controller and acquired by the aircrew prior to the CAS brief, either visually or with a sensor.

b. Anytime a grid or coordinate is not used in Line 6, if capable, the aircrew should state the location of the target from the aircraft's pod or system during readbacks to provide SA to other members of the CAS stack and the fires clearance personnel.

c. For a moving target, as SA dictates, give either a location along the target's route of travel or the origin of the target's route of travel, along with the direction of movement and estimated speed. It is then imperative that, as close as the tactical situation allows following CAS briefing and prior to aircraft engagement, both the attack aircraft and the JTAC/FAC(A) assess the current location of the target in relation to friendlies, noncombatants, and civilians; additionally, considering any airspace/FSCM issues that may have arisen, to include adjacent units/operations. Based on this assessment, and as deemed necessary, the JTAC/FAC(A) will then update any or all of lines 4, 6, 8, and restrictions, and will receive readbacks on all updates from attack aircraft, prior to providing final clearance. This will be accomplished when the JTAC/FAC(A) believes that updates to the initial CAS briefing will more effectively mitigate the potential for friendly fire incidents, civilian casualties, collateral damage, airspace deconfliction problems, etc., based upon the target's changed location since passing the initial CAS brief. In order to avoid the need for updates, which increase the kill-chain timeline, all entities in the CAS targeting process should emphasize quickness from briefing to engagement, but never at the expense of procedure and SA.

"Heartless 21, Punisher 99, the target is a single tactical vehicle in the vicinity of Papa Uniform 123 … 456, traveling northeast along route Michigan at approximately 30 miles per hour."

7. There are rare times when a JTAC is unable to provide a target elevation and coordinate, making lines 4 and 6 a GEOREF, TRP, GRG or an offset from a GEOREF, TRP, or GRG. In this case, there must be additional correlation between the attacking aircraft and controller to confirm the actual target location.

Examples of lines 4 through 6 when using a GEOREF, TRP, GRG, navigational aid or an offset:

Example: "450 feet, personnel in square single-story building, Building 145 in sector Papa 8 of macro GRG."

Example: "232 feet, tactical vehicle and personnel, 200 meters east of the intersection of Gas Station and Baseline roads."

Example: "15 feet, enemy personnel in a ditch, 150 meters southeast of friendly position."

WARNING

These techniques should be used with caution due to the potential for confusion and they do not support the fires approval process, collateral damage estimation, and friendly fire mitigation.

8. **Correlation Prior to the CAS Brief**. If correlation is complete prior to the CAS brief being passed, the procedures for MIR-to-CAS, discussed in paragraph 3, "Multisensor Imagery Reconnaissance and Intelligence, Surveillance, and Reconnaissance in Close Air Support," should be utilized. If aircrew are unable to provide a grid and/or are only tally a suspected target, lines 4 through 6 may be passed as estimated elevation (if known by the JTAC) for Line 4, full description of the target for Line 5, "from your TALLY" for Line 6. In this case, the description in Line 5 is the critical item and must distinguish the target from other potential targets in the area. When this technique is utilized, aircraft read backs will consist of elevation (if passed) and the aircrew will state, TALLY (or target/object CAPTURED). If captured and able to provide, aircrew will pass an elevation and/or grid for the target. At a minimum, aircrews are required to read back elevation and coordinates corresponding to the picture in their sensors. The JTAC and the supporting fires approval chain will utilize this grid for final fires integration; as a starting point for future correlation, if required; and for the BDA report. The grid passed from the aircraft to the JTAC during the target correlation process does not require any further readback by the JTAC if the aircrew passed the grid to enhance SA and assist in the fires approval process, and the attack will be conducted based on the aircrew's capture only. If there is concern over the grid provided, further correlation may be warranted. The purpose of this exchange TTP is to confirm correlation of target location in an expeditious manner and ensure the supported ground element has a record of final target location.

Note: Lines 4 through 6 should not be combined into one statement such as "Lines 4 through 6, from your system" or "Lines 4 through 6, from the talk-on."

Example of lines 4 through 6 when correlation occurred prior to a CAS brief:

JTAC: "Elevation, 450 feet, enemy personnel in defilade, north of road intersection from your TALLY."

Aircraft readback: "450 feet, I am CAPTURED personnel in defilade north of a road intersection. I have them at grid LS 1234 5678."

JTAC and supporting fires approval chain will then utilize this grid for final deconfliction prior to passing clearance.

(j) **Line 7-Mark Type/Terminal Guidance**

1. Mark Type. JTAC/FAC(A) will state the type of mark to be used (for example, smoke, laser, or IR). If using a laser designator, the JTAC/FAC(A) will also pass the code that will be used.

2. Terminal Guidance. When conducting an attack using off board lasing for LGWs, the JTAC/FAC(A) will pass call sign of the platform or individual that will provide terminal guidance for the weapon, the word "laser," and laser code.

(k) **Line 8-Friendlies.** Cardinal/sub-cardinal heading from the target (N, NE, E, SE, S, SW, W, or NW) and distance of closest friendly position from the target in meters (e.g., "South 300").

Note: NATO Allied Tactical Publication 3.3.2.1, *TTP for Close Air Support and Air Interdiction,* requires Line 8 to be a mandatory readback item. When working with NATO FACs/JTACs, aircrew should be prepared to read back Line 8 as part of the mandatory readback items.

(l) **Line 9-Egress.** These are the instructions the aircrews use to exit the target area. Egress instructions can be given as a cardinal direction by using control points or, if the operational environment allows, by stating "Egress at pilot's discretion." The word "egress" will be used before delivering the egress instructions. Consideration should be given to providing egress altitude in actual numbers, vice *"in your block."*

Example: "Egress North to Moon, block 15-17"

(6) **Remarks/Restrictions**

(a) **Remarks.** The following is a list of remarks that may be included in the CAS brief. The order of the remarks portion of the CAS brief is recommended for a standard, logical flow of information. Only those elements that are applicable and have not previously been briefed should be included.

1. LTL shall be passed if using ground-based laser designators (in degrees magnetic).

2. Desired type/number of ordnance and/or weapons effects can be passed here when not passed in the game plan prior to the CAS brief.

3. Surface-to-air threat.

a. Type of threat.

b. Direction and distance from Line 6.

c. Type suppression—continuous, interrupted, or non-standard. If non-standard, state the duration of the suppression relative to the CAS TOT.

d. Suppression gun target line.

4. Additional fires. Gives aircrew SA to other explosions, fires, etc. on the battlefield.

5. Additional radio calls as requested.

a. IP inbound.

b. In with heading or in with cardinal direction.

c. Time to roll-in/release.

6. Additional remarks. The following information should be included if applicable:

a. Hazards to aviation.

b. Weather.

c. Additional target information including TLE CAT.

d. Night vision capability.

e. Other time considerations.

f. Friendly mark (if any).

g. Moving Target—time stamp with estimated speed and direction

h. Depending on the tactical situation or theater requirements, additional information such as ROE may need to be passed.

(b) The following information is always a restriction and should be included if applicable. Additional restrictions are at the discretion of the JTAC/FAC(A). All passed restrictions shall be read back.

1. Danger close (if applicable and with commander's initials).

2. ACAs (formal and informal).

3. FAHs. Overly restrictive run-in headings often increase the time required to attack, decrease the flexibility and survivability of the aircraft, and increase the likelihood of an aircraft not expending its ordnance due to being outside of parameters. However, there is often a need to restrict aircraft run-in headings in order to deconflict with other assets, avoid threat, reduce collateral damage potential, or create desired effects on the target. JTACs should choose the least restrictive FAHs possible while still achieving ground commander's intent and maximizing target destruction. Final attack direction/restriction given in sub-cardinal directions or compass heading.

4. Lateral and/or altitude separation.

5. Approval out of the BP for RW.

6. TOT/TTT (mandatory readback).

a. While technically a timing ACA and a restriction, to indicate the end of the restrictions/remarks portion, TOT should be last. If the TOT has not been assigned yet, "Standby TOT," or "TOT will be issued after correlation" should be used.

b. Assigning TOTs has a synchronizing effect on the battlefield. TOTs allow for efficient fires approval, and effective integration with fire and movement. However, JTACs must be smart about when they assign a TOT.

(1) BOC. TOTs may be assigned as part of remarks/restrictions since BOC correlation is complete with correct readbacks. JTACs should assign TOTs that allow aircrew time to set up their systems, provide readbacks, and ingress to the target area. TOTs must also take into account other fires and movement integrated with the CAS attack.

(2) BOT

(a) TOT Assigned After Correlation. For a BOT attack that may require lengthy correlation, JTACs should consider waiting until after correlation is complete to assign the TOT. This alleviates multiple TOTs being passed due to correlation taking longer than expected.

(b) TOT Assigned Before Correlation. When correlation is to occur as an offset from a mark, TOTs may be established prior to correlation since correlation requires the mark to be in place.

(3) "Push When Ready" Versus "Immediate." There may be times when issuing a TOT is unnecessary and aircrews may proceed on a timeline of their discretion. JTACs should use the terms "Push when ready" in this case. The word "immediate" in relation to TOT implies a level of urgency that may result in task-shedding

on the part of all players. Immediate TOTs should be reserved for when that level of urgency truly exists.

c. If the aircrew will not be able to make the specified TOT, it should tell the JTAC/FAC(A) what TOT it can make, so the JTAC/FAC(A) can begin the approval process for that TOT, vice the JTAC/FAC(A) making multiple guesses as to which TOT the aircrew will be able to make.

7. PLA point or direction/distance, and circumstances for executing PLA, if applicable.

(7) **Readbacks**

(a) Required readbacks of lines 4, 6, and restrictions.

(b) If issued, FAHs, ACAs, danger close, and TOTs shall always be considered restrictions and will be read back. In addition if the JTAC requires additional information to be read back, the aircrew shall do so.

1. JTACs should respond to correct aircrew readbacks with "Call sign readback correct" or "Call sign good readback."

2. If the readback is not correct the JTAC should restate the portion in question correctly, using voice inflection to draw attention to the portion that was read incorrectly.

Example: "Deuce 21, be advised, final attack headings 1-8-0 through 2-1-0"

(c) For BOC attacks, all readbacks shall come from either the weapon or from the aircraft system, provided the aircraft is capable.

CAUTION

If lines 4 and 6 were not a coordinate and elevation, aircrew will not be able to conduct a readback from their system. This technique should be used with caution as it is imperative that both the JTAC and aircrew are referring to the same GEOREF, TRP, GRG, or feature for targeting.

Note: Cases may arise when an aircraft has a known bad navigation system. Therefore, a readback of lines 4 and 6 from that system may induce confusion and error into the attack. In these instances, the affected aircrew should alert the JTAC of the situation and that they will not be providing system readbacks. Depending on the ordnance being used, the aircraft may still be able to safely and effectively employ. More in-depth correlation, however, may be required.

(d) For BOT attacks, the lead aircraft is required to read back lines 4, 6, and restrictions. For BOC attacks, all aircraft delivering ordnance shall read back lines 4, 6, and restrictions from their weapon/system. If the JTAC does not receive read backs from all aircraft, but desires them, he should request those readbacks that are required to positively control the attack.

(e) For BOT attacks where no grid was provided in Line 6, if capable, the aircraft should include the target location during the read back to provide SA to other members of the CAS stack, the fires clearance personnel and to aid the JTAC in the BDA report.

(f) Offsets are restrictions, but do not need to be read back unless requested.

(8) **Correlation.** The process by which the JTAC/FAC(A) coordinates and confirms that the attacking aircraft and/or a third party contributor have acquired the correct target or mark. Correlation is required on each and every CAS attack.

(a) **BOC.** Correlation is complete when the attacking aircraft correctly reads back lines 4, 6 (from aircraft system or weapon), and restrictions. When using a third-party for terminal guidance for a BOC attack, it is still necessary to conduct correlation with that third party.

(b) **BOT and/or Third Party Contributor Required.** Correlation is mandatory with the attacking aircraft or a third party contributor (if used). Third party correlation may occur outside the normal timeline of the CAS attack. During correlation, the JTAC/FAC(A) coordinates actions to mark the target and positions the aircraft to acquire the mark and/or target. Depending on the tactical situation, terminal attack controllers must determine whether the aircrew need to acquire the target, or whether employing on an offset from a mark is sufficient to create the commander‘s desired effects. Target composition, camouflage, and concealment may make it difficult for aircrew to acquire the actual target. In addition, certain attack profiles, such as FW aircraft rolling in on an IDF mark, may not allow time for precise target acquisition. Throughout correlation, terminal attack controllers should confirm that the aircrew is looking at the same reference points as is the JTAC/FAC(A) by asking questions with unique and distinct answers that will indicate that correlation is on track.

(c) Once the JTAC/FAC(A) is satisfied that the aircrew has acquired the correct target, the JTAC should transmit "The xxxx is your target." Aircrew should respond with TALLY, (target/object) CAPTURED, or CONTACT, as appropriate. JTACs should strive to include what the target is in this statement, such as "The third vehicle is your target" or "The individual north of the road is your target." Simply saying "That's your target" is ambiguous and should be avoided. If the JTAC determines that there was significant potential for confusion during correlation, he may ask the aircrew to provide an updated coordinate for the target once it has been acquired. In order to avoid "ping-ponging" of coordinates the JTAC is not required to read back this updated coordinate. The JTAC should plot the updated target location given by the aircrew and ensure that it satisfies required geometry. Requesting updated coordinates is not required, and doing so must be weighed against delaying effects on target.

(d) The following paragraphs outline procedures for conducting correlation using different marking plans:

1. **Laser Hand-Off.** JTACs must be directive in order to ensure proper laser safety geometry is adhered to when executing a laser hand-off. This is especially crucial when aircraft are in the overhead, since if aircraft are on the far side of the overhead from the designator, there is potential for the LST to track the designator. Inbound headings should be provided for laser hand-off and should be interpreted by the aircrew as mandatory to avoid false lock-on.

a. Laser hand-offs may be conducted as part of a target acquisition run after readbacks, or as the aircraft are ingressing on the attack run.

b. Instructions should be assigned for the laser hand-off and may be passed as part of remarks/restrictions. The directions/headings that are used for the hand-off may be different than the FAHs. In this case, the headings used for the target acquisition pass should not be called FAHs.

Example: "Final attack headings 150-170, laser target line 220, after readbacks expect to proceed inbound heading 230-260 for the laser hand-off, standby TOT"

c. After readbacks, JTAC begins laser hand-off with:

"Latch 65 proceed inbound heading 230 to 260, stare 1688 Papa Uniform 123 456"

Note: JTAC may restate laser target line as part of this transmission if comfort level dictates.

d. Aircrew initiates laser communication when in position: "TEN SECONDS…Broadsword 11, LASER ON." JTAC should echo calls to the laser operator (if applicable) prior to responding to the aircrew.

Note: When JTACs use a dedicated collocated laser operator, ensure the operator is trained to respond to internal TACP communication brevity calls for laser operations.

e. Laser operator responds to JTAC: "LASING, 1688."

f. JTAC to aircrew: "Broadsword 11, LASING, 1688."

g. The JTAC shall ensure continuous lasing until the aircrew directs "Aircraft call sign, SPOT, CEASE LASER." JTAC should direct CEASE LASER to the laser operator.

h. Once the aircrew has called SPOT, CEASE LASER, the JTAC shall confirm the aircraft's sensor was cued to acquire the correct target.

JTAC: "Latch 65, what do you have under your crosshairs?"

Attack Aircraft: "Latch 65 has a single armored vehicle oriented north-south."

JTAC: "Latch 65, that armored vehicle is your target."

Attack Aircraft: "Latch 65 CAPTURED."

Note: The terms "spot" and "capture" are not synonymous. JTAC should not cease laser until directed by aircrew (common sense and judgment apply). In situations where it is apparent that a "cease laser" call was not made or missed, the JTAC should query the aircrew with "Aircraft call sign, status". Otherwise, the aircrew may lose the spot before setting a designation. Due to designator jitter, laser overspill, laser underspill, and battlefield obscuration, the laser spot acquired by the aircrew may be slightly off the intended target. **Correlation is still required to confirm the correct designation.**

Note: After an LST handoff, JTACs should avoid going back out to use big to small confirmers, as this will likely induce confusion and unnecessarily increase time to engage. However, due to spot jitter, overspill and underspill, a JTAC should back out as much as necessary to confirm the exact target acquired. In a congested target environment, it may be necessary to back out some, in order to confirm that the aircrew has acquired the exact intended target and not a nearby similar target.

i. If aircrew reports NEGATIVE LASER during the laser hand-off:

(1) JTAC verifies proper laser setup, and pointed at correct target.

(2) Verify aircraft on correct code.

(3) Verify aircraft in a position to receive reflected laser energy.

(4) Many factors influence whether airborne platforms are in a position to receive properly coded laser energy (angle of incidence, reflectivity, power out, environmentals, etc.).

(5) Reinitiate laser hand-off procedures. If unsuccessful and unable to resolve, choose another mark.

For an example of laser hand-off, see Appendix E, "Examples of Close Air Support Missions," Example 5.

2. Match Sparkle

a. When matching IR sparkles, all players must be disciplined in call sign usage to avoid confusion as to who is to SPARKLE ON or CEASE SPARKLE.

b. JTACs should ensure that prior to attempting to match sparkle, the aircraft is in position to allow observation of the sparkle they are to match. This may require pushing FW aircraft into the overhead, or allowing RW aircraft forward of the HA or BP. JTAC verifies own IR sparkle is pointed at the correct target.

JTAC: "Devil 11, proceed into the overhead and advise when ready to match sparkle"

c. Aircrew, initiates when in position: "JTAC call sign, SPARKLE."

Note: JTAC should echo calls to the IR sparkle operator (if applicable) prior to responding to the aircrew. The JTAC may have to direct the sparkle operator to shift to ensure the correct target is marked.

d. JTAC may initiate match sparkle if required. When aircrew reports ready, JTAC turns on IR sparkle and transmits "Aircraft call sign, MATCH SPARKLE".

e. JTACs should be prepared to facilitate SNAKE and STEADY calls by the aircrew.

f. JTAC should then observe the aircraft's IR sparkle move to overlay the ground IR sparkle.

g. Once the aircrew's pointer is on the correct point, the JTAC confirms what the aircrew sees there.

Note: In some cases, the ground-based pointer can "wash-out" the aircraft's pointer. In this case, the JTAC should cease the ground-based IR sparkle in order to confirm the aircraft's sparkle is on the appropriate location. JTAC should transmit the informative call "Broadsword 11, CEASING SPARKLE."

Note: RW IR sparkle may not be steady on the target, due to vibration of the aircraft or the pulsed mode of the IR pointer.

Note: JTACs should be aware that since current aircraft FLIRs are unable to sense IR sparkle, aircrew must compare what they see outside the cockpit to what their sensor is centered on during correlation.

h. If aircrew reports NO JOY or indicates problems with skip/overspill that preclude locating the target:

(1) JTAC verifies IR sparkle is pointed at correct target.

(2) JTAC verifies aircraft is NVG equipped.

(3) JTAC verifies aircraft is in a position to acquire IR energy and is searching in the correct area. Many factors influence whether airborne platforms can see IR sparkles (IR sparkle power out, ambient light levels too high [cultural lighting],

distance from target, cloud cover, NVG performance, etc.). Generally speaking, the JTAC should expect that aircrew will attempt to position themselves to have an unobstructed line-of-sight to the target area.

i. Reinitiate match sparkle procedures. If unsuccessful and unable to resolve, attempt sparkle walk-on, or choose a different type of mark.

j. JTACs must be aware that using their IR sparkle may expose them to NVG-equipped enemies. Ground IR sparkle should not be left on for excessive amounts of time.

3. **Sparkle Walk-On.** When the tactical situation prevents the JTAC from using a ground-based IR sparkle (dead batteries, broken equipment, concealment from enemy observation, excessive skip/overspill, etc.), a sparkle walk-on may be used to orient the aircraft's sensor to the target. The JTAC observes the aircraft's IR sparkle and directs the aircrew to move their IR sparkle using cardinal/sub-cardinal direction and distance slew commands until the aircraft's IR sparkle overlays the target.

a. If holding at an IP, aircraft may need to proceed inbound in order to acquire the target on their sensors.

b. JTAC begins sparkle walk-on with: "Aircraft call sign, SPARKLE."

c. JTAC observes aircraft IR sparkle and gives verbal slew commands

(1) Slew commands should be "Aircraft call sign, SLEW, cardinal/sub-cardinal direction and distance in meters."

Example: "Latch 65, SLEW north 150"

(2) Slew commands may also include a limiting feature.

Example: "Razor 53, SLEW south 50 to the east-west road"

(3) Do not use "left, right, up, down" when conducting a sparkle walk-on.

(4) JTACs must be aware of the difficulties of estimating directions and distances at night, as well as the disparity of perspective between themselves and the aircrew. In addition, since aircrew are splitting time between looking outside and looking at their sensors, it is extremely difficult to precisely measure direction and distance over the ground when slewing the IR sparkle. JTACs must be careful not to give directions that cause the IR sparkle to continually bracket back and forth across the target, e.g., "Latch 65, SLEW north 100." "Latch 65, SLEW south 100." "Latch 65, SLEW north 100."

(5) If JTACs note this occurring, they should reevaluate their direction/distance estimations and use limiting features.

d. When the aircraft's IR sparkle overlays the target, the JTAC should direct "Aircraft call sign, STEADY."

e. JTAC completes correlation by confirming what the aircrew sees and where their IR sparkle is.

f. Aircrew call TALLY, CONTACT SPARKLE, or (target/object) CAPTURED.

g. JTACs may also request that aircrew sparkle the target as they ingress during the attack run in order to provide additional confirmation and to ensure target correlation remains the same.

4. **Aircraft Laser Designation on Target**

a. JTACs equipped with AN/PAS-25 TLSI [thermal laser spot imager] or see-spot devices may correlate by directing the aircrew to lase the target with their laser designator.

b. On vertically developed targets, the aircraft laser must be on a surface that the JTAC can observe.

5. **Ground IR Sparkle Only**

a. The JTAC must ensure that the aircraft is in a position to acquire the target end of the IR sparkle. This may require bringing FW aircraft into the overhead, or pushing RW aircraft forward from the HA. Depending on the target and the attacking aircraft profile, this may require a target acquisition run or may be conducted on the attack run.

b. Depending on target size and composition, JTACs may need to cease sparkle to avoid the IR energy washing out the target. When attacking tactical size targets, attacking aircrew may be able to see the target end of the IR pointer, but unable to acquire the target. In this case, aircrew should make a contact sparkle call, indicating they are able to discern the target end from the friendly end of the IR sparkle, but unable to make out the exact target. Prior to receiving weapons release authorization, aircrew must call VISUAL and TALLY or CONTACT SPARKLE when ground forces employ IR sparkle.

6. **Visually-Significant Mark**

a. IDF, direct fire, or aviation fires may be employed specifically as marks for CAS aircraft. Marks of opportunity, such as battlefield fires or smoke, not specifically employed for CAS, may also be used. Aircrew will generally use a combination of sensors and visual lookout to acquire these marks.

b. Consider the Timing of the Mark. JTACs may coordinate a mark to arrive on deck 30–45-seconds prior to an assigned CAS TOT, or they may coordinate a mark earlier to take advantage of aircraft sensors while the aircraft is holding at an IP or HA. This technique gives the aircrew more time to discern hard-to-find targets before the attack run, but sacrifices surprise.

(1) For BOT attacks using IDF, direct fire, or aviation fires as visual marks that are deliberately synchronized to arrive 30-45 seconds prior to CAS TOTs, there is minimal time to conduct correlation. For these types of attacks, correlation is satisfied by the JTAC providing an accurate correction from the visual mark once observed, “Razor 53, from the mark, east 50.” Transmitting “mark is on the deck” is not required.

(2) Aircrew shall call “CONTACT the mark” to advise JTAC they are meeting the requirements of BOT and to allow him to make correction from the mark.

c. When using direct fire weapons to mark, the JTAC must consider when the mark will be visible to attacking aircraft. FW aircraft will most likely only be able to acquire direct fire impacts using their sensors from inside traditional IP distances. If the threat allows, JTACs should coordinate moving them to the overhead to aid in acquisition. JTACs must also be aware that the presence of multiple direct fire assets on a battlefield could lead to confusion.

d. If the IDF, direct fire, or aviation-fires mark falls out or is unusable, the JTAC must weigh the risk of continuing the attack. JTACs should have a plan to deal with a mark fall-out. This may involve flexing to a back-up mark, using a mark of opportunity, or aborting an aircraft or the entire attack. In addition, the attacking aircrew may call contact of something besides the intended mark. JTACs must be able to quickly weigh whether to use the new object identified by the aircrew as a new mark.

e. If something other than the mark referenced in Line 7 is being used for cueing, it should be not be called “the mark,” it should be called by a different label, e.g., “lead’s hits,” “the black smoke,” etc.

7. Talk-On

a. The JTAC/FAC(A) who effectively executes talk on techniques while considering the CAS asset’s visual/sensor perspective for a BOT will likely be able to successfully execute expeditious and complete target correlation prior to the CAS attack. The objective of a talk-on is to correlate a specific target or target area between the JTAC/FAC(A) and the CAS aircrew to a level of fidelity such that the terminal attack controller knows the CAS asset has acquired the target. Exact brevity and language to conduct a talk-on is dependent on the situation and perspective of the JTAC/FAC(A) and CAS aircrew and targeting systems available to each. The JTAC/FAC(A) must consider the following basic elements that will affect talk-on effectiveness:

(1) Aircrew perspective.

(2) Controller perspective.

(3) Environmental conditions.

(4) Target area relief.

(5) Resolution and currency of reference graphics.

(6) Ability to establish a unit of measure.

b. Figure V-10 articulates the elements of a target area which should be considered in determining what visual aspects of a target would be most remarkable and effective. For example, the vertical relief of a structure will be more apparent from the ground terminal controller's position than from an overhead FW aircraft. However, low flying RW aircraft are more likely to perceive vertical relief. The following figure applies to general perspectives as they relate to target descriptions during a talk-on. It is most useful when at least one of the assets is not aided by a multispectral sensor or VDL. JTACs should select the most prominent structure/feature nearby for initial orientation between themselves and the aircrew.

General Visual Perspectives for Talk-On Consideration

	Ground	Fixed-Wing	Rotary-Wing	Unmanned Aircraft System
Vertical Relief	Good	Poor Note 3	Good	Poor Notes 2, 3
Horizontal Relief	Poor	Good	Poor Note 3	Good
Color Distinction	Good Note 2	Poor* Notes 3, 4	Good Note 3	Good Notes 1, 2, 3
Communications Delay	Not Significant	Not Significant	Not Significant	Significant

This figure assumes the environment is sky clear, visibility unrestricted.

* Aircraft greater than 15,000 feet slant range from the target will likely be unable to discern color with the naked eye. The use of binoculars or other sensors essentially "decreases" slant range to a target to a distance at which the color may be determined.

NOTES:
(1) Sensor dependent
(2) Slant range dependent
(3) Altitude dependent
(4) Enhanced when aided (binoculars)

Figure V-10. General Visual Perspectives for Talk-On Consideration

c. As the JTAC/FAC(A) considers the CAS asset's perspective, they should also consider whether to use large target area features to cue to smaller features or a more narrowly-focused initial search pattern to expedite target correlation. The decision as to which technique to use is dependent on such factors as:

(1) Aircraft sensor capabilities (EO, IR, etc.).

(2) Video downlink capability.

(3) Aircraft INS.

(4) GRGs/operational graphics.

(5) Imagery products with associated elevation data.

d. The JTAC/FAC(A) may elect to conduct a talk-on cued by larger features if CAS aircraft or terminal controller sensors (optics, NVDs) or systems are either not available or degraded, and precision targeting systems are unavailable. In all cases the starting point would be a feature of the target's surroundings, which based on perspective, is identifiable to both the JTAC/FAC(A) and CAS aircrew. From this feature, a gradually more detailed description would begin, ultimately resulting in proper correlation to the intended target.

For an example of an effective talk-on, see Appendix E, "Examples of Close Air Support Missions," Example 4.

e. Should the tools be available, the JTACs/FAC(A)s and CAS aircrew may be able to generate relatively accurate and precise target coordinates with elevation, due to improvements in portable tactical targeting systems, CAS aircraft sensor suites, and CAS aircraft and JTAC/FAC(A) systems. Leveraging these, the JTAC/FAC(A) may elect to conduct a narrowly focused initial talk-on technique. The terminal controller can use the coordinate and elevation as an anchor point, from which the CAS aircrew and JTAC/FAC(A) will move in the target area, in order to positively acquire the CAS target. Using this narrowly-focused cueing to the target area can result in an expeditious target correlation, as the cueing should place the CAS aircrew closer to the intended target.

f. **Enhanced Target Description.** An enhanced target description is typically used in hostile, low-altitude scenarios to assist the aircrew in finding the target when they will only have a few seconds to acquire the target. An enhanced target description paints a picture in the minds of the aircrews as to what the target area will look like as they ingress, and describes where they will find the target. It should be tailored to match the viewpoint and perspective of the attacking aircraft as they approach the target area on the FAH. It is typically used when the aircrew cannot observe the target area as it is being described. The JTAC will usually provide a reference (clearly identifiable feature) or a mark that the pilot should see near the target. Frequently, an enhanced target description will begin with a map or GRG talk-on and then provide amplifying information, including features that are not on the chart. Because the JTAC is describing what the aircrew *will see* and not what he is currently looking at, the aircrew is not required to call CONTACT as the JTAC is describing the area.

g. When coordinating a talk-on, the JTAC should be specific about which type of talk-on he will be using, e.g., map, GRG, VDL, visual, etc. The JTAC should also be specific about when he switches from one type of talk-on to another. For example, a JTAC may begin a talk-on using a GRG, but transition to a visual talk-on once a common frame of reference has been established. When using GRGs, TRPs, GEOREFs, etc., it is essential that both the JTAC and aircrew have a common understanding of the product or feature being used.

"Latch 65, advise when ready for a GRG talk-on using the version 4.8 GRG."

h. JTACs should consider the best way to begin the talk-on. Generally, visual talk-ons should be conducted big-to-small. Sensor talk-ons in an urban area may, on the other hand, start by orienting the aircrew's sensor to a specific intersection or recognizable building in order to ensure a common starting point.

i. Talk-on descriptions and directions should be simple and short, driving the aircrew's eyes and/or sensors from one point to another. A technique for doing this is to give directions in the following format, known by the mnemonic, "FIDO":

(1) **F**rom a point (easily recognizable start point).

(2) **I**n a direction (cardinal/sub-cardinal direction).

(3) **D**istance to travel (established unit of measure or meters).

(4) **O**bject seen (target or object the JTAC/FAC[A] wants the aircrew to see).

Note: Use confirmers around target/object to ensure the aircrew is in the correct area.

JTAC: "Razor 53, from the cubby-hole, proceed south across MSR Michigan to the first building and call CONTACT."

Attack Aircraft: "Razor 53 CONTACT."

JTAC: "Razor 53, that building will be called the bank; from the bank go two buildings east and call CONTACT on a building with a courtyard in the middle."

j. Short, directive transmissions using "call contact" as an instruction are more likely to result in a successful talk-on.

k. Limiting the number of cardinal directions to two in a transmission helps to reduce confusion.

l. Features such as buildings, roads, and intersections should be named throughout the talk-on if they do not already have names assigned. This allows all players to quickly reference them without having to resort to “this road” and “that building.”

m. Establishing units of measure may be helpful to aid in estimating distance over the ground. JTACs should attempt to use features along the route of the talk-on when establishing these units of measures.

n. When conducting visual talk-ons JTACs may use linear terrain features to orient aircrew to cardinal directions. Even if those linear features do not line up exactly with a cardinal direction, establishing them as “north/south” or “east/west” may aid in the talk-on.

o. A two-to-one ratio should be used when conducting talk-ons. Give two directive statements, then ask a confirming question of the aircrew.

Attack Aircraft: “Razor 53 is CONTACT the building with the courtyard.”

JTAC: “Which side of the courtyard opens to the street?”

p. JTACs should make aircrews aware of their avenue of observation to the target, helping the aircrew to visualize what the JTAC can and cannot see.

(1) When transitioning from a map or GRG talk-on to a visual talk-on, the JTAC must be aware of the limitations of their perspective. The JTAC should not ask the aircrew to describe features that the JTAC cannot see.

(2) If an aircrew describes a feature that is not observable by the JTAC, the JTAC should inform the aircrew.

q. Once the JTAC has talked the aircrew onto the correct target, correlation should be completed by verifying the aircrew is looking at the correct target. This should be done by asking specific questions about the target that are unique and distinct. Examples include:

“Which direction is the lead vehicle facing?”

“How many individuals are on the north side of the lead vehicle?”

“What do you see directly south of the lead vehicle?”

8. VDL Talk-On

a. When the JTAC and aircrew are both properly equipped, a VDL talk-on provides good certainty as to what the aircrew is looking at.

b. For ease of JTAC use, aircrew should strive, within a section, to select downlink frequency with at least 30-megahertz separation. This will allow the JTAC to rapidly switch between aircraft downlinks within a section while not dealing with bleed-over from the other aircraft.

c. Most aircraft downlink video feeds provide symbology, including sensor aimpoint reticle, target location and elevation, and aircraft position and elevation. JTACs should strive to be familiar with general symbology, but if they are not, may query aircrew regarding the display. Some aircraft systems are also capable of transmitting metadata that allows aircraft position and SPI to be overlaid on the map feature of some VDL receiver systems.

d. When conducting VDL talk-ons, JTACs should use appropriate brevity terms.

e. When using the term SLEW to directively move a sensor, JTACs should use up, down, left, and right instead of cardinal directions, to avoid confusion. VDL talk-ons should drive the sensor directively from one point to another to avoid excessive slewing.

f. JTACs should keep aircrew informed of handshake or hollow status, providing a common frame of reference to both parties.

9. **APTD.** CAS aircraft that can transmit APTD allow the JTAC to see where the aircraft is, and the aircraft's designated SPI, if the JTAC is properly equipped.

10. **Link-16 Handoff.** If a target has been published as a Link-16 trackfile, aircraft sensors will be cued to the approximate target location. A talk-on will still be required to correlate the exact target.

(e) **Additional Considerations**

1. After correlation is complete, and before the attack, any questions that remain must be answered. If, during correlation, either the aircrew or JTAC realize that an element of the CAS brief should be changed in order to facilitate a successful attack, it should be discussed. Additionally, other information necessary for the attack may not be decided until correlation is complete, and should be discussed in plain language between the JTAC and aircrew prior to beginning the attack. Examples of this include:

a. Delayed versus continuous lase.

b. Section/flight versus individual approval for RW attacks.

c. Ground commander's intent for fires.

d. Ordnance selection, based on aircrew's analysis of the target.

e. Fuzing.

2. JTACs must remember to issue the TOT, if it has not already been issued, and confirm mission with their fires approval chain.

3. JTACs may also need aircrew to state the type of delivery profile they will execute in order to allow the JTAC to plan appropriately.

(9) **Attack**

(a) Throughout a CAS attack, the JTAC must maintain awareness of the aircraft position, the friendly situation, and the objective area.

(b) JTACs should compare the distances required by attack geometry, from IP or HA to target with the time it will take the CAS aircraft to transit that distance and relate this to the TOT. By developing this timeline, and using aircraft calls to update it, JTACs can monitor the CAS attack timeline in order to ensure effective integration with fire and movement.

(c) Changes to the friendly situation must be monitored to ensure their fire and movement will remain integrated with the CAS attack timeline. If changes occur, JTACs must weigh their ability to continue, shift, or abort the attack based on the attack timeline. For instance, if SEAD is required, the JTAC must know the SEAD timeline so that he can shift the CAS TOT if the SEAD is late. The earlier these adjustments can be made, the greater the chance of mission success.

(d) The JTAC must also maintain awareness to the objective area for the timely recognition of changes, such as target movement and/or entrance of noncombatants and civilians.

(e) **TAD Discipline.** The TAD net can become very congested very quickly. All players on a TAD net must use "active listening" and appropriate communications discipline and cadence. Ultimately, the TAD belongs to the JTAC, and the JTAC must control it by voice.

1. Once an aircraft calls IN, all other calls should be held until after the JTAC has issued weapons-release authority or an abort. An exception to this is that anyone can and should call an abort at any time they deem necessary.

2. **Brevity.** A brevity code is a single word or phrase that does not provide security but shortens the message rather than concealing its content. Using brevity codes eases coordination and improves understanding in tactical communications, since brevity codes have only one meaning. In periods of communications jamming, brevity is required to get the message across, since transmissions must be minimized. CAS players should always use brevity for clearer and more concise communications. See Army Tactical Publication 1-02.1/MCRP 3-25B/NTTP 6-02.1/AFTTP 3-2.5 *Brevity, Multi-Service Brevity Codes,* for a complete list of all Multi-Service brevity codes.

(f) **Clearance to Drop/Fire.** Once the clearance requirements for a particular type of control are met, it is important to pass clearance in a timely manner to give aircrews time to prosecute the attack before release parameters have expired. A wide variety of ordnance is available and suitable for CAS missions. Mixed weapons loads on aircraft or between flight members will require the flight lead and the JTAC/FAC(A) to coordinate different delivery patterns. When employing standoff munitions or delivery methods, the JTAC/FAC(A) must provide a timely clearance appropriate for the weapon being delivered. For example, medium-altitude attacks can result in weapon releases more than four nautical miles from the target.

(g) **Abort Procedures.** The JTAC/FAC(A) shall direct CAS aircrews to abort if they are not aligned with the correct target, and **must** abort them if it appears that friendly troops may be endangered, or for the safety of the CAS aircrew. The CAS abort procedure can use the "challenge-reply" method to authenticate the abort command. During the CAS check-in briefing, the flight lead gives the JTAC/FAC(A) a challenge code for use with that flight only. The JTAC refers to the authentication document, finds the reply, and notes but does not transmit it. The reply "letter" becomes the abort code. If no abort code was briefed, then the CAS attack is aborted by simply transmitting: ABORT, ABORT, ABORT (see Figure V-11). The JTAC/FAC(A) may elect to use a single abort code for all aircraft under their control in situations where multiple flights of aircraft with multiple abort codes would be problematic. In such cases the JTAC/FAC(A) needs to state this nonstandard procedure during the situation update and establish the code. Anytime an abort message is transmitted via communication methods that are suspected/known to be compromised, a new abort code shall be established using the "challenge-reply" method.

For PLA procedures, see Chapter III "Planning and Requesting," paragraph 10g, "Post Launch Abort Considerations."

(10) **Assess Effectiveness of the Attack.** Execute reattacks or issue new game plans/CAS briefs as necessary. Once ordnance impacts the target, the JTAC must assess

Abort Call Illustration

(The joint terminal attack controller [JTAC] is "NAIL 11"; the close air support [CAS] attack flight is "SPIKE 41." SPIKE 41 flight has chosen "BRT" [authenticated "D"] as its abort code.)

Radio Call	Action Taken
(During the CAS check-in briefing): "NAIL 11, SPIKE 41, abort code BRAVO ROMEO TANGO."	NAIL 11 notes the correct reply for "BRT" is "D".
(The JTAC calls for an abort): "SPIKE 41, NAIL 11, ABORT DELTA, ABORT DELTA, ABORT DELTA."	SPIKE 41 aborts the pass.

Figure V-11. Abort Call Illustration

whether the commander's desired effects were created. This assessment will determine whether to continue the attack, abort sequential attacks, or set up a reattack.

(a) Obscuration may preclude effect assessment for several minutes. JTACs should weigh the need for follow-on attacks with the need to preserve ordnance until an assessment can be made.

(b) Reattacks allow CAS aircraft to quickly reposition to attack the same target, and while maneuvering, maintain compliance with any restrictions in force. A reattack by CAS aircraft under Type 1 and 2 control may be requested if additional fires are required on the target; aircraft under Type 3 control are free to reattack as long as their "cleared to engage" is in effect. In a high-threat or hostile environment, aircraft may be unable to make multiple passes due to enemy defenses. The JTAC/FAC(A) issues approval for reattack and remains aware of any threats to the aircraft. As was required in the initial attack, clearance to drop/fire on a reattack must be issued by the JTAC/FAC(A) before ordnance release. Corrections and new restrictions can be given to the aircrew during maneuvering. If ordnance adjustments are required, they must be given in a timely manner. Corrections are given in cardinal direction and distance in meters from the previous weapon impact point. In the following example a correction is being given to the second attacking aircraft in the flight, based on lead aircraft's impacts (e.g., "Razor 02, from lead's hits, north 100").

(c) If reattacks are required, the JTAC must determine if there is a need for a new game plan and also determine whether a new CAS brief is required.

(d) If the reattack is against the same target, the JTAC should state "Call sign, CONTINUE for a reattack, restrictions remain the same."

(e) If the reattack target is in close proximity to the previous target, the JTAC must ensure the aircraft is correlated to the new target, but does not require a new CAS brief.

(f) JTACs shall also ensure that previous restrictions are still applicable to reattacks, and change them if necessary.

(11) **BDA**

(a) BDA is used to update the enemy order of battle. Accurate BDA is critical for determining whether a target should be reattacked. In a high-threat environment, BDA may be difficult to judge. There is no simple answer as to who is in the best position to determine BDA. Aircrews and JTACs have different capabilities based on experience, weather, terrain, weapons employment techniques, and enemy actions, when assessing BDA. BDA is crucial in determining mission effectiveness, enemy disposition, and reattack requirements. BDA will be difficult to ascertain in a high threat environment, but the difficulty can be mitigated by integration of JIPOE early in the planning process. This assists in developing an appropriate mix of ISR assets that maximizes collection and exploitation potential. Determination of who reports or collects BDA within a given scenario is based upon the objective, capabilities, experience, weather, terrain, employment techniques, and enemy actions. The BDA report should include:

1. Size—number and type of equipment/personnel observed.

2. Activity—movement direction, stationary, dug-in.

3. Location.

4. Time.

5. Remarks—munitions expended, observed damage (number of tanks destroyed, number still active, and recommendation), mission number, and mission accomplished.

(b) Accurate and timely BDA leads to a more accurate operational picture of the current enemy order of battle, which helps the C2 system correctly dictate asset flow and allocation.

(c) JTACs must ensure that BDA is accurate, and should not overestimate BDA, or report BDA that they cannot observe.

(d) BDA reports may be passed throughout the TOS, or prior to aircraft egressing, and should be given for a flight, not individual aircraft.

(e) **JTAC/FAC(A) Responsibilities**

1. Whenever possible, the JTAC/FAC(A) provides attack flights with the BDA of their attack as they egress. The JTAC/FAC(A) gives BDA for the flight, not for individual aircraft in the flight. BDA must also be passed to intelligence and controlling agencies as soon as possible. The JTAC/FAC(A) should not assume the target is completely destroyed because the enemy may employ deception. JTACs/FAC(A)s must use their judgment and be precise ("if you do not see it, do not report it") in reporting BDA. If conditions preclude briefing BDA, at a minimum pass SUCCESSFUL, UNSUCCESSFUL, or UNKNOWN assessment to the aircraft and the controlling agency; this assessment reflects whether, in the JTAC's/FAC(A)'s judgment, the ground force commander's intent was met. In some cases, aircrew with various sensors may be better situated to aid the JTAC/FAC(A) in assessing hit results.

2. The JTAC/FAC(A) should provide a "SALTR [size, activity, location, time, remarks]" report to the appropriate C2 agency to determine if further assets are required. Develop and maintain a log of all BDA. The log should contain the following elements: mission number, call sign, target coordinates, TOT, specific results (number of enemy killed by air, vehicles/structures destroyed, unexploded ordnance), whether the mission was successful, targets remaining, and recommendation(s).

(f) **Aircrew Responsibilities.** Use the abbreviated USMTF INFLTREP (Figure V-12) to report CAS 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. This might include the presence of SAMs, AAA, or radar warning receiver indications or numbers of remaining targets. Send the INFLTREP directly to any TAGS/MACCS agency, the supported unit, or via any available relay. Message recipients may add additional information and forward via another INFLTREP. INFLTREP information is incorporated in all-source intelligence reports. Use the standard USMTF MISREP format to report mission results after return to base.

INFLIGHT REPORT	
	Aircrew Transmits " Addressee this is aircraft call sign, INFLTREP, over"
	Authentication as required
	Addressee Responds "This is addressee call sign, INFLTREP."
1	Call sign "___________"
2	Mission Number "_________"
3	Location "__latitude/longitude, grid, place name__"
4	Time on Target "__________"
5	Results "___________"
R	Remarks "__Target area weather, significant sightings, essential information__"

Figure V-12. Inflight Report

(12) **Routing/Safety of Flight.** JTACs are responsible for providing routing and safety of flight instructions to aircraft as they egress. This provides safe passage for exiting aircraft, and allows JTACs to maintain a picture of their CAS stack and positions of assets. **Routing should include a point and an altitude block that provides deconfliction from other aircraft and fires.**

3. Multisensor Imagery Reconnaissance and Intelligence, Surveillance, and Reconnaissance in Close Air Support

a. When aircraft are tasked to conduct MIR or ISR, and there is not an immediate need to conduct CAS attacks, the following caveat to the execution template may be used.

(1) Routing/safety of flight.

(2) CAS aircraft check-in.

(3) Situation update/reconnaissance/surveillance briefing. Sensor allocation:

(a) JTACs should develop and brief a comprehensive sensor allocation plan that provides tasking for all available sensors. Redundancy should be minimized.

(b) Figure V-13 provides terms for tasking aircraft sensors providing overwatch for patrols and convoys.

Sensor Postures	
Sensor postures:	Used during patrols and convoys to provide sensor tasking
"Neutral"	Lead aircraft's responsibility is the friendly force. Wing aircraft is primarily responsible for scanning the objective (or assigned checkpoint) and back to the friendly force.
"Offensive"	Both Lead and wing aircraft concentrate on the objective
"Defensive"	Lead aircraft's responsibility is the friendly force. Wing aircraft is responsible for sanitizing the route directly in front of the friendly force

Figure V-13. Sensor Postures

(4) **MIR/ISR**

(a) While MIR/ISR is being conducted, JTACs should remain engaged with aircrew and update tasking and sensor allocation as the tactical situation develops.

(b) **Labeling.** Specific labels may be assigned to individuals, vehicles, etc., that aircrew acquire while conducting MIR/ISR. This enables JTACs and aircrew to quickly refer to these items of interest using the unique label assigned. These labels should be distinctive and unique to each item to reduce confusion, such as "Bongo truck 1" or "Person 2." Figure V-14 provides brevity terms that can be used with these labels to provide quick, directive tasking.

(c) This step may continue into correlation if the aircrew discovers a target.

(d) **If the aircrew is the first to gain SA to a target, the JTAC should request target coordinate and elevation from the aircrew.** Depending on the type of attack planned, the coordinate and elevation passed from the aircrew does not need to be derived through a dedicated coordinate generation pass. For BOT employments, the coordinate and elevation are used by the JTAC for target location verification and clearance of fires. However, if the attack is planned as a BOC for the original aircraft or other CAS assets, the coordinate and elevation must be as precise as necessary to meet ground commander's intent. If in doubt, the aircrew should query the JTAC as to the level of precision required.

Sensor Tasking Brevity Terms	
Term	**Definition**
TRACK____	Directive call assigning responsibility to maintain sensors/visual awareness on a defined object or area.
SORT____	Assignment of responsibility within a GROUP; criteria can be met visually, electronically (e.g., radar), or both. (Directive call to assign sensor priority within a group of vehicles/personnel.)
DROP(PING)	Stop/stopping monitoring of specified emitter/target/GROUP and resume/resuming search responsibilities. (Directive call to discontinue sensor/visual track responsibility.)
MELD____	Shift radar responsibilities from sanitizing to gaining SA on the assigned GROUP. (Directive call for assets to bring sensors onto a single point of interest.)
STATUS____	Call from JTAC requesting aircrew update the activity of the track responsibility or requested label.
SQUIRTER	A ground-borne object of interest departing the objective area.

Figure V-14. Sensor Tasking Brevity Terms

(5) **Game Plan**

(6) **CAS Brief.** If the aircrew was the first to gain SA to the target, the lines 4 and 6 passed should be the same as provided by the aircrew during MIR/ISR

(7) **Remarks/Restrictions**

(8) **Readbacks.** An aircrew can acquire a target and derive targetable data (lines 4, 5, and 6) for JTAC/FAC(A) while conducting CAS, ISR, escort, and other missions. After verifying the target data provided by the aircrew, the JTAC/FAC(A) will provide the same aircrew with a CAS briefing using the target data provided by the aircrew. The transmission of the target data by the JTAC/FAC(A) is considered the mandatory readback and it is the responsibility of the aircrew to confirm readback was correct. **Note: This situation only applies if the aircrew that provides the target data is the same aircrew that is provided the CAS briefing by the JTAC/FAC(A).**

(9) **Attack**

(10) Assess effects and repeat 4-9 as necessary.

(11) **BDA**

(12) **Routing/Safety of Flight**

b. JTACs should strive to remain engaged with the aircrew while they conduct MIR/ISR.

c. When it appears likely that a CAS attack will be required, JTACs should be proactive in executing the steps discussed in paragraph 2a, “JTAC Actions for Developing CAS Brief,” to develop targeting data, game plan, CAS brief, and restrictions. Developing this information early will allow JTACs to issue a preemptive CAS brief, minimizing time to kill once the attack has been approved.

4. Close Air Support Execution with Non-Joint Terminal Attack Controller Personnel

MULTISENSOR IMAGERY RECONNAISSANCE TO CLOSE AIR SUPPORT EXAMPLE

Situation: Faction 31 (F/A-18F) has been providing reconnaissance for Redman 14 (JTAC) due to an anticipated attack on their forward operating base. During the search, Faction 31 observed a mortar launch and identified personnel continuing to fire mortars. Using his pod, Faction 31 derived target elevation, coordinates, and description of the target.

Attack Aircraft: "Redman 14, this is Faction 31, I have mortar point of origin with personnel firing mortars, advise when ready to copy 8-digit grid."

JTAC: "Faction 31, Redman ready to copy."

Attack Aircraft: "Redman 14, elevation 4486 feet, PA 1234 5678."

JTAC plots the target location, ensures deconfliction of fires and obtains fires approval.

JTAC: "Faction 31, advise when ready for game plan."

Attack Aircraft: "Redman, Faction 31 ready."

JTAC: "Type 2, bomb on target, 1 by GBU-38 instantaneous fuzing from Faction 31, advise when ready for 9-line."

Attack Aircraft: "Faction 31, ready to copy."

JTAC: "Delta 8"

"Elevation, 4486 feet,

mortar position,

PA 1234 5678"

"No mark,

S 800,

Egress, left pull, back to delta 8, block 15-16"

Attack Aircraft: "Redman, Faction 31, good readback."

- In this situation, since the aircraft originally provided the elevation and target coordinates, the aircraft will confirm that the JTAC has correctly read back lines 4 and 6 when he reads the 9-line.

JTAC: "Faction 31, advise when ready for remarks/restrictions."

Attack Aircraft: "Faction 31, ready to copy."

JTAC: "Make your attacks west to east, report IP inbound. Push when ready."

Attack Aircraft: "Faction 31, west to east. Wilco."

- Even though there is no requirement for the aircraft to again read back lines 4 and 6, the lead aircraft is still required to read back the other restrictions given by the JTAC.

JTAC: "Faction 31, good readback."

Attack Aircraft: "Faction 31, IN heading 093"

JTAC: "Faction 31, CLEARED HOT."

Attack Aircraft: "Faction 31, off, one away, 27 seconds."

JTAC: "Good impact, proceed back to Delta 8 block 15-16, standby BDA."

a. In certain circumstances, the ground commander might require air support when a JTAC or FAC(A) is not available or is no longer able to provide assistance, but detailed integration with friendly forces fire and movement is still required. Aircrew executing CAS under these circumstances bear increased responsibility for the detailed integration required to minimize friendly fire and collateral damage, tasks normally done by a JTAC/FAC(A). In these circumstances, CAS aircrew should assist non-JTAC-qualified personnel/units to the greatest extent possible, in order to bring fires to bear.

b. Due to the complexity of air support, the commander must consider the increased risk of friendly fire and civilian casualties when using personnel who are not JTAC/FAC(A) qualified. The requester must notify/alert their command element when a JTAC or FAC(A) is unavailable to conduct Type 1, 2, or 3 control. If the maneuver commander accepts the risk, the request is forwarded to the CAS controlling agency (ASOC, DASC, JAOC). This information will alert the CAS controlling agency that aircrew will be working with non-JTAC personnel.

c. Ground personnel requiring air support will normally be able to provide much of the information needed to complete the CAS brief. CAS aircrew should attempt to draw the following information from the ground personnel:

(1) Target elevation.

(2) Target location (grid, latitude/longitude, direction and distance from reference point, etc.).

(3) Target description (sufficient to provide PID).

(4) Any target marks that the ground personnel are able to provide (smoke, direct fire, laser, IR pointer, etc.).

(5) Nearest friendly location (sub-cardinal direction and distance from target).

(6) Any restrictions that the ground commander feels are necessary or SA the aircrew needs to prosecute the target safely (presence of civilians or other friendly troops, etc.). Aircrews should be prepared to develop their own restrictions according to what they believe is necessary for the safe prosecution of the target, to include FAHs, in order to ensure the friendlies and civilians are safe from the effects of all fires.

(7) Aircrews shall achieve positive target correlation through a sufficient dialogue with the ground personnel, while understanding that the ground personnel are not specifically trained in target correlation methods.

(8) Aircrew should direct the ground personnel to use the brevity term "abort," if any unsafe situation develops during the attack.

d. Aircrew in this situation will make a timely effort to involve a JTAC/FAC(A) in the situation, be prepared to obtain information from ground personnel to complete the attack brief, and will exercise vigilance with target identification, weapons effects, friendly locations, and execution of the final attack/abort procedures.

5. Forward Air Controller (Airborne) Integration

a. **Check-In.** The FAC(A) is an extension of the TACP, and should communicate "FAC(A) capable/qualified" at check-in, providing the JTAC knowledge of the capability resident within the asset. If the JTAC intends to utilize the FAC(A) capability in these situations, the situation update should be much more in depth than that of a normal CAS asset, therefore, the JTAC should consider using an enhanced version of the common situation update. If a FAC(A)-capable asset is going to be used ad hoc, then JTACs should be aware that the usual degree of detailed integration may not have taken place during mission planning. More time may be required to allow the asset to develop the necessary SA (i.e., active PAAs, friendly battle tracking) in order to successfully perform FAC(A) duties.

b. With this enhanced knowledge of the overall game plan, the FAC(A) will be better prepared and able to support the ground commander. Other information to be passed to FAC(A) should be any present or developing target areas. If the JTAC has CAS briefs available, complete or incomplete, they should pass as much to the FAC(A) as the tactical situation allows. Routine "nice to know" information for a CAS asset should be considered and passed as "need to know" information for a FAC(A), as it may become critical for effective execution as the tactical situation changes.

c. It is important that a JTAC understands the capabilities that a FAC(A) brings to an operational area. The following list highlights these capabilities:

(1) **TAC (Type 1, 2, and 3)**

(a) Provide final attack clearance in accordance with Type 1, 2, and 3 control.

(b) Coordinate and control SOF gunship fire missions.

(c) Be a reactive CAS asset, available to the JTAC.

(d) Provide a final quality control check to prevent friendly fire.

(2) **Radio Relay**

(a) Provide a communication link due to LOS for the JTAC and supported unit.

(b) Provide a communication link between the supported unit and aviation C2 system.

(c) Provide a communication link between the JTAC and RW CAS assets.

(d) Perform OSC duties in the event of a combat search-and-rescue event where there is no ground commander or TACP/JTAC on scene.

(3) **Reconnaissance**

(a) Perform multispectral imagery function in an attempt to fulfill CCIRs.

(b) Provide target analysis and weaponeering recommendations.

(c) Provide perspective from air, same perspective of CAS assets.

(4) **Indirect Fires Calls for Fire.** Perform as an artillery spotter/perform calls for fire.

(5) **Asset Coordination/Deconfliction**

(a) Provide deconfliction of aircraft and surface fires.

(b) Pass situation updates.

(c) Put targeting information into CAS brief format, tactical situation dependent.

(d) Pass targeting information (CAS brief, SOF gunship call for fire, SPINS specified formats).

(6) **BDA.** Develop and pass BDA.

(7) **Target Marking/Designation/Coordinate Generation**

(a) Provide talk-ons.

(b) Provide marks.

(c) Provide terminal guidance for LGWs.

(d) Generate target coordinates for weapons employment.

(8) **SEAD Coordination Efforts**

d. **FAC(A) Duties and Responsibilities.** It is important for the JTAC and FAC(A) to rapidly determine responsibilities for execution and expedite CAS procedures in a tactically safe manner. The three objectives of the FAC(A) are: to achieve the ground commander's intent, maximize and integrate fires on the battlefield, and mitigate friendly fire. The FAC(A) must understand the tasking and duties set forth by the JTAC in order to accomplish them autonomously and reduce the work load required of the JTAC. Absence, or misidentification, of the tasks and duties for the FAC(A) during planning and/or execution will likely result in delayed CAS operations. It is important to note that these duties can change at any time during the time on station for the supporting FAC(A), at the discretion of the TACP. Should TAC duties be divided between the JTAC and FAC(A), the element who has the authority to provide final weapons release permission **must** be clearly stated. This will alleviate any confusion during the critical phase of employment. JTACs and FAC(A)s should use the following brevity terms to quickly communicate duties, and shall positively echo any responsibilities passed:

(1) **BRIEF.** The FAC(A) will automatically pass information such as operational area updates, available CAS briefs, BDA, etc. to CAS assets within the operational area, as well as copy CAS asset check-in information. The FAC(A) will keep the JTAC updated on the situation, but will allow them to focus on other duties. It is not uncommon for some aspects of the brief to be passed, while the JTAC retains other aspects, e.g., a JTAC could task the FAC(A) to check aircraft into the operating area and then pass a current situation update, while retaining the attack brief or CAS brief. The JTAC will be as specific as necessary, using plain language, to clearly identify the JTAC's desires to the FAC(A).

(2) **STACK.** The FAC(A) will deconflict all CAS assets from surface fires within the operational area, as well as provide deconfliction for assets upon check-in. Deconfliction will include HAs, ingress and egress routings, and target areas. The FAC(A) will keep the JTAC updated of the situation as required, allowing the JTAC to focus on other duties. The JTAC must keep the FAC(A) updated on any changes with FSCMs/IDF operations. Further coordination should take place between the JTAC and FAC(A) if any specific axis or holding points are desired for following missions that the JTAC wishes to undertake.

(3) **MARK.** The FAC(A) will provide target marks for CAS attacks. It is critical that the FAC(A) and JTAC coordinate whether or not the JTAC will issue a clearance via Type 1, 2 or 3 for the FAC(A) to release a mark. A CAS brief is not required to be provided for a FAC(A) mark, as it could significantly increase time to kill, however care should be undertaken to achieve proper target confirmation prior to issuing release authority. If the FAC(A) is provided the authorization to release airborne marks autonomously by the JTAC, at a minimum the FAC(A) shall still telegraph intentions by communicating an IN for the

MARK call prior to releasing ordnance, allowing the JTAC to abort the autonomous mark if tactically necessary. Talk-ons are considered a mark for this tasking. The FAC(A) will bring aircraft forward with deconfliction established and threat permitting, in order to provide talk-ons to targets associated with passed CAS briefs/areas of interest.

(4) **CONTROL.** The FAC(A) will provide final release authority to attacking aircraft if delegated this authority by the JTAC. As always, the JTAC retains abort authority. There is no need to use the term "Joint Control," as it is ambiguous. The JTAC should always back up the FAC(A) if tactically feasible, and be ready to assume control if the FAC(A) is unable to obtain the proper position for a Type I control, given a dynamic tactical scenario requiring significant aircraft maneuvering. In this case, the FAC(A) should clearly communicate intentions to the JTAC as soon as possible, to allow the JTAC the ability to assume terminal control. In the case of a FAC(A) receiving control authority, similar to autonomous marking, the FAC(A) can release ordnance by effectively controlling him/herself, if prior coordination takes place with the JTAC. However, in this scenario the FAC(A) should exercise utmost care to perform all necessary measures to mitigate risk of friendly fire and, at a minimum, the FAC(A) shall telegraph intentions by communicating an IN call prior to releasing ordnance, allowing the JTAC to abort the FAC(A) if tactically necessary.

JTAC/FAC(A) communication examples:

For a FAC(A) who provides aircraft deconfliction:

"Venom 11 has stack, A3C, maintains brief, mark, and control."

For a FAC(A) who will deconflict aircraft and provide talk-ons:

"Bengal 61 has stack and mark, Titus maintains brief and control."

For a FAC(A) who is operating as an autonomous TACP:

"Hawk 81, Broadsword 02, your brief, stack, mark, and control."

e. **Communication Techniques.** Communication often becomes complex, with a FAC(A) and numerous CAS assets on station simultaneously. Several options and techniques are available to maximize the use of verbal communication, while preserving radio time for critical weapons release authority, mission approval, and passing information.

(1) Establish two or three separate frequencies for CAS coordination and execution. One will serve as the primary AO/ALO frequency on which all CAS target-attack missions may be passed and coordinated, and final weapons release permission may be passed. All players including the JTAC, FAC(A), and CAS aircraft should be on the frequency. This frequency will normally be the TAD net assigned to the JTAC. The auxiliary frequency (UHF or VHF) can be used as a coordination frequency between the AO/ALO, JTAC, and the FAC(A) to pass administrative details, situation updates, new targets, coordination for SEAD, coordination for marks, and CAS mission approval. In a Marine operation, this is often the TACP (local) net. A third frequency could be established if numerous aircraft are

anticipated within an operational area, as terminal control communication can quickly become intensive and diminish the ability to deconflict aircraft. On this additional frequency, communications such as check-in, updates, and asset deconfliction can be passed by the FAC(A) and/or JTAC. This prevents these vital but lower-priority communications from interfering with target talk-ons, coordination between the FAC(A) and JTAC, or terminal attack communications. If such a frequency plan is established, the FAC(A) must understand that coordination should occur on this frequency but that all TAC is to occur on the primary net in order to ensure that the JTAC has SA and is able to abort attacks if necessary.

(2) Another technique when utilizing a FAC(A) and/or several CAS assets simultaneously is to ensure that when information is passed, it is passed to as many assets as possible. When passing a CAS brief to a FAC(A) or CAS asset, preface it with a HEADS UP call to all players, alerting them to copy the information. This will potentially prevent the same information from being passed several times on the same frequency.

(3) A final communications technique is to inform all players that communications are becoming intensive and to limit all calls to 10-seconds or less, as well as for attacking aircraft to provide a THIRTY SECONDS call. This will allow information to continue being passed in short segments to all players within the operational area, as well as provide attacking aircraft with breaks in communications, in which to inform the JTAC and/or FAC(A) that they will be making an IN call soon, and will need final attack clearance. When the THIRTY SECONDS call is made, the FAC(A) should inform the aircrew that information is being passed to standby, monitor the attack, and provide weapon release permission (clearance); or to abort and then resume passing pertinent information to the respective aircraft.

f. **Holding.** The FAC(A)'s holding pattern will vary greatly throughout the time on station in order to accommodate such tasks as target identification, coordinate generation, or visual acquisition of CAS assets. If the threat and weather allows, the FAC(A) may wish to orbit over or near the target. This will allow the FAC(A) to be in a position to mark, accomplish talk-ons, provide final clearance, and conduct other tasks previously listed. The JTAC should provide the FAC(A) with as much airspace as possible, both laterally and vertically, consistent with existing limitations, to allow the FAC(A) to manage the airspace deconfliction between him/herself and the other CAS aircraft. This flexibility is necessary for the CAS assets and the FAC(A) to effectively employ ordnance consistent with existing tactics and threat considerations.

g. **Marks.** The requirement for JTAC clearance for FAC(A) marks must be clearly stated real-time. Consideration should be given to providing blanket approval for FAC(A) target marking. If the TACP determines that they will provide clearance in the form of a Type 1, 2, or 3 control for FAC(A) marks, the FAC(A) should request blanket approval for the use of nonlethal marks (e.g., IR pointers/markers). Ultimately, the decision will rest with the ground commander, and as such, the TACP must provide guidance that will allow an informed decision.

h. **Attacks**

(1) During medium altitude operations, with JTAC approval, the FAC(A) can execute all tasks listed above, including briefing the CAS aircraft, bringing them into the target area, providing the talk-on, marking, and providing final clearance. The JTAC must continually monitor the mission, provide necessary corrections, retain abort authority, monitor artillery and RW activities, and work with the ground commander and representatives to further refine target priorities in support of the commander's objectives.

(2) During low-altitude or RW operations, with TACP approval, the FAC(A) will normally remain at the BP/IP, brief the CAS aircraft, provide them holding instructions for deconfliction, confirm a common time hack, and possibly provide target marks.

(3) In a time-sensitive situation, such as a troops in contact, an on-station FAC(A) working with ground forces may have greater SA than CAS fighters checking in, and may also be able to provide support most rapidly through the employment of own-ship munitions. As stated previously, this ordnance release must be coordinated with the JTAC and be either under a blanket approval to mark and suppress targets ("your mark and control"), or via a terminal attack-control clearance.

(4) A FAC(A) can use several techniques to aid the JTAC with flexible and lethal aviation fires. One such technique is to initiate a CAS attack window with a visual mark followed by either a Type 1 or 2 control for the first weapon to be employed to ensure that all members of the attacking flight have the target TALLY/CAPTURED. Once the attacking aircraft are TALLY/CAPTURED, the FAC(A) may then request a transition to Type 3 on the specified target set, allowing the FAC(A) to continue monitoring the engagement while assisting the JTAC with any of the other FAC(A) capabilities or tasks listed earlier.

i. **Post Attack.** If the FAC(A) is providing deconfliction at the IP and/or in the target area, they will continue to do so for the CAS aircraft egressing the area. Whoever has the best observation of the attack and weapons effects should provide the CAS aircraft with BDA. If communications are interrupted by terrain, the JTAC should plan to relay BDA through the FAC(A) to the CAS asset.

j. **Battle Handover.** Prior to the FAC(A) checking out with the JTAC, a handover brief shall be conducted with the JTAC or oncoming FAC(A). Information should include, but is not limited to:

(1) **Assets On Station.**

(a) Location.

(b) Ordnance/time on station remaining.

(c) Established deconfliction plan for assets within the operational area.

(2) **Threat Updates.**

(3) **Missions Conducted.**

(a) Targets engaged/CAS briefs passed.

(b) Targets currently being engaged under Type 3.

(c) Targets remaining and priority.

(4) **Communications Plan.**

(5) **Recommendations to JTAC or Oncoming FAC(A).**

(6) Any other pertinent information.

k. **FAC(A) integration in the absence of an on-scene TACP**

(1) As per the definition, a FAC(A) is normally an extension of the TACP. However, as the demand for qualified controllers increases, it is important to highlight considerations for employing a FAC(A) either as a separate terminal attack controller working directly for the ground commander, or as an extension of a TACP not physically located with the supported unit commander.

(2) When operating as a separate TACP or without a JTAC on scene, the FAC(A) must maintain the communication links to the ground commander and receive authorization (either in planning or real-time) for coordination and delivery of aviation fires. The close and continuous coordination with the supported ground commander will foster understanding about the FAC(A) platform's capabilities and when to leverage them. The supported commander is responsible for all fires, both aviation and surface-based, that are delivered in the assigned operational area. A FAC(A) conducting CAS operations as a separate TACP must be aware that the fires in the support of the ground commander are occurring in a unit's operational area. All FAC(A) fire missions (aviation or surface-to-surface) **must still be approved by the supported ground maneuver element's appropriate fire support coordination agency.** This may require the FAC(A) to conduct detailed, real-time coordination on the supported unit's fire support coordination net. Additionally, the FAC(A) must understand that the unit in need of FAC(A) support may not be the one that owns the operational area. In recent counterinsurgency operations, FAC(A)s have been employed supporting convoys and mounted patrols from one unit, while those elements are transiting another unit's operational area. Often in these situations, the on-scene unit leader did not have the same SA with regard to nearby friendly force disposition or fire missions as the unit that was responsible for the operational area. In many of these situations, CAS engagements resulting in friendly fire were avoided due to a FAC(A)'s ability to conduct coordination, understand through whom fires approval must be requested, and build each unit's SA quickly as a radio-relay between agencies. The FAC(A) must understand that complex operations, as discussed, will require potentially greater and more detailed real-time integration with adjacent and HHQ.

(3) Ground commanders should provide the FAC(A)s the same direction with respect to the fire support plan and execution as would be provided to the TACP/JTAC, and expect the FAC(A) to perform the tasking. The FAC(A) can and will likely be the terminal controller who will retain the employment authority of FAC(A) and CAS element ordnance

as required to support the ground commander's maneuver. While positively identifying targets may be challenging for the FAC(A), it is important to note that since the establishment of the FAC(A) role in the Korean war, this difficult task has been accomplished through sound understanding of the supported ground commander's scheme of maneuver, SA, and detailed integration and coordination.

(4) While the emphasis is usually placed on the "control" in FAC(A), recent combat experience has shown that the most important utility in having a FAC(A) overhead may lie with the mission-essential tasks, other than terminal control, that the FAC(A) can provide to the supported commanders. The FAC(A) may be given TAC or, by focusing on the other mission essential tasks (radio relay, reconnaissance, calls for fire, asset coordination/deconfliction, BDA, target marking, designation, coordinate generation, and SEAD), may become the critical link that allows a JTAC to provide weapons release approval. In recent counterinsurgency operations, TAC has been a low-percentage task for the FAC(A)s, whereas the requirement for the coordination aspects of the FAC(A) mission have increased. The requirement for the FAC(A) to seamlessly assume control and coordinate with the ground commander for fires approval and weapons release authority during terminal attack operations has not diminished. The increased role of the FAC(A) executing the coordination missions allows the FAC(A) to act as a facilitator between agencies maintaining and expediting the kill chain. As the TACPs and JTACs operate at greater distances from the supported ground maneuver units, the requirement for aircrew to be well versed in the finer details of CAS has increased. Whether delivering sophisticated ordnance in close proximity to friendly troops, dropping new classes of weapons through increasingly complex airspace, or operating as part of the air-ground team against an enemy mindful of collateral damage and political impact, the FAC(A)s must bring to bear all of the knowledge and equipment necessary to best contribute to the commander's success on the battlefield.

(5) Whether operating as an extension of a TACP or as a separate TACP, FAC(A)s are terminal attack controllers with a host of capabilities that vary based on platform. They can and should be used to maximize and integrate fires on the battlefield and achieve the supported commander's intent while minimizing the risk of friendly fire.

6. Joint Fires Observer Integration

a. **JFO Action**

(1) Once established in the assigned location/area, the JFO will contact the JTAC/FAC(A) on the briefed communications net. Upon initial contact, the JFO should communicate the situation to the JTAC/FAC(A) using the observer lineup brief. The JFO should periodically update the JTAC/FAC(A) as the battlefield situation changes. (See Figure V-15)

Observer Lineup
"__________, this is _____________with observer lineup. Over" (JTAC C/S) (JFO C/S)
Only to JTAC: "My position is _____________________" (i.e., grid and/ or reference point)
"I am in ________________________, located ___________________from target area, (Overwatch, Convoy, Defensive, etc.) (direction and distance m/km)
marked by ___________ . I have ___________ targets for CAS. (Friendly mark type) (Number of)
My specialized equipment is ________________. Over." (PSS-SOF, LTD w/JFO PRF code, LRF, GPS, IR Pointer, etc.)
Notes:
1. The JFO should be prepared to describe how the target coordinates were derived for each CAS brief. For example: LRF coupled with a GPS, PSS-SOF, or map and compass. This information provides the JTAC and supporting aircrew situational awareness regarding the accuracy of the target coordinates provided.
2. Friendly grid coordinates should not be passed on an unsecure net.

Figure V-15. Observer Lineup

(2) Depending on the tactical situation, the JFO situation update brief should use the same format as the CAS situation update brief, only including those items that are applicable. JFOs may pass the situation update directly to the JTAC/FAC(A) or may require the CAS aircraft to relay. Clearance authority is not briefed by the JFO. JFOs should break the situation update into manageable transmissions using the brevity term BREAK when passing to their JTAC/FAC(A).

(3) Targets may be nominated for attack by unit leaders (e.g., platoon commanders, squad leaders) via maneuver frequencies or by JFO via TACP frequencies or surface fires frequencies. It is imperative that the communications plan is understood by all.

(a) JFO Target Brief. When the decision has been made to attack the target using CAS, the JFO shall contact the JTAC/FAC(A) and provide targeting information. A target brief should be prefaced by "advise when ready for JFO target brief." JFOs should ensure that they are ready to pass the entire target brief prior to transmission. The target brief should be prefaced by stating the first line number, "Line 4:" Additional line numbers are not transmitted unless there is an omission. After Line 8 is read, the JFO will state "Advise when ready for remarks." At a minimum, JFOs should recommend final attack restrictions. (See Figure V-16)

Joint Fires Observer Target Brief		
Line 4: Target Elevation (ft MSL)		**"Line 4 ______________________"**
Line 5: Target Description		**"______________________"**
Line 6: Target Location		**"______________________"**
Line 7: Target Mark		**"______________________"**
Line 8: Friendlies		**"______________________"**
"Advise ready for remarks"		
FAH		
LTL/PTL		
Threat	**Direction/Distance**	
SEAD	**Int/Cont/Non-Stan**	
GTL/LOF	**Max Ord**	
Restrictions		
TOT	**Readback**	

Figure V-16. Joint Fires Observer Target Brief

1. If any lines between 4 and 8 are omitted from the brief, the line must be prefaced with the line number to identify the location of the information within the attack brief, followed by either "None" or "Unknown." Lines 4 and 8 shall not be omitted.

2. JFOs shall ensure that Line 8 references the closest friendlies to the target, which may or may not be their position. It is incumbent on the JTAC/FAC(A) to verify the direction and distance by all available battle-tracking methods.

3. Remarks may include, but are not limited to, LTLs, IR pointer-target lines, threats to aviation, recommended/requested attack geometry (e.g., FAHs), ordnance, etc.

4. The JTAC/FAC(A) shall read back the information and then verify the target location/attack geometry.

5. Readbacks. During the JFO target brief, the JFO will receive readbacks of all mandatory readback items from the TAC. The JFO should respond to correct readbacks with "Chief 21, readback correct," or "Chief 21, good readback." If the readback is not correct, the JFO should restate the portion in question correctly, using voice inflection

to draw attention to the portion that had been read incorrectly, e.g., "Chief 21, correction, FAHs 1-8-0 through 2-1-0."

(b) The JTAC will then conduct CAS mission preparation.

(4) After the JFO target brief, the JTAC will pass instructions and the intended plan of action. Consider requesting an "IN with direction" or "heading" radio call from the aircrew. This can increase the JFO's SA of the attack and allows timely aborts from the JFO if required. (See Figure V-17)

Examples of Tactical Air Control Party Information to Coordinate
Target refinement, if applicable **Ordnance / effects requested** **Direction of attack** **Abort code** **TOT** **Mark information / JFO marking responsibilities (if required)** **Mark the target** **Provide corrections from the mark** **Set laser PRF code for marking or designation**
Note: With the information the JFO confirms the ability to provide any required marks, TGO, talk-ons, etc. and briefs the CAS mission to the ground commander.

Figure V-17. Examples of Tactical Air Control Party Information to Coordinate

(a) The JTAC to JFO instructions identify actions required by the JFO to support the JTAC's intended plan of action.

(b) The intended plan of action communicates the details of the CAS attack so that the JFO can brief the supported unit leader.

(5) The JTAC will direct the JFO to switch to the TAD frequency to monitor the CAS brief. During the execution of the CAS attack, the JFO will provide TGO, correlation, or target/situation updates, as required for mission success.

(6) JTAC conducts the CAS mission using the execution template. Execution template considerations specific to JFO integration are:

(a) Routing/Safety of Flight. The JTAC or higher TACP provide aircraft routing, but the JFO may be required to pass safety of flight information as the battlefield situation changes or during CAS execution with non-JTAC personnel.

(b) CAS Aircraft Check-In. The JFO should be on TAD and monitoring the communications between the TAC and the CAS aircrew. This will enable the JFO to brief the ground commander on CAS mission status. JFOs must take care to copy the check-in accurately the first time it is passed, whether from their JTAC or from monitoring transmission to the JTAC from the aircrew.

(c) Situation Update. The JTAC's SITREP should include JFO information if applicable (general location, equipment/capabilities, and duties with regard to the CAS mission).

(d) Game Plan. The JFO monitors the game plan to provide the ground commander with pertinent information.

(e) CAS Brief. The JFO monitors the CAS brief to validate accuracy.

(f) Remarks/Restrictions. The JFO monitors the remarks/restrictions to identify attack geometry, TGO requirements, and TOT.

1. JFO confirms the ability to provide required TGO, correlation, or observation of the target.

2. JFO and ground commander should be involved in establishment of TOT.

(g) Readbacks. The JFO monitors to validate accuracy

(h) Correlation. See paragraph 6b, "Target Correlation."

(i) Attack. See paragraph 6c, "Mission Execution."

(j) Assess Effects. JFO provides assessment of weapon(s) effects and updated commander's intent. Conferring with the on-scene maneuver commander and JTAC, JFOs shall ensure that previous restrictions are still applicable to reattacks, and recommend changes to them if necessary.

(k) BDA. JTACs working with a JFO in a Type 2 control scenario will generally have the JFO pass BDA directly to the attacking section of aircraft over TAD while monitoring for accuracy. In some cases, aircrew with various sensors may be better situated to aid the JFO in assessing hit results. JFO monitors and updates ground commander on CAS mission status.

(l) Routing/Safety of Flight. N/A

b. **Target Correlation.** Target correlation can occur either between the JFO and the JTAC or between the JFO and the CAS aircrew. Some correlation considerations follow:

(1) JFO to JTAC Correlation

(a) While not required, it is recommended that the JFO utilize the TAD frequency.

(b) Correlation should occur prior to aircraft check-in, if possible. With systems available in the COC, this could enable the JTAC to conduct a BOC attack, minimizing time to first effects, vice a BOT attack.

(c) Correlation may be required to refine target location to a high enough fidelity for mission approval.

(d) JFO can continue to search for additional targets once target correlation occurs.

(e) Line 7 of the target brief should specify which type of correlation the JFO will be using, i.e., map, GRG, visual talk-on.

(2) JFO to Aircrew Correlation

(a) JFO must be on TAD frequency.

(b) Required for BOT attacks when JFO is the individual that is tally.

(c) When aircraft are already on-station and in a position to participate in a target talk-on. JFOs should confirm that the aircrew is looking at the same reference points as they are, by asking questions with unique and distinct answers that will indicate that correlation is on track.

(d) When visual marking is the means to effect target correlation (e.g., IR sparkle, smoke, direct fire).

(e) If the JFO is employing a GLTD for correlation or terminal guidance of a LGW, the JFO will confirm the laser is on the correct code and use appropriate laser brevity terms.

(f) The JFO will use appropriate IR and VDL brevity terms in response to aircrew or the JTAC.

(3) While the JFO will not issue weapons release authority (i.e., CLEARED HOT), informing him of weapons release from the aircraft allows the JFO time to notify ground forces to seek cover if required.

c. **Mission Execution.** The JFO should be kept informed as the mission progresses. The JFO must know CAS mission specifics that may include when aircraft are prosecuting attacks, how many aircraft are attacking the target, when they release ordnance, and approximate time of weapons impact.

(1) During mission execution, the JFO will pass pertinent information to the JTAC, while maintaining communications with the on-scene maneuver commander. This includes, but is not limited to:

(a) Target updates, target location refinement, target movement, and change in target priority.

(b) Troops in contact.

(c) Friendly location updates and maneuver plan after the attack.

(d) Collateral damage considerations and updates.

(e) Weapons impact correction and/or new desired aim point. The JTAC should be proactive and ensure the JFO provides timely corrections.

(f) Threats to aircraft (MANPADS, small arms, AAA equipment).

(g) Inputs to BDA.

(2) JFO should monitor TAD and be prepared to provide an ABORT call to prevent friendly fire, ensure safety of flight, or satisfy commander's intent. While not certified to assess aircraft attack geometry, the JFO should monitor the aircraft's employment profile if the situation dictates. The JFO should use active listening and take care to practice TAD discipline during the terminal phase of a CAS attack.

(3) CAS Execution with Non-JTAC Qualified Personnel. In instances where a JFO facilitates CAS without a terminal attack controller present, the JFO will inform the aircrew they are a JFO upon aircraft check-in, ensure aircraft safety of flight, and adhere to procedures outlined in paragraph 4, "Close Air Support Execution with Non-Joint Terminal Attack Controller Personnel."

d. **Laser TGO for CAS.** When the JFO is providing TGO with a LTD, the JTAC should ensure that all laser communications occur between the JFO and attacking aircraft. This communication will occur on TAD, and a communication check between the JFO and the aircrew should be accomplished.

e. **FW PGM CAS Employment.** Due to extended time of fall associated with PGM employment, the JTAC should notify the JFO of weapons release and time of fall if the JFO is unable to monitor TAD. This will give the JFO SA and allow him time to notify others in the target area of pending weapons impact.

(1) The JTAC should verify the coordinate source (i.e., PSS-SOF, Vector 21, GRG) during BOC employment if the JFO is the sole source of targeting information.

(2) The JTAC should cross-check the intended aim point against the coordinates provided.

f. **Night CAS Operations**

(1) When the JFO is using an IR sparkle to mark a target, the JTAC must ensure that all proper IR terminology is utilized.

(2) IR TGO communication should occur on TAD between the aircraft and JFO.

APPENDIX A
JOINT TACTICAL AIR STRIKE REQUEST

SECTION I—MISSION REQUEST

Line 1.

- **UNIT CALLED.** Identifies the unit designation/call sign/preassigned number.
- **THIS IS.** Identifies the request originator by unit designation/call sign/pre-assigned number.
- **REQUEST NUMBER.** For preplanned missions, indicates the originator's request number in series. For an immediate mission, this number is assigned by the ASOC/DASC.
- **SENT.** Indicates the time and the individual who transmitted the request.

Line 2. (Mission Categories).

- **PREPLANNED:** For preplanned requests, enter precedence (block A) or priority (block B).

  - **PRECEDENCE** is stated numerically in descending order of importance, as determined by the requestor.

  - **PRIORITY** is expressed as shown below (#1 for emergency, #2 for priority, or #3 for routine).

- **IMMEDIATE:**

  - **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 is #1. Targets that require immediate action and supersede all other categories of mission priority.

  #2. Priority is #2. Targets that require immediate action and supersede routine targets.

  #3. Routine is #3. Targets of opportunity. Targets which do not demand urgency in execution.

- **RECEIVED.** Indicates the time and the individual who received the request.

Line 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 (e.g., 10 tanks) or the size of the target area (e.g., personnel on a 500 meter front).

Otherwise planners cannot accurately determine what force is required — aircraft numbers/type and ordnance amount/type. Note: Item M: "Centers (CP, COM)" refers to C2 centers, command posts, etc.

Line 4: TARGET LOCATION IS. Locates the target by using the MGRS prescribed for the area concerned.

BLOCK A. COORDINATES. Locates a point target or starting point

BLOCK B. COORDINATES. When used together with A, provides from A to B coordinates.

BLOCK C. COORDINATES. When used together with A and B, provides a route.

BLOCK D. COORDINATES. When used together with A through C, provides a route or describes a target area.

BLOCK E. TGT ELEV. Target elevation in feet above MSL.

BLOCK F. SHEET NO. Self-explanatory.

BLOCK G. SERIES. Self-explanatory.

BLOCK H. CHART NO. Self-explanatory.

CHECKED. Indicates with whom target information has been crosschecked.

Line 5. TARGET TIME/DATE. Indicates the time/date when the air strike is requested.

BLOCK A. ASAP - As soon as possible.

BLOCK B. NLT. The target is to be attacked before, but not later than the time indicated.

BLOCK C. AT. Indicates time at which target is to be attacked.

BLOCK D. TO. Denotes end of period of time in which support such as airborne alert or column cover is required. When TO is used, NLT and AT are unnecessary.

Line 6. DESIRED ORD/RESULTS. Indicates the requestor's desired air strike results. This is essential information for the planner and must be carefully considered by the requestor.

BLOCK A. ORDNANCE. Desired ordnance.

BLOCK B. DESTROY. Self-explanatory.

BLOCK C. NEUTRALIZE. Self-explanatory.

BLOCK D. HARASS/INTERDICT. Self-explanatory.

Line 7. FINAL CONTROL. Identifies the final controller (e.g., JTAC, FAC[A]) who will conduct the briefing and control the release of ordnance.

BLOCK A. JTAC. Transmit the type of terminal control.

BLOCK B. CALL SIGN. Call sign of terminal controller.

BLOCK C. FREQ. Recommended TAD frequency.

BLOCK D. CONTROL POINT. Military grid coordinates and/or navigational aid 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.

Line 8. REMARKS. Allows incorporation of information not included elsewhere in the request. Situation Update. When submitting a JTAR, the JTAC or requesting agency will provide a current situation update to the ASOC/DASC. The situation update will consist of:

(1) Situation update number (#)

(2) Target, general enemy situation

(3) Threat activity

(4) Friendly situation

(5) Friendly positions

(6) Artillery activity

(7) Clearance authority

(8) Ordnance requested

(9) Restrictions/Remarks

(10) Localized SEAD efforts (suppression/EW)

(11) Hazards (weather terrain/obstructions)

SECTION II – COORDINATION

Line 9. NSFS. NSFS coordination.

Line 10. ARTY. Artillery coordination.

Line 11. AIO/G-2/G-3. Air Intelligence Officer, G-2, G-3, or other Service equivalent coordination.

Line 12. REQUEST. Indicates the approval or disapproval of the request.

Line 13. BY. Indicates the individual who approved or disapproved the request.

Line 14. REASON FOR DISAPPROVAL. Self-explanatory.

Line 15. RESTRICTIVE FIRE/AIR PLAN. The ACA establishes airspace that is reasonably safe from friendly surface-delivered nonnuclear fires. The ACA provides a warning to aircrew of the parameters of surface-delivered fire in a specific area. A plan number or code name is issued, as appropriate.

Line 16. IS IN EFFECT. Establishes the time period that the applicable ACA plan will be in effect.

Line 17. LOCATION. Grid coordinates of the start/end points of the ACA's centerline.

Line 18. WIDTH (METERS). Defines ACA from either side of the centerline.

Line 19. ALTITUDE/VERTEX. ACA altitude given in feet above MSL.

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 20. MISSION NUMBER. Self-explanatory.

Line 21. CALL SIGN. Self-explanatory.

Line 22. NO. AND TYPE AIRCRAFT. Self-explanatory.

Line 23. ORDNANCE. Type of ordnance either by code number or actual nomenclature.

Line 24. EST/ALT TAKEOFF. Estimated or actual time the mission aircraft will take off.

Line 25. EST TOT. Estimated time on target.

Line 26. CONTROL POINT (COORDS). The farthest limit of the attack aircraft's route of fight prior to control by the final controller. Same as Line 7, item D, when designated in the request.

Line 27. INITIAL CONTACT. Indicates the initial control agency the flight is to contact.

Line 28. JTAC/FAC(A)/TAC(A) CALL SIGN/FREQ. Call sign and frequency of the final control agency.

Line 29. AIRSPACE COORDINATION AREA. Refer to lines 15 through 19 for this data.

Line 30. TGT DESCRIPTION. Self-explanatory.

Line 31. TGT COORD/ELEV. Self-explanatory.

Line 32. BDA REPORT (USMTF INFLTREP). This optional space is used to record BDA for each mission.

Department of Defense Form 1972, Joint Tactical Air Strike Request

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

SECTION I - MISSION REQUEST

DATE

1. UNIT CALLED — THIS IS — REQUEST NUMBER — SENT: TIME / BY

2. PREPLANNED: [A] PRECEDENCE ______ [B] PRIORITY ______ — RECEIVED: TIME / BY
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 — CHECKED: BY
[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 ______
THE FOLLOWING MAY BE INCLUDED IN THE "REMARKS", IF REQUIRED:
BCN-TGT ______ MAG BCN GRID ___/___
BCN-TGT ______ METERS TGT GRID ___/___
BCN ELEVATION ______ FEET MSL

SECTION II - COORDINATION

9. NSFS — 10. ARTY — 11. AIO/G-2/G-3

12. REQUEST
[ ] APPROVED
[ ] DISAPPROVED

13. BY — 14. REASON FOR DISAPPROVAL

15. RESTRICTIVE FIRE/AIR PLAN
[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) CALL SIGN/ 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, APR 2003 — PREVIOUS EDITION MAY BE USED. — Reset — Adobe Professional 7.0

Figure A-1. Department of Defense Form 1972, Joint Tactical Air Strike Request

APPENDIX B
SAMPLE CLOSE AIR SUPPORT 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. Close Air Support Overview

a. **Friendly Situation**

(1) FEBA/FLOT.

(2) Control points/IPs.

(3) Scheme of maneuver.

(a) Target area.

(b) Key terrain.

(c) JTAC/FAC(A) position and call sign.

(d) Supporting arms.

1. Artillery positions and planning ranges.

2. Mortar positions and planning ranges.

3. Counterfire radar positions and planning ranges.

4. Gun target lines.

(e) Control and coordination measures.

1. Permissive measures.

a. CFL.

b. FSCL.

c. BCL.

d. FFA.

e. Kill box.

2. Restrictive measures.

a. RFL.

b. NFA.

c. RFA.

d. Zone of fire.

3. ACMs/ACAs.

4. Missile engagement zone/fighter engagement zone and status.

b. **Intelligence**

(1) Enemy position and number.

(a) Projected intent.

(b) Likely avenues of approach.

(c) Observed tactics.

(2) Supporting elements.

(3) Threats.

(a) Locations.

(b) Threat guidance.

1. Radar.

2. Optical.

3. IR.

(c) Threat capabilities.

(d) Indications and warnings.

(e) Employment doctrine.

c. **Weather: Takeoff/Target/Land**

(1) Ceiling.

(2) Visibility.

(3) Temperature/dew point.

(4) Winds.

d. **Environment**

(1) Sun azimuth.

(2) Sun elevation.

(3) Sunrise/sunset time to include:

(a) Begin morning nautical twilight.

(b) End of evening nautical twilight.

(4) Moon azimuth.

(5) Moon elevation.

(6) Percent illumination.

(7) Lux level.

(8) Absolute humidity.

(9) Historical temperature.

(10) Predominant albedos.

(11) Urban lighting.

(12) Thermal crossover.

e. **Mission/Objective**

(1) Mission statement.

(2) Commander's intent.

(3) Unit supporting.

(4) Target precedence.

(5) POF.

(6) Preplanned missions.

(a) USMTF.

(b) Groups/series.

(c) Search sectors.

(7) TOT/time on station.

(8) Divert authority.

(9) ROE.

f. **Control Procedures**

(1) AOA entry.

(a) Routing.

(b) Altitude/airspeed.

(c) Available control agencies.

(d) Air asset deconfliction.

(2) CEOI.

(a) Authentication.

(b) HAVE QUICK.

(c) Secure voice.

(d) Code/pro words.

(e) Changeover.

2. Execution

a. **Ground Procedures**

(1) Alert posture and upgrades.

(2) Mission tape/mission load.

(3) NVG eye lane.

(4) AKAC issue/checkout.

(5) Step time.

(6) Weapons preflight.

(7) Aircraft preflight.

(8) Engine start time.

(a) INS alignment anomalies.

(b) Aircraft lighting.

(c) FLIR checks.

(d) Built-in test checks.

(9) Marshal.

(10) Check-in.

(a) HAVE QUICK checks.

(b) K-8Secure voice checks.

(c) VMF, AFAPD/improved data modem (IDM), and MTS check (as applicable).

(d) Link 16 and SADL check (as applicable).

(11) Taxi plan.

(a) Foreign object damage prevention.

(b) NVD checks.

(12) Weapons arming.

b. **Airborne Transition**

(1) Takeoff.

(a) Position.

(b) Arresting gear.

(c) Takeoff type.

(d) Calls.

(2) Climb out.

(a) Rendezvous.

(b) Profile.

1. Altitudes.

2. Airspeed.

3. Power settings.

(c) Formation: Look-out/scan tasking.

(d) NVD donning.

(e) Light package.

c. **En Route**

(1) C2.

(a) Primary check-in.

(b) Alternate check-in.

(c) Terminology.

(2) Combat checks.

(a) Sensor boresight.

(b) Weapon boresight.

(c) Expendable checks.

(d) Environmental assessment.

(e) Radar altimeter check.

(3) Routing.

(a) Stack/hold/push points.

(b) Time/fuel management.

(c) Emitter/lights management.

d. **Air Refueling**

(1) Time.

(2) Track.

(3) Base altitude/altitude blocks.

(4) Tanker call sign.

(5) Offloads.

(6) Time on boom/cycle sequence.

(7) Formation procedures.

(8) Post-aerial refueling.

e. **Attack Phase**

(1) Threat zones.

(2) Combat checks.

(3) CAS brief.

(a) Holding.

1. Profile.

2. Formation.

3. Tasking/responsibility.

4. Deconfliction.

(b) System interface.

(c) Cadence.

(d) System update.

(4) Terminal attack control.

(a) Communications (required calls).

(b) Restricted run-ins.

(c) Available marks.

(d) Laser code/code words.

(e) Minimum capable hack time.

(5) Attack plan.

(a) Preplanned missions: changes to the plan.

(b) 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. Expendables.

    c. Cadence.

    d. Routing.

e. Mutual support.

7. Rendezvous.

a. Profile.

b. Deconfliction.

c. Cadence.

(6) Attack plan variations.

(7) Reattack plan.

(a) Criteria.

(b) Minimum disengagement.

1. Time.

2. Distance.

3. Terrain.

(c) Communication requirement.

1. Inter-flight.

2. JTAC/FAC(A).

(d) Deconfliction.

f. **Return to Force**

(1) Rendezvous.

(a) Position.

(b) Profile.

(c) Aircraft damage assessment.

(2) Dump target plan.

(3) Combat checklist.

(4) C2.

(a) Route.

(b) Profile.

(c) Tasking.

(d) Lame duck/wounded bird procedures.

(e) C2 agencies.

(f) BDA/intelligence back-brief.

(g) Integrated air defense system penetration.

1. IFF/lights/other emitters.

2. ADA monitors.

(h) Divert/alternate/emergency airfields.

g. **Recovery**

(1) C2.

(2) Recovery type.

(a) Primary.

(b) Secondary.

(3) NVD stowage.

(4) Formation breakup.

(5) Landing.

(a) Primary.

(b) Secondary.

(6) De-arm/safing procedures.

APPENDIX C
PLANNING CONSIDERATIONS FOR CLOSE AIR SUPPORT USING NIGHT VISION DEVICES AND INFRARED (LASER) POINTERS

Preplanned/Scheduled (Planned Location and Time)

1. Can a NVD acquire the target well enough to mark it with an IR pointer?

2. What will the light conditions be at TOT?

   a. Moon phase/rise/set/angle.

   b. Overall illumination level and/or changing ambient lighting conditions (dusk/dawn).

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

   d. Are there 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 aircrew to acquire the beam?

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

8. Is it best to self-mark location with an IR source, and/or acquire the aircraft with NVGs? Does the aircraft have IR lights?

9. Will other assets (attack helicopters) 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 will it be necessary to utilize an alternate marking means?

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APPENDIX D
DIGITALLY AIDED CLOSE AIR SUPPORT PLANNING CONSIDERATIONS

1. DACAS Planning

This appendix has general comments on network construction, addressing, mission number and call signs. It then has planning considerations for each of the DACAS family of capabilities (VMF, Link 16/SADL, AFAPD, and MTS) and a section on planning considerations for gateways.

a. **Network Construction.** During planning phases, ensure that BLOS and LOS network architectures are properly constructed. Work with communications network authorities early in the process as some elements (satellite training time availability for example) require a significant lead-time prior to execution. Data links information should be coordinated at the Joint-service level by the JICO with assistance from the ASOC/DASC. VMF, Link 16 and SADL will have their own segments within the OPTASK document. The role of developing and managing the "OPTASK LINK, CNR SEGMENT" for the VMF network has been given to the JICO community; resourcing is still being determined to provide this capability. The ASOC/DASC will need to participate with the JICO in preparing these products. The JTAC is responsible for programming the communications nets into the ground kit.

b. **Gateway Construction.** The planning phases will also determine what gateway systems will be set up and managed by the JICO or the subordinate units, like the ASOC/DASC. Understanding what DACAS protocols and systems that connects to each other will help drive the information exchange requirement between different protocols.

c. **Addressing Considerations—VMF.** The Joint Mission Planning System (JMPS) is the tool CAS aircrew use to configure their DACAS system via their aircraft mission loads. For JTAC reference, the following JMPS data fields are integral to participating in a VMF network.

(1) Call sign.

(2) Mission number.

(3) Internet protocol address.

(4) Link address.

(5) Subnet mask.

(6) URN.

Note: Each JTAC enters similar information such as internet protocol and link addresses, call sign and URN into the ground kit. Upon receipt of some digital messages, some ground kits can auto-learn and add other network participants' addressing information and thus negate time consuming manual entry of respective addressing information. While auto learning is a benefit, it does not mitigate confusion when two aircraft show up with the same URN on the same frequency. Aircrew and JTACs need to use their assigned URNs as provided by the joint interface control cell in the OPTASK link's CNR segment or as provided for local DACAS training opportunities.

d. **Addressing Considerations—Link 16/SADL.** Common among all Link 16 platforms are four variables.

(1) JTIDS [Joint Tactical Information Distribution System] Unit (JU) Number. Also known as a source track number, this JU defines the platform. Like C2 systems, Tactical Air Control Party Close Air Support System users will have a “track block” associated with the machine’s JU that allows the placement of “points” on Link 16 that are identified by numbers within the track block.

(2) Main net channel, also known as mission channel.

(3) Fighter net channel.

(4) Call sign.

Note: Each JTAC will need to know what platforms will be in the Link 16 segment of the OPTASK Link in order to configure for Link 16 interoperability and know what track block to work from.

e. **Mission Number and Call Sign**

(1) Mission Number. In theater, mission numbers should be as assigned per the ATO.

(2) Call sign. Use the Link-16 Standard (First and last letter of the name component of the call sign, then the call sign number). VMF messages allow for more characters, but JMPS can only accommodate six characters.

Example: Aircraft call sign from the ATO is “Nickel 21”, the digital network call sign is “NL21.”

f. **Planning Considerations VMF.** VMF uses K-series message sets. In addition to the mission number and call sign addressed above, VMF addressing includes the following: internet protocol address, link address, subnet mask, and URN. The following information is one method used to apply DACAS network addressing.

(1) **Internet Protocol Assignment.** Internet protocol is designed for large networks where a message may pass through several routers before it arrives at its destination. That does not happen in VMF DACAS networks. The internet protocol address is for future growth only and serves no specific purpose at this time. However, an incorrect internet protocol address setup can cause broadcast and multicast communications to fail. (Broadcasting is the way stations auto-learn; internet protocol address errors can defeat, and have defeated, auto-learning.) The current recommendation is to assign a unique internet

protocol to each aircraft. The internet protocol address assignment scheme is based on squadron number and call sign in the following format:

1.1.YYY.XXX

YYY is squadron number and is limited to 0-254. If squadron number is higher than 254, divide by two. VMFA 314 = 157. If squadron number is over 509, divide by three. The JICO may need to resolve redundancy that may occur where the numbers of two squadrons yield a common number.

XXX is tactical call sign number

Example: VMFA 122, Nickel 21 = 1.1.122.21

(2) **Link Addressing.** Link address is the means by which radios uniquely identify each other on a given channel. Link addresses should not be duplicated simultaneously on a channel. The Link address is the ATO call sign numeric and is valid for numbers 05-95, but numbers ending in 5 are reserved for JTACs and numbers ending in 6 are reserved for FAC(A).

Example: Call sign NL21 would be Link 21.

(3) **Subnet Mask Addressing.** Recommendation is to use a subnet mask of 255.255.0.0 in order to allow DACAS systems to use the last 6 digits (or 2 octets) of the IP as a way to identify the desired recipient. With this address scheme and the subnet mask above, aircraft will not ignore broadcast messages sent from other units. (Bottom line note: Set 255.255.0.0 and leave alone.)

(4) **URN Addressing.** URNs have the least effect of the three address elements within the VMF DACAS domain but are important to friendly force tracker systems. URNs range between 0 and 16777215 with 16777215 reserved as a broadcast URN. Each Service has a block of URNs. However, VMF DACAS specific URNs are not finalized; thus some ad hoc assignments may be in use. When establishing VMF digital communications DACAS systems may automatically learn each other’s URNs. As noted earlier, while auto learning is a benefit, it does not mitigate confusion when two aircraft show up with the same URN on a channel.

WARNING

Data Transfer of numerical values. When performing digital transfer of numerical values (coordinates, elevation, final attack heading, etc.), data is entered, then converted by the sender's system using computer language, and then reconstructed at the receiving end. Because of limitations involved with these actions, errors may occur that cause changes in the final digit within the receiving field.

g. **Planning Considerations Link-16/SADL.** Employing J-series messages (Link 16 and SADL) for machine-to-machine exchange of information is yet another means of conducting digitally aided CAS. CAS employed over Link 16 and SADL entails the use of J-series messages exchanged over various RF and non-RF systems. J-series messages are both fixed format (J3.5 Land Track/Point) and non-fixed format (J28.2 Free Text). Link 16 and SADL messages allow BLOS transfer of information between potentially large numbers of data link participants. The range of information exchanged and the greater distances at which data exchange may occur over a network makes J-series messaging attractive for building situation awareness and providing C2. TACPs and JTACs planning for DACAS with Link 16 should coordinate with the appropriate C2 element (ASOC/DASC) for assignment of JUs and track blocks. TACPs and JTACs should be prepared to reference published track numbers to supporting aircraft and other controllers, i.e., FAC(A) and JFO. A thorough study of data link standards found in SPINS would also be appropriate. A key item to look for in the SPINS is information highlighting the difference in J-series message implementation between CAS platforms. Understanding the difference between platforms' J-series message implementation will aid in the timely and accurate exchange of information. For example the length of J28.2 free text messages will vary between aircraft types as noted in Figure D-1.

Note: Placing digital marks (i.e., friendly position, target, and planned routes of travel and/or surveillance indicators), in the objective area for ready reference during CAS talk-ons, is a principal advantage of Link 16 and SADL. The effective use of J3.5 Land Tracks as marks will also require disciplined track management and timely removal of non-relevant tracks. As with other DACAS tools, Link 16 use may result in significant "heads-down" time spent composing free text messages, and thus may dictate TAC suite employment from tactical operation centers. Keep in mind, if a free text message takes a long time to compose, it will also take heads-down time for the aircrew to read.

h. **Planning Considerations AFAPD.** This link is used for digital LOS communications between DACAS systems, F-16CMs (formerly known as Block40/50), and AH-64s equipped with the IDM. To establish a link, the JTAC must have the AFAPD link address for the specific aircraft. CAS platforms' AFAPD link address can be obtained during mission planning from the

Example: Aces 21 = Link 21.

ASOC, a broadcast check-in from aircraft, or verbally from the pilot during check-in. The aircraft should use link address XX where XX corresponds to ATO call sign number.

J-Series Free Text Character Limits	
Aircraft	**J-Series Free Text Character Limits**
A-10C (SADL)	Tx/Rx 23 characters
F-15E (Link-16)	Rx 50 Lines, 45 characters
F-16 Block 30 (SADL)	Rx only 16 Lines, 20 characters
F-16CM (Link-16)	Rx only 16 Lines, 20 characters
F/A-18E/F (Link-16)	Rx only 16 Lines, 20 characters
B-1B (Link-16)	Tx/Rx unlimited characters

Figure D-1. J-Series Free Text Character Limits

Note: The aircrew should ensure the link address used is known by the ASOC/DASC. The ASOC/DASC should pass the flight's AFAPD address to the JTAC/TACP to help expedite the establishment of digital connectivity. Conversely, a situation permitting the ASOC/DASC should provide the JTAC/TACP's AFAPD link address to CAS aircraft as part of the mission tasking and AO update.

i. **Planning Considerations MTS.** This is used for digital LOS communications with AV-8s. The aircraft should use link address XX, where XX corresponds to the ATO call sign number.

Example: VMA 231 Spade 21 = Link 21

Note: In a similar fashion as link addresses for VMF, numbers ending in 5 are reserved for JTACs.

Example: FAC25 (JTAC) would be Link 25

Note: Additional MTS information. Initial points for the Harrier and the DACAS system must match exactly. Be sure to enter all IPs and control points exactly as spelled out in the ACO and SPINS. The AV-8B is not capable of receiving a keyhole template IP. This can be overcome by attaching a point "E" in the JTAR and by prior coordination with the supporting squadron. The naming convention of IP in the kit must match exactly with what is programmed in the jet. Recommended is: "KEYA," "KEYB," "KEYC," and "KEYD."

j. **Planning Considerations Gateways.** Gateways allow the JTAC with UHF SATCOM or HF to communicate digitally BLOS with link capable aircraft by transmitting a J-series message, such as a J3.5, over CNR to the gateway. At the gateway, the JTAC's targeting and SA information is broadcast to all aircraft in the Link 16/SADL networks. The USAF's ASOC gateway provides TACPs with the capability to publish digital reference points and other information onto the data link network for Link 16 and SADL capable aircraft. The ASOC gateway includes a joint range extender for interface to the Link 16 network and the joint range extender Transparent Multi-Platform Gateway Equipment Package for interface to Link 16 and SADL networks. Most USAF CAS fighter platforms and most USN and USMC fighters are Link 16 capable. All A-10Cs and Air National Guard F-16C+s are SADL capable. The gateway is capable of sending information from the Link 16/SADL networks back to DACAS-equipped JTACs. Including a gateway in the DACAS kill chain is extremely beneficial for SA of the maximum number of platforms in the AO. With this, they employ BLOS connections that can have latency for real-time decisions. Planning for gateways in the JCAS mission will require thought of what J-series messages can be published before air players arrive on station. Coordinate with the ASOC/DASC early to publish J3.5 land track/points and build your J28.2 free text messages to send before this time. Also, it is imperative to understand that the incorporation of a gateway allows for the gateway owner (ASOC/DASC) to help you publish tracks. A technique of using the ASOC/DASC follows: during a target nomination, voice-over-radio to the ASOC to publish the target's location, and report back with the track number assigned to the point. Once the track number is received, voice to the aircrew of the presence of the track number, typically by Line 5 or 6 of the CAS brief.

k. Example: DACAS mission for JTAC working with aircraft capable of VMF and Link 16.

At all times JTACs must be ready to conduct terminal attack control using non-digital (voice) means as digital interoperability issues may exist between kits and aircraft.

(1) When possible, publish the J3.5 land track or digital target reference point in advance of aircraft check-in. If unable to publish the J3.5 directly to the link consider having the ASOC/DASC or next higher TACP to do so for you. Timely publishing of tracks allows aircrews to investigate the area or point of interest with the aircraft's sensors before establishing contact with the JTAC. Exercise caution not to place tracks in close proximity to each other (< 500 meters); consider instead employing a "stake" (center of target array), vice multiple closely placed tracks.

(2) Situation permitting, send the ASOC/DASC the situation update (J28.2 Free Text or K01.1) with relevant track numbers referenced. JTACs may require confirmation of digital addresses during this initial contact call.

(3) Establishing initial digital contact with the aircraft on strike net. TACPs need to know their VMF digital address information (i.e., Internet protocol address, link address, and URN), and be prepared to pass it to strike aircraft when establishing initial contact as needed (if the strike aircraft is unable to capture (i.e., auto learn) the VMF net address information from JTAC's transmission).

(4) Following initial verbal contact, broadcast a free text (K01.1) containing the current situation update for the mission, the game plan, and a request for AOS or OSR. Strike aircraft that are able can then capture the JTAC's ground kit VMF addressing information.

(5) Acknowledgement of the "send AOS or OSR" message will come in the form of the aircraft's AOS or OSR. The aircrew must be able to expeditiously add the JTAC to the network, and transmit the AOS or OSR back to the JTAC. Consequently, it is essential that flights exchange/collect each other's AOS or OSR information in advance of checking in with the JTAC. A momentary delay in time, perhaps three to five seconds, should be expected by both parties as the normal time needed to accomplish the AOS or OSR request and reply. It is as incumbent on the JTAC to expect that momentary delay through training and experience as it is on the aircrew to be proficient enough to set up the network and respond in that time. (It should be standard for the flight lead to collect wingman data as part of TACADMIN prior to checking in with the JTAC to expedite the AOS or OSR.)

(6) JTACs can also capture flight lead's digital address information from the on station report addressed to the JTAC's ground kit.

(7) JTAC's voice call or free text acknowledges receipt of OSR and advises

aircrew digital CAS brief will follow.

(8) Send the CAS brief and look for a machine receipt.

(9) The pilot will acknowledge it with the current standard of voice "copy" or "copy all," a digital WILCO, CANTCO, or negotiation. If needed be prepared to negotiate the CAS brief information until a WILCO is received.

(10) Restrictions/amplifying remarks are voice or free text followed by the pilot's readback of mandatory items verbally. (Pilot should read target coordinates from system, after transferred to mission computer.)

(11) After target data is in mission computer, pilots may designate the target and send a single APTD message (K02.57) to the JTAC for confirmation. The JTAC can also send a digital request (K02.59) for an aircraft APTD message. The aircraft's APTD message may display on the kit's screen as a line from the aircraft's symbol to the designation point or it may provide a symbol atop the designation point without a line from the aircraft. (Note: The reference here is "designation point" rather than "target," as it is possible to request an APTD to provide a simple point of designation not intended for weapon employment [i.e., not a target]). The designation may be a target depending on the JTAC's objectives. JTAC initiates tracking of aircraft via the APTD to confirm the aircraft is engaging the correct target. Compare the coordinates for the intended weapons impact point to the coordinates provided in the CAS brief. Note: Coordinates may show a slight difference due to rounding even if the pilot did not change them.

(12) At this point, the mission would transition almost entirely to voice as corrections from the mark are passed and acknowledged, or in the case of laser weapons employment, the associated JLASER communications, and finally a voice cleared hot or abort, all concurrent with any aircraft status messages that may be passed for JTAC's SA.

(13) If the CAS brief, APTD and talk-on information agree, the attack should continue, and the JTAC can prepare to transmit a voice cleared hot, once all requirements are met for the type of terminal attack control in use. Always provide clearance or abort first as a voice radio call.

(14) Following a verbal clearance or verbal abort, it is optional to follow this up with the digital (K02.58) final attack control transmission if this is a desired training objective for aircrew and terminal attack controller. The voice call will always be first and always take precedence.

(15) After completing all attack run-ins, provide aircrew with a free text message containing the mission's BDA. JTAC ensures APTD is terminated to stop tracking of aircraft. (Note: The APTD request should stop once the JTAC is satisfied the aircraft designation point is correct per the mission. The risk with keeping this message exchange (continuous APTD) until attack complete is the data bursts associated with the APTD message exchanges. The data bursts on the TAD net are very disruptive to aircrew and may interfere with voice communications.)

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APPENDIX E
EXAMPLES OF CLOSE AIR SUPPORT MISSIONS

The below examples are not intended to be directive or definitive but to show examples of the radio exchanges that may occur during a CAS mission. The specific information and language contained in the game plan and subsequent radio exchange will vary depending upon the training, experience and in some cases the Service of the controller (JTAC or FAC[A]) and aircrew.

EXAMPLE 1–TYPE 1 CONTROL, BOMB ON TARGET MISSION WITH MARK AND SUPPRESSION

The following scenario provides a step-by-step example of how a Type 1, BOT mission can be conducted and integrated with a mark and suppression.

JTAC (Texas 17) visually acquires target and verifies target location. At the direction of the supported commander, the JTAC submits an immediate JTAR, reports troops in contact, and receives two F/A-18C aircraft (Winder 61). The JTAC also coordinates with the fire support representative for integration of a target mark and suppression of enemy air defenses.

Attack Aircraft: "Texas 17, Winder 61."

JTAC: "Winder 61, proceed to Mazda block 13 to 14, be advised SA-8 active in target area, you are only aircraft on station, check in when able."

Attack Aircraft: "Winder 61, copy, mission number AB2061, 2 by F/A-18 Hornet. 10 miles north of Mazda inbound from 200 to block 13 to 14, 4 by MK-82 instantaneous and delay fuzing, and 450 rounds of 20 mm each. 35 minutes of PLAYTIME. AT FLIR, Cat II coordinate capable, VDL codes 4797 and 4457 respectively, TIMBER SWEET. ABORT code none."

JTAC: "Texas 17, copy, advise when ready for SITREP."

Attack Aircraft: "Winder 61, ready."

JTAC: "Threat SA-8 active in target area and small arms. Enemy personnel are dug into fighting positions to the north. Friendlies are a company size infantry element collocated with Texas 17. We have gun position 3 active and in support, gun target line 040. Clearance will come from Texas 17. Weather is clear in the target area. Stay east of Mazda till IP inbound. Advise when ready for game plan."

Attack Aircraft: "Winder 61, ready for game plan."

JTAC: "Winder 61, this will be a Type 1 control, BOT, 2 by MK-82 each, instantaneous fuzing, 30-second separation, advise when ready for 9-line."

In the game plan, in addition to the required type of control and method of attack, the_JTAC requests 30-second spacing as the minimal time he needs between aircraft to provide clearance, judge effects, and acquire the second aircraft. This spacing provides the optimum tempo for the attack and clearance process while reducing time to kill and aircraft vulnerability window. If the aircrew requires a different interval due to systems or preferred tactics, it should request it from the JTAC. However, the JTAC will need this information from the aircrew in order to plan any SEAD or marking requirements. The JTAC's intent is not to dictate aircrew tactics, but to offer a plan that meets the requirements for the clearance and BDA assessments.

Attack Aircraft: "Texas 17, Winder 61, ready."

JTAC:
"Mazda,
270 Left,
12.1."

"Elevation, 350 feet,
Platoon of infantry dug in,
CM 367 971."

"White phosphorous,
South 900,
Egress left pull, back to Mazda, block 13-14.
Advise when ready for remarks."

Attack Aircraft: "Ready."

JTAC: "Final attack heading 285-330. SA-8 north 1000 meters, continuous suppression, gun-target line 040, stay above 3000. Request IP inbound TOT 50."

Attack Aircraft: "Winder 61, 350 feet, CM 367 971, final attack heading 285-330, stay above 3000, TOT 50."

JTAC: "Good readback, Winder 62 go with readback."

Attack Aircraft Dash 2: "Winder 62, 350 feet, CM 367 971, final attack heading 285-330, stay above 3000, TOT 50."

JTAC: "Good readback."

Prior to weapon release, each attack aircraft in the flight will provide the JTAC with an IN call.

Attack Aircraft: "Winder 61, IP inbound."

JTAC: "Winder 61, CONTINUE."

JTAC notes the time at which the aircraft calls IP inbound and compares it to the SEAD timeline to ensure the SEAD window is still effective and the aircraft are deconflicted from the MARK.

JTAC*:* "MARK on deck. Suppression effective."

Attack Aircraft: "Winder 61, CONTACT."

JTAC: "From the MARK, south 100"

Attack Aircraft: "Winder 61, IN"

JTAC visually acquires attack aircraft and assesses attack geometry to ensure friendlies will be safe from expected effects and aircraft is aligned with approved target.

JTAC: "Winder 61, CLEARED HOT."

Attack Aircraft: "Winder 61, two AWAY."

Attack Aircraft dash 2: "Winder 62, contact lead's hits IN."

JTAC visually acquires attack aircraft and assesses attack geometry to ensure friendlies will be safe from expected effects and aircraft is aligned with approved target.

JTAC: "Winder 62, from lead's hits, west 50, CLEARED HOT."

Attack Aircraft dash 2: "Winder 62, two AWAY."

EXAMPLE 2 – TYPE 1 CONTROL, BOMB ON COORDINATE MISSION WITH REATTACK AND CHANGE TO GAME PLAN

In this example, the JTAC (Spartan 03), is part of a small reconnaissance team that is currently pinned down behind a low dike just outside a small village by an enemy machine gunner in a well-concealed spider hole. The enemy machine gun nest is 800 meters from the friendly location and is located in a relatively featureless field of tall grass. Spartan 03 is able to reach back to the battalion TOC and, due to the proximity and concealed nature of the enemy position, requests immediate RW CAS. Unfortunately, there are no RW assets available, and the DASC routes a single F-16 to his location. The F-16 (Fang 24), is the junior wingman of a two-ship. Fang 24's lead aircraft is currently on the tanker. Spartan 03 doubts that he can successfully talk Fang 24 onto the target, but he is able to generate a grid that he believes will be accurate enough to suppress the target long enough for his team to reposition.

Attack Aircraft: "Spartan 03, Fang 24."

JTAC: "Fang 24, Spartan 03, I am currently receiving heavy effective machine gun fire from a well-concealed spider-hole approximately 800 meters north of my position. Hold your full check-in, Keyhole template in effect, advise when ready for 8-digit echo point."

JTAC directs aircraft to hold his full check-in due to the extremely urgent nature of their situation. For the moment, he only needs to know the aircraft's ordnance and playtime in order to plan the attack. Once the threat is suppressed, he will get the full check-in and provide a more detailed SITREP.

Attack Aircraft: "Fang 24, ready."

JTAC: "Echo point ME 1234 5678, proceed immediately overhead echo at 15 block 16 thousand, you are the only aircraft on station, say ordnance and PLAYTIME."

Attack Aircraft: "Fang 24, copy, 3 minutes out in the descent. Fang 24 single F-16, with 4-by MK-82, and gun. Ten minutes of PLAYTIME."

JTAC: "Fang 24, advise when ready for game plan."

Attack Aircraft: "Fang 24, ready."

JTAC: "Fang 24, Type 1, bomb on coordinate, advise when ready for 9-line."

Attack Aircraft: "Fang 24, ready."

JTAC elects to utilize a BOC mission due to the aircraft's short on-station time combined with the concealed nature of the enemy location. The JTAC believes that a talk-on would take too much time and that the desired effects can be created with only an 8-digit grid. The JTAC requires visual acquisition of the CAS aircraft prior to and at weapons release.

JTAC: "From the overhead" or "Lines 1-3 N/A."

"Elevation, 416 feet,
Enemy machine gun nest,
ME 1234 5678."

"No mark,
South 800,
Egress, back to the overhead block 15-16.
Advise when ready for remarks."

Attack Aircraft: "Fang 24, ready."

Attack Aircraft: "Fang 24, ready."

JTAC: "Final attack heading 270 degrees plus-or-minus 15. Request TEN SECONDS to roll-in call. Push when ready. Go with readbacks when able."

JTAC requests a 10-seconds to roll-in call allowing enough time to look for and find the aircraft and be ready to provide clearance.

Attack Aircraft: "Fang 24, 416 feet, ME 1234 5678, final attack heading 270 plus or minus 15. Be advised, Fang 24 will employ 2 x MK-82s against that target."

JTAC: "Fang 24, good readback."

Attack Aircraft: "Fang 24, 10-seconds to roll-in."

JTAC: "VISUAL, CONTINUE."

Attack Aircraft: "Fang 24, IN from the east."

The attack aircraft may call IN from a cardinal direction to aid in situational awareness and JTAC visual acquisition. JTAC visually acquires attack aircraft and assesses attack geometry to ensure friendlies will be safe from expected effects and aircraft is aligned with approved target.

JTAC: "Fang 24, CLEARED HOT."

JTAC assesses the first impacts and judges that the bomb impacted approximately 25 meters west of the spider hole. At this point, the JTAC believes he can create better effects by switching to BOT now that he has an adequate mark on deck.

JTAC: "Fang 24, good impacts. Are you CONTACT your last impact?"

Attack Aircraft: "Fang 24, affirm."

JTAC: "Request reattack. Change to game plan, bomb on target. Same ordnance, same 9-line, same restrictions. From your last impacts, adjust east 25 meters."

Attack Aircraft: "Fang 24, CONTACT, 10-seconds to roll-in."

JTAC: "VISUAL, CONTINUE."

Attack Aircraft: "Fang 24, IN from the east."

JTAC again visually acquires attack aircraft, assesses attack geometry, and ensures friendlies will be safe from expected effects and aircraft is aligned with approved target.

JTAC: "Fang 24, CLEARED HOT."

JTAC: "Fang 24, mission successful, enemy fire ceased, say remaining PLAYTIME."

Attack Aircraft: "Fang 24, copy, BINGO, Fang 23 inbound to support."

JTAC: "Spartan 03, copy. Proceed to A-8 at 16,000, contact Blacklist. "

EXAMPLE 3–TYPE 2 CONTROL, BOC MISSION

The following scenario provides an example of how BOC may be employed as part of a Type 2 attack.

Weather is 500 feet above ground level, overcast, and the JTAC (Redman 01), visually acquires an enemy formation in a trench line with camouflage overhead.

The JTAC has a digital portable tactical targeting system but the trench line is not on the imagery, and therefore, the JTAC cannot generate an accurate location. JTAC is able to terrain associate using a 1:50K map and derive a 6 digit grid with a high degree of confidence. At the direction of the supported commander, the JTAC submits an immediate JTAR requesting RW CAS or aircraft with coordinate seeking weapons in order to engage the enemy formation. The ASOC routes 2 F/A-18C (Rumble 41), with 2 GBU-32s equipped with airburst option as the quickest response option airborne.

Attack aircraft check in and pass that they are carrying GBU-32s with an airburst fuze option. JTAC determines that they can create desired effects to the enemy personnel in the trench with the current target location and the combination of the airburst fuze on the JDAM and decides to employ the F/A-18s using Type 2 control, BOC. JTAC passes situation update to include weather in target area.

JTAC: "Keyhole in effect, Echo point NB 234 876. Proceed to Bravo 8, block 17-19, you are the only aircraft on station, advise when ready for game plan."

Attack Aircraft: "Redman 01, Rumble 41, proceeding to Bravo 8, block 17-19, ready."

JTAC: "Rumble 41, this is Redman 01, Type 2 control, bomb on coordinate, 1 by GBU-32 each, airburst fuzing, simultaneous impacts, advise when ready to copy 9-line."

In the game plan, in addition to the required type of control and method of attack, the JTAC includes the number and type of weapon with fuzing and the attack interval to be used. If the aircrew desired a different interval, it could request it with the JTAC, recognizing that this change will affect his overall plan for the attack.

Attack Aircraft: "Redman 01, Rumble 41, ready."

JTAC:
"Bravo 8,
Elevation, 1650 feet,
Company of infantry in trench line,
NB 234 876."

"No mark,
South 1100,
Egress right pull, back to Bravo 8, block 17-19.
Advise when ready for remarks."

Attack Aircraft: "Ready."

JTAC: "Final attack headings 280 through 320. Request IP inbound and IN with heading calls."

Attack aircraft validate target location by cross-checking that the position is coincident with the expected target area using all appropriate means: map plot, digital map set, and radar through the weather, etc. Additionally, attack aircraft complete entry of Line 4 and 6 into the GBU-32s on board and confirm fuzing is set to airburst.

Attack Aircraft: "Rumble 41, 1650 feet, NB 234 876, final attack heading 280 through 320."

JTAC: "Rumble 41, good readback. Rumble 42, go with readbacks."

Attack Aircraft dash 2: "Rumble 42, 1650 feet, NB 234 876, final attack heading 280 through 320."

JTAC: "Rumble 42, good readback; Rumble flight, report IP inbound, TOT 35, expect clearance as a flight."

In this case, the attack aircraft are able to read back the target location and elevation directly from the weapon display. If the aircraft were unable to read lines 4 and 6 directly from the weapon display, they could alternatively read back from the aircraft system designation or designated waypoint.

Since correlation was complete for the BOC mission after appropriate readbacks, the JTAC could have assigned the TOT prior to the readbacks in the restrictions.

However, since it can take up to several minutes to input the information into the weapons, it may be best to coordinate and assign TOTs after readbacks are complete or during the process.

Attack Aircraft: "Rumble flight, TOT 35."

Attack Aircraft: "Rumble 41 flight, IP inbound."

JTAC: "CONTINUE."

Attack Aircraft: "Rumble 41 flight, IN heading 300."

JTAC compares the flight's IN heading to the restrictions he passed and confirms that all friendlies will be safe from weapon effects.

JTAC: "Rumble 41 flight, CLEARED HOT."

Attack Aircraft: "Rumble 41 flight, 2 AWAY, 33 seconds to impact, proceeding to Bravo 8."

JTAC: "Good impacts, standby BDA."

JTAC: "Ground commander's intent met, enemy neutralized. Switch Blacklist for routing and further tasking, you are still the only aircraft on station."

EXAMPLE 4–TYPE 2 CONTROL, BOT MISSION WITH TALK-ON

The following scenario provides an example of how Type 2 terminal attack control may be used for a BOT attack.

The JTAC (Spartan 03) is unable to acquire the target but receives real-time targeting information from a scout that is currently in contact. The JTAC will verify target location and coordinates through the use of an aircraft. The JTAC plans to use IPs Moon and Charger for holding.

Attack lead aircraft checks in (Ragin' 11), informs the JTAC regarding their onboard capabilities, receives a situation update, the following game plan, and close air support attack briefing.

JTAC: "Ragin' 11, this is Spartan 03, proceed to Moon-Charger, block 18-20, advise when ready for game plan."

Attack Aircraft: "Ragin' 11, WILCO, go with game plan."

JTAC: "Ragin' 11, Spartan 03, Type 2 control, bomb on target, expect 8-digit grid, advise when ready for 9-line."

Attack Aircraft: "Spartan 03, Ragin' 11, ready."

JTAC:
JTAC:
"Moon,
030,
9.2."

"Elevation, 450 feet,
2 BTR 90s,
NB 8652 4274."

"No mark,
South 900,
Egress, back to Moon-Charger, block 18-20.
Advise when ready for remarks."

Attack Aircraft: "Ragin' 11, ready."

JTAC: "Final attack heading 300 through 325. Request IP inbound and IN with heading calls."

Attack Aircraft: "Ragin'11, 450 feet, NB 8652 4274, final attack heading 300 through 325."

JTAC: "Ragin' 11, good readbacks, advise when ready for sensor talk-on."

Attack Aircraft: "Ready."

JTAC: "Ragin' flight, SLEW to lines 4 and 6. Describe what you see."

Attack Aircraft: "A large 4-way intersection. On the northeast corner of the intersection, a large L-shaped building."

JTAC: "Ragin' 11, which direction is the short leg of the L pointing?"

Attack Aircraft: "East."

JTAC: "Do you show any vehicles parked on the east side of the short leg of the L shaped building?"

Attack Aircraft: "Two vehicles appear to be in revetments."

JTAC: "Roger the east vehicle is your target."

Attack Aircraft: "Ragin 11, CAPTURED."

JTAC: "Ragin 12, the west vehicle is your target."

Attack Aircraft dash 2: "Ragin 12, CAPTURED."

JTAC: "Ragin 11, say best ordnance and interval."

Attack Aircraft: "Ragin 11 will employ 2 x GBU-12s with 2-minutes separation."

Note that the JTAC completed correlation with both aircraft since the game plan included both aircraft attacking.

JTAC: "Ragin' 11, copy. Push when ready, report IP inbound."

In this example the attack aircraft acquires the target in a targeting pod and updates the target location appropriately, then sets up the system/weapon for a proper delivery. No additional readback of coordinates is necessary in BOT; however, for collateral damage and BDA reports, the JTAC may request an updated coordinate from the aircraft. This updated coordinate, in a BOT mission, does not require a readback from the JTAC.

Attack Aircraft: "Ragin' 11, IP inbound."

JTAC: "Ragin' 11, CONTINUE."

Attack Aircraft: "Ragin' 11, IN heading 325."

JTAC: "Ragin' 11, CLEARED HOT."

Attack Aircraft: "Ragin' 11, 1 AWAY, 30 seconds."

Attack Aircraft dash 2: "Ragin' 12, IP inbound."

JTAC: "Ragin' 12, CONTINUE."

JTAC: "Ragin' 11, good impacts."

Attack Aircraft dash 2: "Ragin' 12, IN heading 317."

JTAC: "Ragin' 12, CLEARED HOT."

Attack Aircraft dash 2: "Ragin 12, 1 AWAY, 30 seconds"

JTAC: "Both vehicles destroyed. Ragin' flight egress, back to Moon-Charger, block 18-20. Report established."

EXAMPLE 5–TYPE 3 CONTROL, BOT, USING LASER HAND-OFF

The following scenario provides an example of how Type 3 control may be used.

The supported commander is in contact with a company of mechanized infantry 1.1 km to the north. The commander has authorized the JTAC to determine which type of CAS control best suits the situation. A flight of 2 A-10s (Razor 11) are currently in the CAS stack. Upon consideration of all these factors, the JTAC (Heartless 31) decides to utilize Type 3 terminal attack control against the mechanized company. The following CAS brief is provided:

JTAC: "Razor 11, Heartless 31, Type 3 control, bomb on target, advise when ready for 9-line."

Attack Aircraft: "Heartless 31, Razor 11, ready."

JTAC: "From the overhead" or "Lines 1-3 NA."
"Elevation, 450 feet, Mechanized company in the open, NB 922 556. Lonewolf laser handoff, 1511, South 1100, egress south to Mazda block 10 to 11. Advise when ready for remarks."

Attack Aircraft: "Razor 11, ready."

JTAC: "Razor 11, laser target line 360. No attack run-ins from north to south. Recon team, call sign Lonewolf, is currently 1100 m south in position to lase, as required, contact on this TAD."

Attack Aircraft: "Razor 11, 450 feet, NB 922 556."

JTAC: "Razor 11, good readback."

Attack aircraft establishes communications with recon team and calls established overhead.

Attack Aircraft: "Lonewolf, Razor 11, overhead, ready for SPOT."

Observer: "Razor 11, Lonewolf, proceed to the south, run IN heading 320 to 040, STARE line 6, laser 1511, laser-to-target line is 360."

Attack Aircraft: "Lonewolf, Razor 11, IN heading 320 for laser handoff, TEN SECONDS."

Observer: "Lonewolf, TEN SECONDS."

Attack Aircraft: "Razor 11, LASER ON."

Observer: "LASING 1511."

Attack Aircraft: "Razor 11, SPOT...CEASE LASER."

Even though the attack aircraft has reported "SPOT", the JTAC and observer still need to conduct correlation in order to be certain that the aircraft is captured on the correct target.

Observer: "Razor 11, what do you see in your pod?"

Attack Aircraft: "Razor 11, CONTACT tactical vehicle in a large field."

Observer: "Your pod is on the center vehicle in a formation of tactical vehicles. How many vehicles are in the field?"

Attack Aircraft: "Razor 11, five."

Observer: "Razor 12, describe the orientation of the vehicles."

Attack Aircraft dash 2: "2 vehicles to the south and 3 vehicles to the north. The vehicles to the south are oriented east-west, facing south. The northern vehicles are also oriented east-west, facing east in a line."

Observer: "Razor 11, Lonewolf, correct, those five vehicles in the field northwest of the bridge are your target."

JTAC (listening to frequency): "Razor 11, CLEARED TO ENGAGE from time 45-55."

Attack Aircraft: "Razor 11, COMMENCING ENGAGEMENT."

JTAC monitors progress of the mission via radio.

Attack Aircraft make multiple attacks within the time window while complying with other restrictions. The attacks continue until time 55.

Attack Aircraft: "Heartless 31, Razor 11 ENGAGEMENT COMPLETE. Advise when ready to copy BDA."

Aircrew passes BDA to JTAC.

EXAMPLE 6–TYPE 3 CONTROL, BOC

In this example, the JTAC (Jaguar 11) is receiving harassing fire from a large enemy force located in dense jungle on the northwest side of a river. JTAC requests FW CAS with 2000-lb ordnance. Doom 45 (B-52H) checks in to provide support. JTAC takes the aircraft check-in and passes a quick SITREP.

JTAC: "Doom 45, this is Jaguar 11, I am part of a company-sized element approximately 1700 meters southeast of a large river. Currently receiving fire from a large enemy force located in dense jungle tree line northwest of river. Enemy oriented southwest-to-northeast line along river approximately 100-meters wide. Ground commander's intent to disrupt the enemy with continuous bombardment for next 30 minutes. After bombardment, commander intends to assault across river. Advise when ready for game plan."

Attack Aircraft: "Doom 45, ready."

JTAC: "Type 3, bomb on coordinate, MK-84s and MK-82s, instantaneous fuzing, be advised line 6 will be a set of 2, six-digit grids to define a linear target, advise when ready for 9-line."

Attack Aircraft: "Doom 45, ready."

JTAC:
"Mazda, 045, 15.1."

"Elevation, 250 feet,
Enemy troops in tree line,
19P HM 267 169 to 19P HM 272 173."

"No mark,
Southeast 1700,
Egress back to Mazda, block 24 to 25, advise when ready for remarks."

Attack Aircraft: "Doom 45, ready for remarks."

JTAC: "Final attack heading 020 through 070."

Attack Aircraft: "Doom 45, elevation 250 feet, Line 6, from 19P HM 267 169 to 19P HM 272 173. Final attack headings 020 through 070."

JTAC: "Doom 45, good readback, CLEARED TO ENGAGE time 15-45."

Attack Aircraft: (At time 1315) "Doom 45, COMMENCING ENGAGEMENT."

JTAC: "Jaguar 11."

Doom 45 bombs the tree line for the next 30 minutes, making multiple attacks and adjusting ordnance and interval to achieve ground commander's intent.

Attack Aircraft: "Doom 45, ENGAGEMENT COMPLETE. Proceeding back to Mazda."

JTAC: "Jaguar 11, copy all, proceed to Mazda block 24-25, standby BDA."

EXAMPLE 7–TYPE 3 CONTROL, BOT MISSION USING RW CAS ASSETS WITH INTEGRATED SEAD

In this example, a JTAC (Dealer 22), attached to an infantry company in a defensive position on the southeast corner of Trident Airfield. The ground commander has detected an enemy light armor company, consisting of 6 BRDMs and dismounted infantry approaching an obstacle belt 2000 meters to the east. In addition, the JTAC has detected an accompanying ZU-23 located approximately 1500 meters south of the light armor. The JTAC has an artillery battery in support. Ground commander's intent is to destroy the light armor and neutralize the infantry with CAS. Weather is 2000' overcast and clear below. JTAC immediately requests RW CAS via the JARN and begins developing targeting data and SEAD plan. He receives a section of AH-1 Cobra's (Venom 41) in support.

Attack Aircraft: "Dealer 22, Venom 41, 12 km SW at Cherubs 8."

JTAC: "Venom41, Dealer 22, proceed to HA Nancy ANGELS 2 and below, you are the only aircraft on station. ZU-23 located approximately 2500 meters southeast of Trident airfield. Advise established, check-in."

Attack Aircraft: "Venom 41 established HA Nancy ANGELS 2 and below, mission number AX 2041, two AH-1s, each aircraft has three AGM-114K2A, fourteen 2.75" HE rockets, and 250 rounds of 20mm. VDL capable, codes 1780 for Venom 41 and 1810 for Venom 42. 1+00 PLAYTIME, ABORT code none."

JTAC: "Dealer 22, copy. SITREP A to follow. Only known threat is the previously described ZU-23. Enemy mechanized light armored company approaching our position from east consisting of 6 BRDMs and dismounted troops. Friendlies in static position in southeast portion of Trident airfield. Gun Position 3, in support, gun target line 130. High-tension power lines west of target running north to south and rapidly rising terrain east of targets. Advise when ready for game plan."

Attack Aircraft: "Venom 41, ready."

JTAC: "Venom 41, Type 3 control, bomb on target, Employ 6 x K2A Hellfires from BP Viper on 6 x BRDMs. Expect approval forward of BP for Rockets and Guns on dismounted troops once SEAD deemed effective. Simultaneous attacks. Advise when ready for 9-line."

Attack Aircraft: "Venom 41, ready."

JTAC: "Viper, 150, 3200. Elevation, 4759 feet, BRDMs and dismounted troops, LD 947 539. No mark. West 2000, egress, left, pull to the north, back to Viper ANGELS 2 and below when complete with rockets and guns. Advise when ready for remarks."

Attack Aircraft: "Venom 41, ready to copy."

JTAC: "Make your attacks northwest to southeast. ZU-23, 1500 meters south, non-standard suppression from +2 to +5, gun target line 130. Once approved forward of BP, stay north of the 53 Northing. You will have two minutes to engage the 6 BRDMs with Hellfire from the BP prior to the first suppression impact. Standby for engagement window. Readback when able."

Attack Aircraft: "Venom 41, elevation 4759 feet, LD 947 539, attacks northwest to southeast, stay north of the 53."

JTAC: "Venom 41, good readback."

Attack Aircraft dash 2: "Venom 42, elevation 4759 feet, LD 947 539, attacks northwest to southeast, stay north of the 53."

JTAC: "Venom 42, good readback. Venom flight proceed to BP Viper for talk on."

Attack Aircraft: "Venom 41, WILCO ready for talk-on."

JTAC: "Venom flight, call CONTACT on Trident airfield."

Attack Aircraft: "Venom 41, CONTACT Trident airfield."

JTAC: "From the southernmost tip of the runways, you should see a large, light-colored wash with vehicle tracks leading southeast from the airfield."

Attack Aircraft: "Venom 41, CONTACT several vehicle tracks and a wash leading southeast from the south portion of runways."

JTAC: "Using shortest runway length as one unit of measure. The target area is approximately two units of measure southeast of airfield along that light-colored wash. The BRDMs are oriented north-to-south in line and slowly traveling west. Northern vehicle is in the wash."

Attack Aircraft: "Venom 41, TALLY."

Attack Aircraft: "Venom 42, TALLY."

JTAC: "Venom 41 flight, sort north-to-south due to winds."

JTAC: "Venom 41 flight, CLEARED TO ENGAGE time 40 through 45."

Attack Aircraft: "Venom 41, engagement window 40 through 45."

Attack Aircraft: "Venom 41 and 42, COMMENCING ENGAGEMENT."

JTAC: "Suppression in the air."

Attack Aircraft: "Venom 41."

Attack aircraft continue to engage the 6 BRDMs with Hellfire till time 42.

At time 42:

JTAC: "Suppression effective. Venom 41 flight, approved forward of BP for Rockets and Guns."

Attack Aircraft: "Venom 41, flight PUSHING ."

Attack aircraft continue to engage the targets with rockets and guns till time 45.

Attack Aircraft: "Venom 41 flight, ENGAGEMENT COMPLETE."

JTAC: "Venom 41 flight, left pull back to Viper ANGELS 2 and below. Standby BDA."

Attack Aircraft: "Venom 41. WILCO, ready."

JTAC: "Venom 41, Mission successful, 6 BRDMs destroyed, unknown enemy KIA. You are the only aircraft on station. Proceed HA Nancy ANGELS 2 and below, stay north of Viper en route Nancy, contact Blacklist."

EXAMPLE 8–VISUAL OFFSET FROM A REFERENCE POINT EXAMPLE

In this example, a JTAC (Spartan 03) is part of a small SOF team, call sign Red Bull, executing a dismounted raid against a suspected IED factory in a large urban area. The SOF team is infiltrating on foot from a nearby combat outpost. The JTAC has requested CAS to provide overwatch as they execute the raid. The JTAC checked in the aircraft (Wake 71) and provided a detailed SITREP prior to departing the combat outpost. The JTAC directed Wake 71 flight to utilize neutral sensor posture. As they patrol to the target, the team comes under heavy automatic weapons fire from a technical vehicle to their east.

JTAC: "Wake 71, Spartan 03, currently receiving heavy enemy fire from technical vehicle to east. All friendlies on Gas Station and north of Baseline, call CONTACT on intersection."

Attack Aircraft: "Wake 71, CONTACT."

JTAC: "Wake 71, from intersection of Gas Station and Baseline, SLEW east on Baseline approximately 200 yards. Single technical vehicle on south side of Baseline parked in alleyway. Call CONTACT."

Attack Aircraft: "Wake 71, from friendly position moving east on Baseline, 5 vehicles on road within 300 meters. Three parked on north side and two on south. Both vehicles on south side of road in alleyways and have personnel moving around them.

JTAC: "Call CONTACT on the westernmost of two vehicles parked on south side of Baseline road."

Attack Aircraft: "Wake 71, CONTACT."

JTAC: "Confirm this vehicle is first vehicle parked in alleyway on south side of road from friendly position."

Attack Aircraft: "Affirm."

JTAC: "Which direction is vehicle facing?"

Attack Aircraft: "Vehicle is facing north. It is either a pick-up or flatbed truck with two personnel in back. Three more personnel moving just south of truck in alleyway."

JTAC: "Pick-up truck in alleyway with personnel in back is target. Label target pick-up truck Technical 1. Advise when ready for game plan."

Attack Aircraft: "Wake 71, CAPTURED technical 1, ready."

JTAC: "Type 2, bomb on target, best weapons and fuzing from Wake 71, advise when ready for 9-line."

Attack Aircraft: "Wake 71, ready."

JTAC: "Alpha 8."

"Elevation, 257 feet,

Enemy personnel and Technical 1,

200 meters east of intersection of Gas Station and Baseline roads."

"No mark,

West 300,

Egress back to ALPHA 8, block 15 to 16. Advise when ready for remarks."

Attack Aircraft: "Wake 71, ready."

JTAC: "Final attack heading 180 plus-or-minus 20. Request IP inbound and IN with heading. Push when able. Readback when able."

In this case, since no grid was provided in the CAS brief, the aircraft should read back lines 4 and 6 and, if able, provide a rough grid of the target for final deconfliction as well as other restrictions.

Attack Aircraft: "Wake 71, 257 feet, 200 meters east of intersection of Gas Station and Baseline roads, located at LB 4261 9864. Final attack heading 180 plus-or-minus 20. Wake 71 will be delivering 1 x GBU 12."

The aircraft read back the elevation, description of target location from the reference point, and a rough grid of the target to serve as a double check in lieu of a coordinate in Line 6. In addition, the grid of the target can aid the situational awareness of other members in the CAS stack and be used for fires approval. The JTAC quickly compares the grid provided with the expected target location and ensures final deconfliction.

JTAC: "Wake 71, good readback. Push when able, we are still receiving effective fire."

Attack Aircraft: "Wake 71, IP inbound,"

JTAC: "Wake 71, CONTINUE."

JTAC informs Red Bull element that the aircraft is inbound for weapons release.

Attack Aircraft: "Wake 71, IN heading 180."

JTAC: "Wake 71, CLEARED HOT."

Attack Aircraft: "Wake 71, one AWAY 27 seconds."

JTAC: "Spartan 03,"

JTAC informs Red Bull element that there is 27 seconds to impact and advises to take cover.

Attack Aircraft: "Good impact."

JTAC: "Wake 71, good hits, target destroyed. We are no longer receiving effective fire."

EXAMPLE 9–ROTARY WING FAC(A) AND TWO F-16S IN SUPPORT OF DISMOUNTED PATROL IN CONTACT. TYPE 2 BOC LGB WITH FAC(A) LASE FOLLOWED BY TYPE 1 BOT GUN

The following scenario provides an example of how a FAC(A) can be used as an extension of the TACP.

The AO (Siege 31) received notification that a patrol without a JTAC is in contact and has requested CAS. Siege 31 elects to direct a RW section that is FAC(A) (Scarface 24) capable to support the patrol and passes STACK, brief, MARK, and control to the RW FAC(A). The FAC(A) is familiar with the area of operations and the supported unit to provide more precise control of fires. Siege 31 retains fires approval authority and is collocated with the FSC.

Air Officer: "Scarface 24, Siege 31, advise when ready for situation update."

RW FAC(A): "Siege 31, Scarface 24, ready."

Air Officer: "Threat to aircraft is small arms, RPGs, and 1st Gen MANPADS. Last Enemy contact was taken from a compound IVO 42S QR 725 491. 4-6 enemy fighters observed and suspect preparing another attack. The friendly patrol located in trench line approximately 500 meters south and moving eastbound toward the Patrol Base. Trail element of patrol strung out approximately 200 meters to west. Viper 11, 2 x F-16 established B8-C8 at 16-18K. Mortars at PB are cold. Winds on the deck calm. Move sensors IVO compound and search for enemy fighters. Priorities are enemy fighters engaging friendly patrol followed by enemy personnel in open. Scarface 24 has STACK, brief, MARK, and control at time 17. Siege 31 retains approval of all fires."

RW FAC(A): "Scarface 24 has STACK, brief, MARK, and control time 17. Break, Viper 11, Scarface 24, update your ordnance and PLAYTIME."

FW Attack Aircraft: "Scarface 24, Viper 11, each aircraft has 2 x GBU-12 and gun, 0+30 PLAYTIME."

The RW FAC(A) slews his sensor to the target building and sees 4-6 enemy fighters with machine guns. After correlation with the AO, he is approved to strike the compound and enemy personnel. Based on his assessment of the situation, he decides to utilize a GBU-12 to destroy one of the buildings in the compound from where the patrol is receiving heavy machine gun fire and elects to run the FW attack aircraft parallel to the friendly patrol.

RW FAC(A): "Viper 11, Scarface 24, advise when ready for game plan and 9-line."

FW Attack Aircraft: "Viper 11, ready."

RW FAC(A): "Type 2, BOC for Viper 11, 1 x GBU-12 using Scarface 24's laser.

Viper 12 Type 1 BOT, gun, 2 minutes in trail, 9-line to follow."

"BRAVO 8."

"Elevation, 2745 feet,

Compound and enemy personnel

QR 725 491"

"Scarface 24's laser, 1688,

South 500,

Egress overhead, 16-18K. Advise when ready for remarks."

FW Attack Aircraft: "Viper 11, ready."

RW FAC(A): "FAH 260 through 290, LTL 310, request IN with a heading. TOT 30. Readbacks when able."

Readbacks are conducted and the AO confirms that the mission is approved.

Air Officer: "Scarface 24, Siege 31, TOT 30 approved."

RW FAC(A): "Siege 31, Scarface 24 copies."

FW Attack Aircraft: "Viper 11, IP inbound."

RW FAC(A): "Viper 11, CONTINUE."

FW Attack Aircraft: "Viper 11 IN heading 270."

RW FAC(A): "Viper 11, CLEARED HOT."

FW Attack Aircraft: "Viper 11, one AWAY, time of fall 30 seconds."

FW FAC(A): "Scarface 24."

FW Attack Aircraft: "Viper 11, TEN SECONDS."

RW FAC(A): "TEN SECONDS."

FW Attack Aircraft: "LASER ON."

RW FAC(A): "Scarface 24, LASING 1688."

The RW FAC(A) assesses a direct hit on the building in the compound, but has 2 SQUIRTERs move into a treeline to the east of the compound.

RW FAC(A): "Viper 12, from lead's hit, east 50, target is two enemy fighters in tree line."

FW Attack Aircraft: "Viper 12 is CONTACT lead's hit, TALLY, IP inbound."

RW FAC(A): "Viper 12, CONTINUE, VISUAL."

FW Attack Aircraft: "Viper 12, IN from the east heading 270."

RW FAC(A): "Viper 12, CLEARED HOT."

RW FAC(A): "Viper flight, advise when ready for BDA."

The RW FAC(A) assesses BDA and passes it to the FW attack aircraft. If necessary, the RW FAC(A) could integrate his own section into the attack by following up with rockets and gun. This would have to be approved through the AO.

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APPENDIX F
TERRAIN EXAMPLES

Figures F-1, F-2, F-3, and F-4 provide terrain examples.

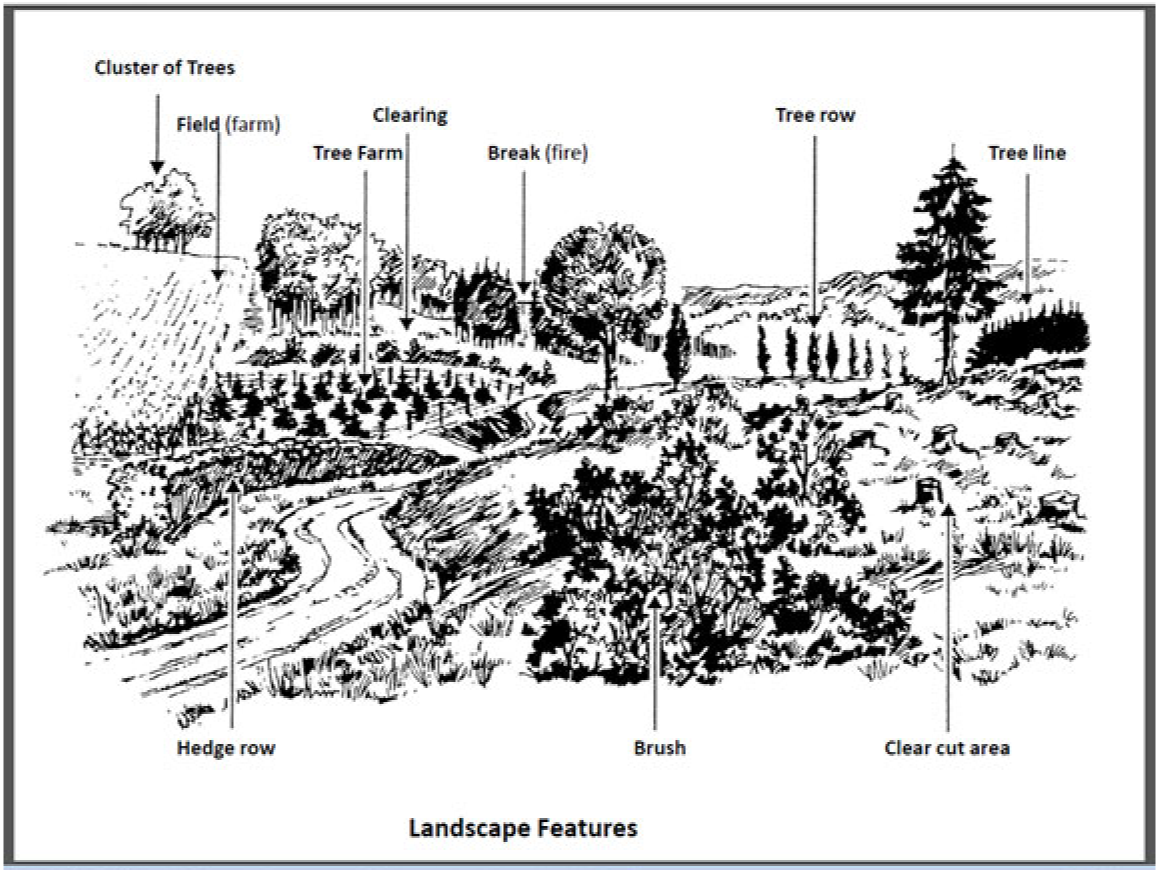

Figure F-1. Landscape Features

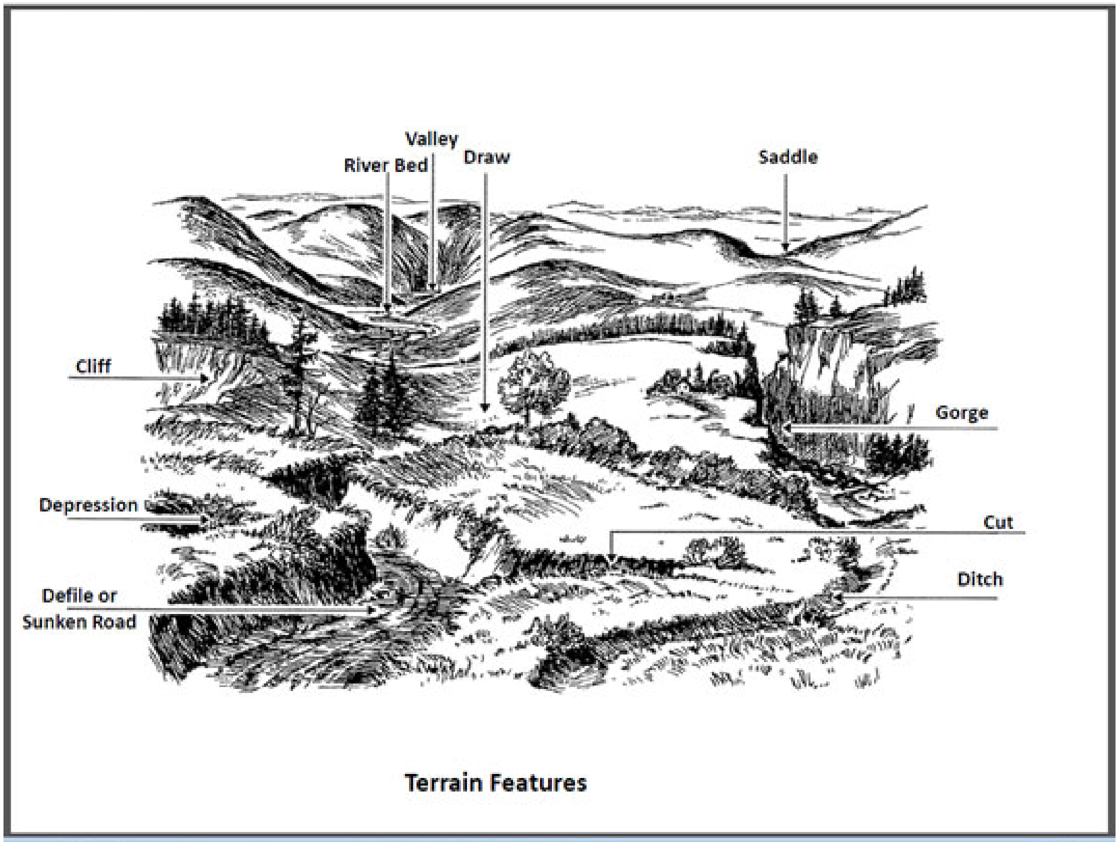

Figure F-2. Terrain Features

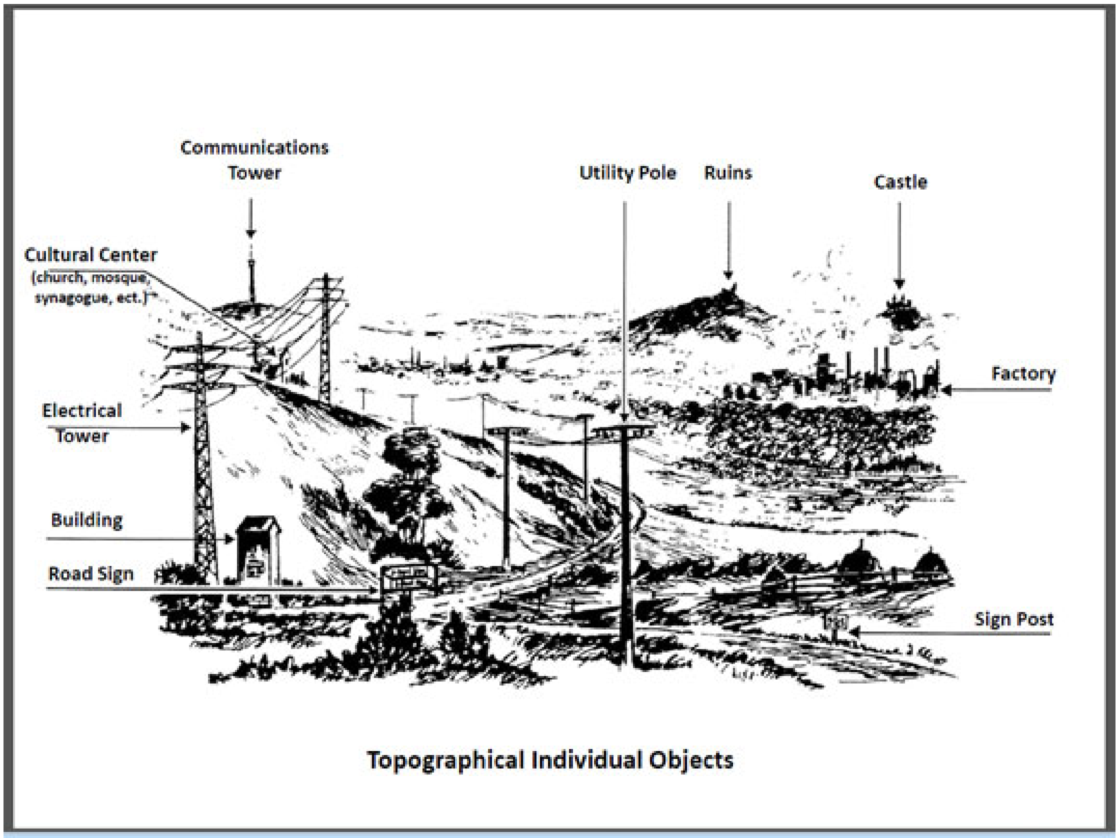

Figure F-3. Topographical Individual Objects

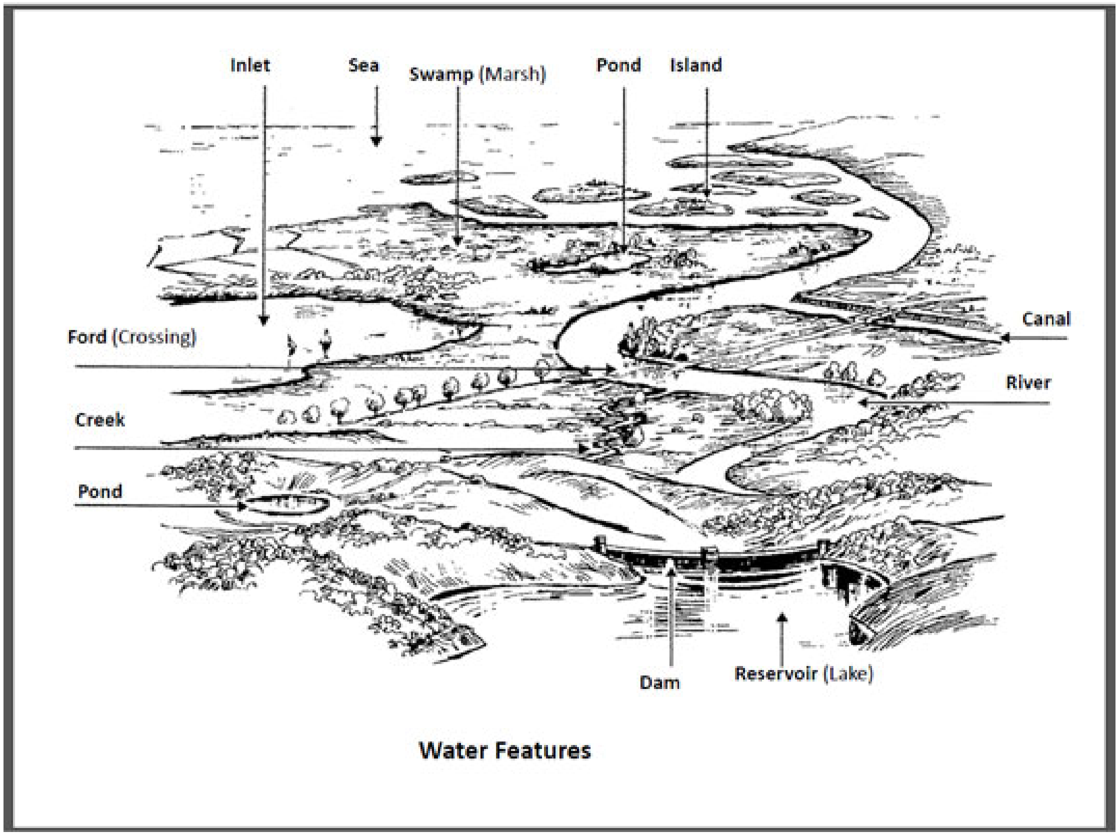

Figure F-4. Water Features

APPENDIX G
REFERENCES

The development of JP 3-09.3 is based upon the following primary references:

1. Chairman of the Joint Chiefs of Staff Publications

a. CJCSI 3160.01A, *No-Strike and the Collateral Damage Estimation Methodology*.

b. CJCSI 3505.01B, *Target Coordinate Mensuration Certification and Program Accreditation*.

c. CJCSI 3900.01C, *Position (Point and Area) Reference Procedures.*

d. CJCSI 3901.01C, *Requirements for Geospatial Information and Services.*

e. JP 1, *Doctrine for the Armed Forces of the United States*.

f. JP 1-02, *Department of Defense Dictionary of Military and Associated Terms.*

g. JP 2-01, *Joint and National Intelligence Support to Military Operations.*

h. JP 2-01.3, *Joint Intelligence Preparation of the Operational Environment.*

i. JP 3-0, *Joint Operations.*

j. JP 3-01, *Countering Air and Missile Threats*.

k. JP 3-02, *Amphibious Operations*.

l. JP 3-05, *Special Operations.*

m. JP 3-09, *Joint Fire Support.*

n. JP 3-30, *Command and Control for Joint Air Operations.*

o. JP 3-50, *Personnel Recovery*.

p. JP 3-52, *Joint Airspace Control.*

q. JP 3-60, *Joint Targeting.*

r. JP 5-0, *Joint Operation Planning.*

2. Multi-Service Publications

a. Army Tactical Publication 3-91.1/AFTTP 3-2.86, *The Joint Air Ground Integration Center*.

b. Army Tactical Publication 3-09.32/MCRP 3-16.6A/NTTP 3-09.2/AFTTP 3-2.6, *JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower*.

c. FM 3-52.2/NTTP 3-56.2/AFTTP(I) 3-2.17, TAGS, *Multi-Service Tactics, Techniques, and Procedures for the Theater Air Ground System*.

d. Army Tactical Publication 1-02.1/MCRP 3-25B/NTTP 6-02.1/AFTTP 3-2.5, *Brevity, Multi-Service Brevity Codes*.

e. Army Tactics, Techniques, and Procedures 3-04.15/MCRP 3-33.8A/NTTP 3-55.14/AFTTP 3-2.64, *UAS Multi-Service Tactics, Techniques, and Procedures for Unmanned Aircraft Systems*.

f. Army Tactical Publication 3-09.34/MCRP 3-25H/NTTP 3-09.2.1/AFTTP 3-2.59, *Multi-Service Tactics, Techniques, and Procedures for Kill Box Planning and Employment*.

g. FM 3-52.1/AFTTP 3-2.78 *Multi-Service Tactics, Techniques, and Procedures for Airspace Control.*

3. Service Publications

a. FM 6-20-30, *Tactics Techniques, and Procedures for Fire Support for Corps and Division Operations.*

b. AFTTP 3-3. JTAC, *Combat Fundamental – Joint Terminal Attack Controller*.

c. AFTTP 3-1, *Threat Guide*

APPENDIX H
ADMINISTRATIVE INSTRUCTIONS

1. User Comments

Users in the field are highly encouraged to submit comments on this publication to: Joint Staff J-7, Deputy Director, Joint Education and Doctrine, ATTN: Joint Doctrine Analysis Division, 116 Lake View Parkway, Suffolk, VA 23435-2697. These comments should address content (accuracy, usefulness, consistency, and organization), writing, and appearance.

2. Authorship

The lead agent for this publication is the US Marine Corps. The Joint Staff doctrine sponsor for this publication is the Joint Staff/J-3.

3. Supersession

This publication supersedes JP 3-09.3, *Close Air Support,* 8 July 2009.

4. Change Recommendations

a. Recommendations for urgent changes to this publication should be submitted:

TO: JOINT STAFF WASHINGTON DC//J7-JED//

b. Routine changes should be submitted electronically to the Deputy Director, Joint Education and Doctrine, ATTN: Joint Doctrine Analysis Division, 116 Lake View Parkway, Suffolk, VA 23435-2697, and info the lead agent and the Director for Joint Force Development, J-7/JED.

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a. Joint Staff J-7 will not print copies of JPs for distribution. Electronic versions are available on JDEIS Joint Electronic Library Plus (JEL+) at https://jdeis.js.mil/jdeis/index.jsp (NIPRNET) and http://jdeis.js.smil.mil/jdeis/index.jsp (SIPRNET) and on the JEL at http://www.dtic.mil/doctrine (NIPRNET).

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c. JEL CD-ROM. Upon request of a joint doctrine development community member, the Joint Staff J-7 will produce and deliver one CD-ROM with current JPs. This JEL CD-ROM will be updated not less than semi-annually and when received can be locally reproduced for use within the combatant commands, Services, and combat support agencies.

GLOSSARY
PART I—ABBREVIATIONS AND ACRONYMS

AAA	antiaircraft artillery
AAGS	Army air-ground system
ACA	airspace coordination area
ACE	aviation combat element (USMC)
ACEOI	automated communications-electronics operating instructions
ACM	airspace coordinating measure
ACO	airspace control order
ADA	air defense artillery
ADAM	air defense airspace management
AFAPD	Air Force Applications Program Development
AFATDS	Advanced Field Artillery Tactical Data System
AFLE	Air Force liaison element
AFTTP	Air Force tactics, techniques, and procedures
AGL	above ground level
AH	aircraft utility
AI	air interdiction
ALO	air liaison officer
ALTD	airborne laser target designator
ANGLICO	air-naval gunfire liaison company
AO	air officer
AOA	amphibious objective area
AOC	air operations center
AOF	azimuth of fire
AOS	aircraft on station
APTD	aircraft position target designation
ASCS	air support control section
ASLT	air support liaison team
ASOC	air support operations center
ATCS	air traffic control section
ATO	air tasking order
ATP	advanced targeting pod
AWACS	Airborne Warning and Control System
BAE	brigade aviation element
BCD	battlefield coordination detachment
BCL	battlefield coordination line
BCT	brigade combat team
BDA	battle damage assessment
BLOS	beyond line-of-sight
BN	battalion
BOC	bomb on coordinate
BOT	bomb on target
BP	battle position

C2	command and control
CAP	crisis action planning
CAS	close air support
CAT	category
CCA	close combat attack
CCIR	commander's critical information requirement
CDE	collateral damage estimation
CDM	collateral damage methodology
CE	circular error
CFL	coordinated fire line
CID	combat identification
CJCSI	Chairman of the Joint Chiefs of Staff instruction
CNR	combat net radio
COA	course of action
COC	combat operations center
COE	concept of employment
COF	conduct of fire
COMAFFOR	commander, Air Force forces
COMNAVFOR	commander, Navy forces
COMSEC	communications security
CONOPS	concept of operations
CP	contact point
CRC	control and reporting center
DACAS	digitally aided close air support
DASC	direct air support center
DASC(A)	direct air support center (airborne)
DCGS	distributed common ground/surface system
DD	Department of Defense form
DGT	designated ground target
DPIP	departing initial point
DPPDB	digital point positioning database
ELINT	electronic intelligence
EMCON	emission control
EO	electro-optical
EW	electronic warfare
FAC	forward air controller
FAC(A)	forward air controller (airborne)
FAH	final attack heading
FARP	forward arming and refueling point
FC	fires cell (Army)
FCT	firepower control team
FDC	fire direction center
FFA	free-fire area
FFCC	force fires coordination center (USMC)

FIST	fire support team
FLIR	forward-looking infrared
FLOT	forward line of own troops
FM	field manual (Army)
FMV	full motion video
FOB	forward operating base
FOV	field of view
FP	firing point
FPF	final protective fire
FSC	fire support coordinator (USMC)
FSCC	fire support coordination center (USMC)
FSCL	fire support coordination line
FSCM	fire support coordination measure
FSCOORD	fire support coordinator (Army)
FSEM	fire support execution matrix
FST	fire support task
FSO	fire support officer
ft	feet
FW	fixed-wing
G-3	Army or Marine Corps component operations staff officer (Army division or higher staff, Marine Corps brigade or higher staff)
GCE	ground combat element (USMC)
GEOREF	geographic reference
GLINT	gated laser intensifier
GLTD	ground laser target designator
GPS	Global Positioning System
GRG	gridded reference graphic
GTL	gun-target line
HA	holding area
HDC	helicopter direction center
HF	high frequency
HHQ	higher headquarters
HIDACZ	high-density airspace control zone
HMCS	helmet-mounted cueing system
HQ	headquarters
HR	helicopter request
HUMINT	human intelligence
IAM	inertially aided munition
ID	identification
IDF	indirect fire
INFLTREP	inflight report
INS	inertial navigation system
IP	initial point

IR	infrared
IRC	internet relay chat
ISR	intelligence, surveillance, and reconnaissance
ISRLO	intelligence, surveillance, and reconnaissance liaison officer (USAF)
JAAT	joint air attack team
JACCE	joint air component coordination element
JACE	joint air coordination element
JAGIC	joint air-ground integration center
JAOC	joint air operations center
JARN	joint air request net
JDAM	Joint Direct Attack Munition
JFACC	joint force air component commander
JFC	joint force commander
JFO	joint fires observer
JFSOCC	joint force special operations component commander
JICO	joint interface control officer
JIPOE	joint intelligence preparation of the operational environment
JMPS	Joint Mission Planning System
JP	joint publication
JSA	joint security area
JSOAC	joint special operations air component
JSOTF	joint special operations task force
JSTARS	Joint Surveillance Target Attack Radar System
JTAC	joint terminal attack controller
JTAR	joint tactical air strike request
JU	Joint Tactical Information Distribution System unit
km	kilometer
LF	landing force
LGB	laser-guided bomb
LGM	laser-guided missile
LGW	laser-guided weapon
LNO	liaison officer
LOAL	lock-on after launch
LOBL	lock-on before launch
LOS	line of sight
LRF	laser range finder
LSS	laser spot search
LST	laser spot tracker
LTD	laser target designator
LTL	laser-to-target line

MACCS	Marine air command and control system
MAGTF	Marine air-ground task force
MANPADS	man-portable air defense system
Marine TACC	Marine Corps tactical air command center
MARLE	Marine liaison element
MCRP	Marine Corps reference publication
METT-T	mission, enemy, terrain and weather, troops and support available—time available
MGRS	military grid reference system
MIR	multisensor imagery reconnaissance
MISREP	mission report
MRR	minimum-risk route
MSL	mean sea level
MTS	Marine tactical system
NAI	named area of interest
NALE	naval and amphibious liaison element
NATO	North Atlantic Treaty Organization
Navy TACC	Navy tactical air control center
NCS	net control station
NFA	no-fire area
NGLO	naval gunfire liaison officer
NOE	nap-of-the-earth
NSFS	naval surface fire support
NTACS	Navy tactical air control system
NTTP	Navy tactics, techniques, and procedures
NVD	night vision device
NVG	night vision goggle
O&I	operations and intelligence
OPCON	operational control
OPLAN	operation plan
OPORD	operation order
OPTASK	operation task
OSC	on-scene commander
OSR	on-station report
PGM	precision-guided munition
P_i	probability of incapacitation
PID	positive identification
PLA	post-launch abort
POF	priority of fires
PRF	pulse repetition frequency
PSS-SOF	Precision Strike Suite-Special Operations Forces
PWT	precision weapons team

RF	radio frequency
RFA	restrictive fire area
RFL	restrictive fire line
ROC	rehearsal of concept
ROE	rules of engagement
ROZ	restricted operations zone
RPG	rocket propelled grenade
RW	rotary-wing
S-3	battalion or brigade operations staff officer (Army; Marine Corps battalion or regiment)
SA	situational awareness
SACC	supporting arms coordination center (USMC)
SADL	situation awareness data link
SALT	supporting arms liaison team
SAM	surface-to-air missile
SATCOM	satellite communications
SE	spherical error
SEAD	suppression of enemy air defenses
SITREP	situation report
SOAGS	special operations air-ground system
SOF	special operations forces
SOLE	special operations liaison element
SOP	standard operating procedure
SPI	sensor point of interest
SPINS	special instructions
TAC	terminal attack control
TAC(A)	tactical air coordinator (airborne)
TACP	tactical air control party
TACS	theater air control system
TAD	tactical air direction
TADC	tactical air direction center
TAGS	theater air-ground system
TAI	target area of interest
TAOC	tactical air operations center (USMC)
TAR	tactical air request
TATC	tactical air traffic control
TGO	terminal guidance operations
TLE	target location error
T/M/S	type, model, and/or series
TOC	tactical operations center
TOT	time on target
TRP	target reference point
TTP	tactics, techniques, and procedures
TTT	time to target

UA	unmanned aircraft
UAS	unmanned aircraft system
UHF	ultrahigh frequency
URN	unit reference number
USAF	United States Air Force
USMC	United States Marine Corps
USMTF	United States message text format
USN	United States Navy
VDL	video downlink
VE	vertical error
VHF	very high frequency
VMF	variable message format
WOC	wing operations center (USAF)
WP	white phosphorous

PART II—TERMS AND DEFINITIONS

air liaison officer. The senior tactical air control party member attached to a ground unit who functions as the primary advisor to the ground commander on air power. Also called **ALO.** (Approved for incorporation into JP 1-02.)

airspace coordination area. A three-dimensional block of airspace in a target area, established by the appropriate commander, in which friendly aircraft are reasonably safe from friendly surface fires. Also called **ACA.** (Approved for incorporation into JP 1-02.)

air support operations center. The principal air control agency of the theater air control system responsible for the direction and control of air operations directly supporting the ground combat element. Also called **ASOC.** (Approved for incorporation into JP 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. Also called **AAGS.** (Approved for incorporation into JP 1-02.)

attack heading. 1. The interceptor heading during the attack phase that will achieve the desired track-crossing angle. 2. The assigned magnetic compass heading to be flown by aircraft during the delivery phase of an air strike. (JP 1-02. SOURCE: JP 3-09.3)

attack position. The last position occupied by the assault echelon before crossing the line of departure. (Approved for incorporation into JP 1-02 with JP 3-09.3 as the source JP.)

begin morning civil twilight. None. (Approved for removal from JP 1-02.)

begin morning nautical twilight. The start of that period where, in good conditions and in the absence of other illumination, the sun is 12 degrees below the eastern horizon and enough light is available to identify the general outlines of ground objects and conduct limited military operations. Also called **BMNT.** (Approved for incorporation into JP 1-02 with JP 3-09.3 as the source JP.)

brevity code. A code word, which provides no security, that serves the sole purpose of shortening of messages rather than the concealment of their content. (Approved for incorporation into JP 1-02.)

command net. A communications network that connects an echelon of command with some or all of its subordinate echelons for the purpose of command and control. (Approved for incorporation into JP 1-02.)

contact point. 1. In land warfare, a point on the terrain, easily identifiable, where two or more units are required to make contact. (JP 3-50) 2. In air operations, the position at which a mission leader makes radio contact with an air control agency. (JP 3-09.3) 3.

In personnel recovery, a location where isolated personnel can establish contact with recovery forces. Also called **CP.** (JP 1-02. SOURCE: JP 3-50)

contour flight. None. (Approved for removal from JP 1-02.)

control point. 1. A position along a route of march at which men are stationed to give information and instructions for the regulation of supply or traffic. 2. A position marked by coordinates (latitude, longitude), a buoy, boat, aircraft, electronic device, conspicuous terrain feature, or other identifiable object which is given a name or number and used as an aid to navigation or control of ships, boats, or aircraft. 3. In marking mosaics, a point located by ground survey with which a corresponding point on a photograph is matched as a check. (JP 1-02. SOURCE: JP 3-09.3)

danger close. In close air support, artillery, mortar, and naval gunfire support fires, the term included in the method of engagement segment of a call for fire that indicates that friendly forces are within close proximity of the target. (Approved for incorporation into JP 1-02.)

direct air support center. The principal air control agency of the United States Marine Corps air command and control system responsible for the direction and control of air operations directly supporting the ground combat element. Also called **DASC.** (Approved for incorporation into JP 1-02.)

direct air support center (airborne). An airborne aircraft equipped with the necessary staff personnel, communications, and operations facilities to function as a direct air support center. Also called **DASC(A).** (JP 1-02. SOURCE: JP 3-09.3)

direct fire. Fire delivered on a target using the target itself as a point of aim for either the weapon or the director. (JP 1-02. SOURCE: JP3-09.3)

direct support. A mission requiring a force to support another specific force and authorizing it to answer directly to the supported force's request for assistance. Also called **DS.** (JP 1-02. SOURCE: JP 3-09.3)

engage. 1. In air defense, a fire control order used to direct or authorize units and/or weapon systems to fire on a designated target. (JP 3-01) 2. To bring the enemy under fire. (JP 1-02. SOURCE: JP 3-09.3)

final protective fire. An immediately available prearranged barrier of fire designed to impede enemy movement across defensive lines or areas. Also called **FPF.** (Approved for incorporation into JP 1-02.)

fire direction center. That element of a command post, consisting of gunnery and communications personnel and equipment, by means of which the commander exercises fire direction and/or fire control. Also called **FDC.** (Approved for incorporation into JP 1-02.)

fire support team. A field artillery team provided for each maneuver company/troop and selected units to plan and coordinate all supporting fires available to the unit, including mortars, field artillery, naval surface fire support, and close air support integration. Also called **FIST.** (JP 1-02. SOURCE: JP 3-09.3)

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. Also called **FAC.** (JP 1-02. SOURCE: JP 3-09.3)

forward air controller (airborne). A specifically trained and qualified aviation officer, normally an airborne extension of the tactical air control party, who exercises control from the air of aircraft engaged in close air support of ground troops. Also called **FAC(A).** (Approved for incorporation into JP 1-02.)

forward arming and refueling point. A temporary facility, organized, equipped, and deployed to provide fuel and ammunition necessary for the employment of aviation maneuver units in combat. Also called **FARP.** (Approved for incorporation into JP 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.** (JP 1-02. SOURCE: JP 3-09.3)

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.** (JP 1-02. SOURCE: JP 3-09.3)

forward operating base. An airfield used to support tactical operations without establishing full support facilities. Also called **FOB.** (Approved for incorporation into JP 1-02.)

general support. 1. That support which is given to the supported force as a whole and not to any particular subdivision thereof. 2. A tactical artillery mission. Also called **GS.** (JP 1-02. SOURCE: JP 3-09.3)

general support-reinforcing. The artillery mission of supporting the force as a whole and of providing reinforcing fires for other artillery units. Also called **GSR.** (Approved for incorporation into JP 1-02.)

gun-target line. An imaginary straight line from gun to target. Also called **GTL.** (Approved for incorporation into JP 1-02 with JP 3-09.3 as the source JP.)

head-up display. A display of flight, navigation, attack, or other information superimposed upon the pilot’s forward field of view. Also called **HUD.** (Approved for incorporation into JP 1-02 with JP 3-09.3 as the source JP.)

high altitude bombing. Horizontal bombing with the height of release over 15,000 feet. (JP 1-02. SOURCE: JP 3-09.3)

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. (JP 1-02. SOURCE: JP 3-09.3)

immediate mission request. None. (Approved for removal from JP 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.** (JP 1-02. SOURCE: JP 3-09.3)

IR pointer. None. (Approved for removal from JP 1-02.)

joint air attack team. A combination of attack and/or scout rotary-wing aircraft and fixed-wing close air support aircraft operating together to locate and attack high priority targets and other targets of opportunity. Also called **JAAT**. (Approved for incorporation into JP 1-02.)

joint air-ground integration center. A staff organization designed to enhance joint collaborative efforts to deconflict joint air-ground assets in the division's airspace. Also called **JAGIC.** (Approved for inclusion in JP 1-02.)

joint fires observer. A trained Service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 close air support terminal attack control, and perform autonomous terminal guidance operations. Also called **JFO.** (JP 1-02. SOURCE: JP 3-09.3)

joint terminal attack controller. A qualified (certified) Service member who, from a forward position, directs the action of combat aircraft engaged in close air support and other offensive air operations. Also called **JTAC.** (Approved for incorporation into JP 1-02.)

laser seeker. A device based on a direction-sensitive receiver that detects the energy reflected from a laser designated target and defines the direction of the target relative to the receiver. (Approved for incorporation into JP 1-02.)

lead aircraft. 1. The airborne aircraft designated to exercise command of other aircraft within the flight. 2. An aircraft in the van of two or more aircraft. (Approved for incorporation into JP 1-02 with JP 3-09.3 as the source JP.)

low level flight. None. (Approved for removal from JP 1-02.)

Marine air command and control system. A system that 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. Also called **MACCS.** (Approved for incorporation into JP 1-02.)

marking. To maintain contact on a target from such a position that the marking unit has an immediate offensive capability. (JP 1-02. SOURCE: JP 3-09.3)

maximum ordinate. In artillery and naval gunfire support, the height of the highest point in the trajectory of a projectile above the horizontal plane passing through its origin. Also called **vertex height** and **MAXORD.** (Approved for incorporation into JP 1-02.)

nap-of-the-earth flight. None. (Approved for removal from JP 1-02.)

naval surface fire support. Fire provided by Navy surface gun and missile systems in support of a unit or units. Also called **NSFS.** (JP 1-02. SOURCE: JP 3-09.3)

Navy tactical air control center. None. (Approved for removal from JP 1-02.)

night vision device. Any electro-optical device that is used to detect visible and infrared energy and provide a visible image. Also called **NVD.** (Approved for incorporation into JP 1-02.)

night vision goggle. An electro-optical image intensifying device that detects visible and near-infrared energy, intensifies the energy, and provides a visible image for night viewing. Also called **NVG.** (Approved for replacement of "night vision goggle(s)" and its definition in JP 1-02.)

no-fire area. An area designated by the appropriate commander into which fires or their effects are prohibited. Also called **NFA.** (JP 1-02. SOURCE: JP 3-09.3)

post-launch abort. Deliberate action taken post-separation to cause a precision munition to miss its target. Also called **PLA.** (Approved for inclusion in JP 1-02.)

preplanned air support. Air support in accordance with a program, planned in advance of operations. (JP 1-02. SOURCE: JP 3-09.3)

preplanned mission request. None. (Approved for removal from JP 1-02.)

procedure word. A word or phrase limited to radio telephone procedure used to facilitate communication by conveying information in a condensed standard form. Also called **proword.** (JP 1-02. SOURCE: JP 3-09.3)

proword. None. (Approved for removal from JP 1-02.)

release altitude. Altitude of an aircraft above the ground at the time of ordnance release. (Approved for incorporation into JP 1-02.)

safing. As applied to weapons and ammunition, the changing from a state of readiness for initiation to a safe condition. Also called **de-arming.** (Approved for incorporation into JP 1-02 with JP 3-09.3 as the source JP.)

spot net. Radio communication net used by a spotter in calling fire. (Approved for incorporation into JP 1-02 with JP 3-09.3 as the source JP.)

spot report. A concise narrative report of essential information covering events or conditions that may have an immediate and significant effect on current planning and operations that is afforded the most expeditious means of transmission consistent with requisite security. Also called **SPOTREP.** (Note: In reconnaissance and surveillance usage, spot report is not to be used.) (JP 1-02. SOURCE: JP 3-09.3)

supporting arms coordination center. A single location on board an amphibious warfare command ship in which all communication facilities incident to the coordination of fire support of the artillery, air, and naval gunfire are centralized. Also called **SACC.** (Approved for incorporation into JP 1-02.)

surface-to-air weapon. None. (Approved for removal from JP 1-02.)

synchronized clock. None. (Approved for removal from JP 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. Also called **Marine TACC.** (Approved for incorporation into JP 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.** (JP 1-02. SOURCE: JP 3-09.3)

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. Also called **TACP.** (JP 1-02. SOURCE: JP 3-09.3)

tactical air coordinator (airborne). An officer who coordinates, from an aircraft, the actions of other aircraft engaged in air support of ground or sea forces. Also called **TAC(A).** (JP 1-02. SOURCE: JP 3-09.3)

tactical air direction center. An air operations installation under the overall control of the Navy tactical air control center or the Marine Corps tactical air command center, from which aircraft and air warning service functions of tactical air operations in support of amphibious operations are directed. Also called **TADC.** (JP 1-02. SOURCE: JP 3-09.3)

tactical air operations center. The principal air control agency of the United States Marine Corps air command and control system responsible for airspace control and management. Also called **TAOC.** (Approved for incorporation into JP 1-02.)

target location error. The difference between the coordinates generated for a target and the actual location of the target. Also called **TLE.** (Approved for incorporation into JP 1-02.)

target reference point. A predetermined point of reference, normally a permanent structure or terrain feature that can be used when describing a target location. Also called **TRP.** (Approved for inclusion in JP 1-02.).

terminal attack control. The authority to control the maneuver of and grant weapons release clearance to attacking aircraft. (JP 1-02. SOURCE: JP 3-09.3)

terminal control. 1. A type of air control with the authority to direct aircraft to maneuver into a position to deliver ordnance, passengers, or cargo to a specific location or target. 2. Any electronic, mechanical, or visual control given to aircraft to facilitate target acquisition and resolution. (Approved for incorporation into JP 1-02.)

terrain flight. Flight close to the Earth's surface during which airspeed, height, and/or altitude are adapted to the contours and cover of the ground in order to avoid enemy detection and fire. Also called **contour flight**; **low-level flight**; **nap-of-the-earth flight.** (Approved for incorporation into JP 1-02.)

thermal crossover. The natural phenomenon that normally occurs twice daily when temperature conditions are such that there is a loss of contrast between two adjacent objects on infrared imagery. (JP 1-02. SOURCE: JP 3-09.3)

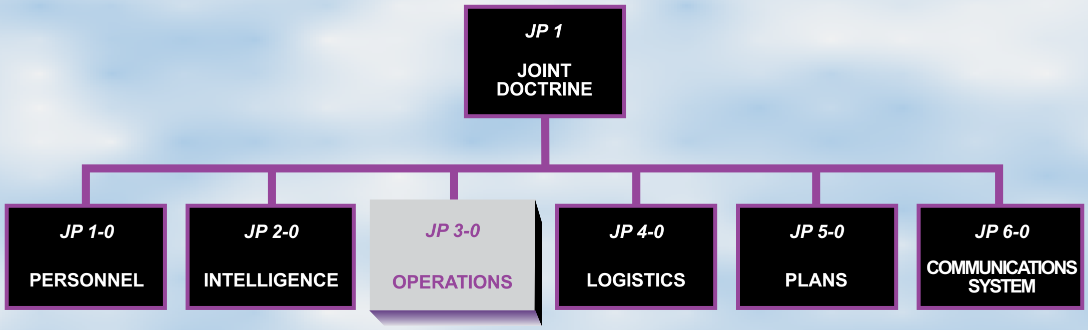
time on target. The actual time at which munitions impact the target. Also called **TOT.** (JP 1-02. SOURCE: JP 3-09.3)

time to target. The number of minutes and seconds to elapse before aircraft ordnance impacts on target. Also called **TTT.** (JP 1-02. SOURCE: JP 3-09.3)

vertex height. None. (Approved for removal from JP 1-02.)

wing. 1. An Air Force unit composed normally of one primary mission group and the necessary supporting organizations. 2. A fleet air wing is the basic organizational and administrative unit for naval-, land-, and tender-based aviation. 3. A balanced Marine Corps task organization of aircraft groups and squadrons, together with appropriate command, air control, administrative, service, and maintenance units. 4. A flank unit; that part of a military force to the right or left of the main body. (Approved for incorporation into JP 1-02.)

JOINT DOCTRINE PUBLICATIONS HIERARCHY



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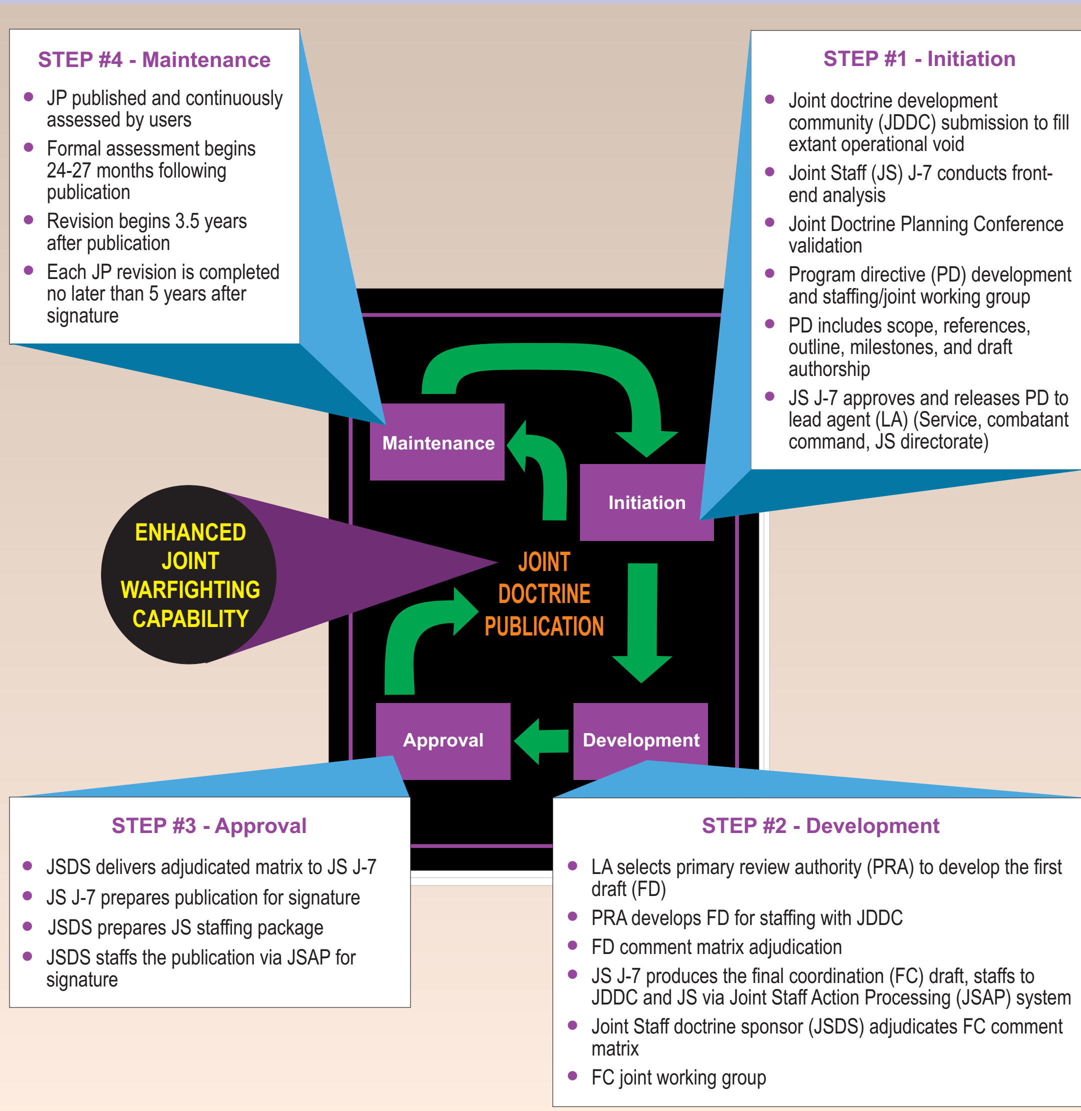

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