Joint Publication 3-09.3

Joint Close Air Support

10 June 2019
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PREFACE

1. Scope

This publication provides fundamental principles and guidance for planning, executing, and assessing 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 it provides considerations for military interaction with governmental and nongovernmental agencies, multinational forces, and other interorganizational partners. It provides military guidance for the exercise of authority by combatant commanders and other joint force commanders (JFCs), and prescribes joint doctrine for operations and training. It provides military guidance for use by the Armed Forces in preparing and executing their plans and orders. 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 objectives.

3. Application

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

b. This doctrine constitutes official advice concerning the enclosed subject matter; however, the judgment of the commander is paramount in all situations.

c. 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:

DANIEL J. O'DONOHUE
Lieutenant General, USMC
Director, Joint Force Development

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SUMMARY OF CHANGES
REVISION OF JOINT PUBLICATION 3-09.3
DATED 25 NOVEMBER 2014

- **This publication was validated without change on 07 June 2021.**

- **Modified definition of close air support (CAS).**

- **Replaced “weapon release authority” with “target engagement authority.”**

- **Removed redundancies.**

- **Modified terminal guidance operations discussion.**

- **Updated situation updates supporting information.**

- **Updated remarks and restrictions in CAS 5- and 9-line briefs.**

- **Updated digitally aided CAS operations and Appendix D, “Digitally Aided Close Air Support Planning and Execution Considerations.”**

- **Added rotary-wing keyhole procedures.**

- **Modified laser discussions.**

- **Updated US Army rotary-wing discussion.**

- **Updated brevity terms, airspace coordinating measures, and fire support coordination measures.**

- **Deleted reference to specific aircraft and weapons when appropriate.**

- **Added crosswind considerations to final attack heading discussion.**

- **Updated line 8, remarks section, of Department of Defense Form 1972, Joint Tactical Air Strike Request.**

- **Updated reference publications.**

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- **Provides an overview of how close air support is planned and executed to support ground units.**
- **Outlines the integrated, flexible, and responsive command and control structure essential to process close air support requirements.**
- **Describes the dependable, interoperable, and secure communications architecture to exercise control of close air support.**
- **Examines preparation activities by units before execution to improve their ability to conduct operations, including rehearsals, movement, and observations.**
- **Outlines close air support execution.**
- **Provides standard formats used in passing key information between close air support participants.**

Overview and Fundamentals

Close air support is air action by 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 planned and executed to support ground tactical units. The air apportionment recommendation and allocation process for joint air operations, which includes 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.

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 available means to exploit tactical opportunities in the offense or defense by providing fires to destroy, disrupt, suppress, fix, harass, neutralize, or delay enemy ground forces.

Terminal attack control (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.

Use of Close Air Support

CAS is used to attack the enemy, day or night, in all weather conditions, 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 have the authority to decide the target priority, effects, and timing of CAS and other supporting fires in their respective operational areas.** For decentralized execution, the ground commander at the lowest level with the ability to coordinate should be responsible for the employment of CAS assets unless specifically retained by a higher-level commander in the ground force chain of command.

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 joint force commander (JFC) an air apportionment recommendation, after consultation with other affected component commanders.

Responsibilities

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

JFACC. For CAS, JFACC responsibilities are to recommend air apportionment decisions, allocate forces/capabilities made available from the JFC and components, create and execute the air tasking order (ATO), and other applicable actions associated with CAS execution.

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

Minimizing Friendly Fire

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.

Minimizing Civilian Casualties

Responsibility. All participants in the CAS employment process are responsible for the effective and safe planning and execution of CAS and must make decisions on the basis of information available to them and in good faith, including, when directed, application of heightened standards of identification, such as positive identification. CAS must comply with the law of war and applicable rules of engagement (ROE).

Command and Control

CAS requires an integrated, flexible, and responsive command and control (C2) structure to process CAS requirements and a 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's staff located in the joint air operations center, using host-component organic C2 architecture.

Air Force Command and Control

Theater Air Control System (TACS). The TACS is the commander, Air Force forces' (COMAFFOR's), mechanism for commanding and controlling component air and space operations. **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 Command and Control

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). Teamed with the Air Force air support operations center (ASOC) and tactical air control party, they form the joint air-ground integration center (JAGIC) for coordination and deconfliction of joint fires in the division operational area and assigned airspace.

Air Force and Army Command and Control 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, Air Force TACS may be clearly interconnected with the 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.

Navy Command and Control

The Navy tactical air control system is the principal air control system afloat.

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. Ideally, the Navy TACC is collocated with the supporting arms coordination center (SACC) onboard amphibious warfare ships. The SACC is the naval counterpart to the landing force's fire support coordination center.

Marine Corps Command and Control

The Marine air command and control system (MACCS) consists of various air C2 agencies that provide the Marine air-ground task force aviation combat element commander with the ability to monitor, supervise, and influence the application of Marine Corps aviation. The Marine air control group is responsible for providing, operating, and maintaining principal MACCS agencies. The Marine Corps tactical air command center is the focal point for tasking and exercising OPCON over Marine Corps air assets.

Navy and Marine Corps Command and Control 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 Command and Control

Special Operations Air-ground System. 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.

Intelligence

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.

Intelligence preparation at all levels in the CAS process is largely dependent on mission and planning time available. Optimum intelligence, surveillance, and reconnaissance support to CAS begins early in the planning process, to include JIPOE and the targeting process.

Planning and Requesting

Close Air Support Integration Model

The CAS integration model is a continuous, three-phase cycle (i.e., plan, prepare, and execute) tailored for joint fire support and focused specifically on CAS. The CAS integration model assists the commander and staff in making CAS fire support plan decisions by integrating the planning and preparation of the supported and supporting components. **The planning phase ends in a published order to subordinate units.**

Five steps to CAS planning phase:

- Step 1: receipt of mission/prepare for mission analysis.
- Step 2: mission analysis.
- Step 3: course of action (COA) development.
- Step 4: COA analysis/war game.
- Step 5: orders production.

Command Responsibilities

Supported commanders should ensure CAS planners understand the objectives, scheme of maneuver, scheme of fires, C2 requirements, and criteria for specific ROE. Commanders also provide the risk assessment guidance for types of TAC.

Essential Planning Factors for Effective Close Air Support

It is critical for JTACs, FAC(A)s, and combat operations center/tactical operations center elements to coordinate their efforts in the planning stage. Their plans consider such key issues as communications, battle tracking, target nomination, tactical risk assessment, target engagement authority, methods of attack, types of TAC, airspace deconfliction and coordination, synchronization of CAS with fires and movement of the supported ground forces, and which JTAC/(FAC[A]) will provide TAC. **Only through effective coordination can the CAS team successfully achieve the supported commander's objectives for CAS.**

Types of Terminal Attack Control and Methods of Attack

Types of TAC. There are three types of TAC (1, 2, and 3). Types of TAC are tools that give the ground commander the greatest chance of accomplishing the mission while mitigating friendly fire and collateral damage. Type of TAC shall be passed as part of the game plan before the attack brief for aircrew situational awareness but imposes no requirement on the aircrew. The type of TAC conveys the JTAC's/FAC(A)'s intent on how best to control individual attacks based on the tactical risk assessment. **Specific levels of risk should not be associated with each type of TAC.**

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. JTACs, FAC(A)s, airspace control, and fire support personnel must integrate airspace users to provide a reasonably safe operating environment for aircraft to maneuver and attack targets. **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.**

Digital Information Networks and Systems Considerations

During planning phases, ensure network architectures, with or without gateways, are properly constructed. The coordination with communications network authorities must begin early in the planning 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 joint interface control officer with assistance from the ASOC/Direct Air Support Center.

Multinational Operations

North Atlantic Treaty Organization and partner nations have and continue to use Joint Publication 3-09.3 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), *Tactics, Techniques, and Procedures for Close Air Support and Air Interdiction*. Some differences still remain between US joint doctrine and US-ratified Allied joint doctrine, but these differences have minimal impact when conducting CAS.

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.**

Preparation

Preparation consists of activities by the unit before execution to improve its ability to conduct operations, including, but not limited to, rehearsals, movement, and observations.

Preparation includes concept of employment (COE) briefs, COE mission rehearsals, operation orders, brief-backs, equipment and communications checks, standard operating procedure 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. Moreover, the repetition of combat tasks during the rehearsal leaves a lasting mental picture of the sequence of key actions within the operation. **The types of rehearsals include combined arms rehearsal and fire support rehearsal.**

Execution

CAS execution begins with a target nomination from the supported commander and involves two processes that are continuous and overlapping in nature: JTAC/FAC(A), operations center coordination and CAS target engagement. Key issues such as battle tracking, target nomination, airspace deconfliction and coordination, tactical risk assessment, types of TAC, and which JTAC/FAC(A) will provide TAC must be clearly understood. Only through effective coordination can the CAS "team" achieve the supported commander's objectives for CAS successfully.

Close Air Support 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.

CONCLUSION

CAS is an element of joint fire support. Although simple in concept, CAS requires knowledge, detailed planning, coordination, and training for effective and safe execution.

This publication provides fundamental principles and guidance for planning, executing, and assessing CAS during joint operations.

CHAPTER I
OVERVIEW 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 air action by aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces.

b. 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 the component commanders 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.

c. While the focus of this publication is on CAS, the tactics, techniques, and procedures (TTP) for terminal attack control (TAC) may be used for other missions that do not require detailed integration with the fire and movement of ground force assets. All fires should support the joint force commander's (JFC's) objectives, guidance, and priorities.

d. CAS is planned and executed to support ground tactical units. The air apportionment recommendation and allocation process for joint air operations, which includes 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.

e. **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 available means to exploit tactical opportunities in the offense or defense by providing fires to destroy, disrupt, suppress, fix, harass, neutralize, or delay enemy ground forces.

f. **Digitally aided close air support (DACAS)** is CAS augmented by machine-to-machine exchange of situational awareness (SA) and targeting messages that can include CAS briefs; friendly, threat, and target locations; battle damage assessment (BDA); clearance of fires; and command and control (C2). DACAS utilizes datalink(s) to exchange both text and/or visual cueing information to enhance SA of the battlefield, minimize transcription error, make correlation easier, and potentially decrease the engagement timeline.

g. **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 component commanders integrate available CAS capabilities into the concept of operations (CONOPS).

h. **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 (DOD) as capable and authorized to perform TAC. There are three types of control (Types 1, 2, and 3).

(1) **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** 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** 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 10, "Types of Terminal Attack Control and Methods of Attack."

i. **Terminal Guidance Operations (TGO).** 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. As specifically pertaining to CAS, TGO are most often used to either mark or designate a target. A number of systems may be used to conduct TGO, such as Global Positioning System (GPS), laser designator/range finder, or aircraft targeting pods. While a variety of personnel may provide TGO to guide a weapon to impact, only certified JTACs/FAC(A)s may conduct TAC. For additional information, see Joint Publication (JP) 3-09, *Joint Fire Support.*

2. Use of Close Air Support

CAS is used to attack the enemy, day or night, in all weather conditions, 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 have the authority to decide the target priority, effects, and timing of CAS and other supporting fires in their respective operational areas.** For decentralized execution, the ground commander at the lowest level with the ability to coordinate should be 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 make CAS decisions with the advice and guidance of specially trained members of the tactical air control party (TACP) such as the air liaison officer (ALO), air officer (AO), JTAC, or FAC(A).

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

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 (e.g., on-station time, onboard precision targeting, ordnance circular error probable, and net explosive weight).

(4) Locations, communications, and special equipment available to JTACs (e.g., 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 a continuous, analytic process to identify, develop, and affect targets to meet commander objectives.

(1) Joint targeting is conducted through the joint targeting cycle. However, land component commanders normally use an interrelated process to enhance joint fire support planning and interface with the joint targeting cycle for targets within their areas of operations. That process is the decide, detect, deliver, and assess (D3A) methodology, which tactical units use to directly engage enemy ground forces with organic and supporting fires such as CAS. D3A incorporates the same fundamental functions of the joint targeting cycle and functions within phase 5 of the joint targeting cycle. The D3A methodology facilitates synchronizing maneuver, intelligence, and fire support.

(2) While conducting CAS, targeting may equate to the ground force commander or JTAC/FAC(A) selecting a particular target in a target array. When selecting targets, JTACs/FAC(A)s 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 ordnance, and response time. Other considerations include attack geometry, proximity of friendly forces, potential for collateral damage, capability of available sensors, and other available fire support. Aircrews may provide weaponeering recommendations and aircraft employment tactics, while the JTAC/FAC(A) focuses on target effects. (See Chapter III, "Planning and Requesting," for aircraft employment tactics.) Additionally, JTACs/FAC(A)s and CAS aircrews should expeditiously obtain and report BDA information. Commanders, JTACs/FAC(A)s, and CAS aircrews can use BDA to determine if attack objectives have been met or whether a reattack is necessary.

3. 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's 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 (e.g., CAS and AI) in the JFC's operation order (OPORD) and the JFACC's air operations directive, air tasking order (ATO), airspace control order (ACO), SPINS, and operations task links (OPTASKLINKs). The CAS integration model is presented in Chapter III, "Planning and Requesting," paragraph 2, "Close Air Support Integration Model."

4. Manned Aircraft Employment

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 fixed-wing (FW) and rotary-wing (RW) aircraft can both conduct CAS, the employment considerations of each differ and may vary among the Services.**

a. **Sorties and Formations.** 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-aircraft formations, thus one or two sorties. The United States Air Force (USAF) calls these *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. FW assets equipped to employ a wide variety of both general-purpose weapons and precision-guided munitions (PGMs). All of the free fall and forward-firing ordnance can be optimized to effectively attack any CAS target. Advanced targeting pods enhance the FW aircrew's ability to acquire targets and guide weapons to impact day or night and in a variety of terrain and weather conditions.

c. **RW Considerations.** RW attack assets provide the ability to maneuver and reposition to provide immediate and persistent fires in response to changing situations. They carry a wide variety of forward-firing and off-axis firing munitions, are equipped with advanced sensors, and have quick response and extended loiter times. RW assets can conduct low-altitude or nap-of-the-Earth (NOE) ingress, attacks, and egress and have the capability to conduct CAS in diverse terrain and while accompanying other transport, medical evacuation, or personnel recovery assets.

(1) Army RW assets are organic; assigned or attached to corps, divisions, and brigades; and perform air-ground operations as part of the Army combined arms team. Army aviation assets (RW and unmanned aircraft system [UAS]) normally receive mission-type orders and execute them as an integral unit or maneuver element. Special situations may arise where attack aviation assets are employed in smaller units. **The Army does not consider its attack helicopters (AHs) as CAS systems, although they can conduct attacks employing CAS TTP when operating in support of other forces.** Although some Army aircrews may be proficient in CAS TTP, JTACs/FAC(A)s should not routinely expect Army attack aviation assets to perform CAS TTP without further coordination and training.

(2) Marine Corps CAS helicopters are organized in squadrons and typically operate in sections and divisions. These units are assigned to and integral to the Marine air-ground task force (MAGTF). Marine Corps AHs and utility helicopters (UHs) are trained

and equipped for CAS missions to support the ground commander's objectives and may be tasked accordingly. Sections of AHs and UHs fly in either a pure section (AH/AH or UH/UH) or in a mixed section (AH/UH). Mixed sections provide the RW CAS element with the most flexible mix of sensors, communications capabilities, maneuverability, munitions, and mutual support.

d. **Special Operations Forces (SOF) FW and RW Considerations.** US Special Operations Command operates both FW and RW aircraft, which employ CAS, gunship, and FAC(A) procedures in support of SOF. Conventional force aircraft will also routinely support SOF with CAS and Army attack aviation capabilities.

5. Unmanned Aircraft Employment

a. The Services operate a variety of FW and RW UASs with weapons and sensor capabilities similar to manned aircraft. Unmanned aircraft (UA) in this JP applies to armed, CAS-capable assets. Not all UA platforms train to CAS procedures. 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 C2 personnel. UA normally fly individually 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/FAC(A) use UA sensor data to build SA of the target area and to locate targets. Once a target has been found, the JTAC/FAC(A) 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 or laser spot hand off or use their laser target designator (LTD) to designate the target for laser-guided munitions from other CAS aircraft, as appropriate. When available, JTACs/FAC(A)s can use UA communications relay and multiple intelligence sensors.

b. Planning is critical to the integration of UA into CAS and requires a thorough understanding of specific UA capabilities 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.

6. Conditions for Effective Close Air Support

The conditions for effective CAS are depicted in Figure I-1. Although not a requirement for CAS employment, favorable environmental conditions improve CAS effectiveness. Additionally, successful DACAS requires thorough system training, effective network planning, and properly configured systems.

a. **Effective Training and Proficiency.** CAS training should integrate all maneuver and fire support elements involved in executing CAS. Maintaining proficiency allows aircrews and JTACs/FAC(A)s to adapt to rapidly changing conditions in the operational environment.

Conditions for Effective Close Air Support

- Effective training and proficiency
- Planning and integration
- Command and control
- Control of the air (e.g., air superiority)
- Target marking
- Streamlined and flexible procedures
- Appropriate ordnance
- Environmental conditions

Figure I-1. Conditions for Effective Close Air Support

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/FAC(A)s, ground forces, the 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,* Joint Air Operations.

d. **Control of the Air.** Typically, the desired degree of control of the air that permits CAS to function without prohibitive interference is air superiority. Suppression of enemy air defenses (SEAD) may be an integral part of control of the air and may also 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 aircrew 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 AOs, or 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 (e.g., 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 render RW CAS ineffective. Environmental conditions also significantly impact the ability to use target marking devices. In addition

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

to the terrestrial environmental impacts, the space environment must also be considered, as it can affect space assets and the supporting capabilities those assets provide. This could impact GPS-guided/aided weapons, aircraft navigation systems, and ground targeting equipment. Communication and intelligence, surveillance, and reconnaissance (ISR) collection assets can also be affected by both the terrestrial and space environment anomalies.

7. 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 their assets are capable of executing CAS missions within Service roles and as directed by the JFC.

8. Minimizing Friendly Fire

a. **General.** Casualties to friendly forces caused by friendly fire incidents are the occasional tragic consequence of warfare. However, these 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/FAC(A)s, 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 [TDLs]); effective staff, JTAC/FAC(A), 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, noncombatant, or civilian and include additional characterizations such as class, type, nationality, or mission configuration. CID characterizations, when applied with ROE, enable engagement decisions to use or prohibit weapons that create lethal and/or nonlethal effects to support achievement of 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.** These exercises simulate situations joint forces will encounter in the operational environment, to develop the skill sets and familiarity required for success.

9. Minimizing Civilian Casualties

a. **General.** The law of war requires commanders to take all feasible precautions to reduce the risk of harm to civilians and civilian objects, consistent with mission accomplishment and the security of the force. In addition, the US military's operational environment is increasingly open to scrutiny. This is particularly true for incidents involving civilian casualties. These events are tragic and can have lasting, negative operational and strategic effects.

b. **Responsibility.** All participants in the CAS employment process are responsible for the effective and safe planning and execution of CAS and must make decisions on the basis of information available to them and in good faith, including, when directed, application of heightened standards of ID, such as positive identification (PID). CAS must comply with the law of war and applicable ROE.

c. **Training.** Minimizing civilian casualties should be an inherent part of all training scenarios. Predeployment preparation and review of current CAS ROE, vignettes, scenarios, and lessons learned can help minimize civilian casualties.

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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.

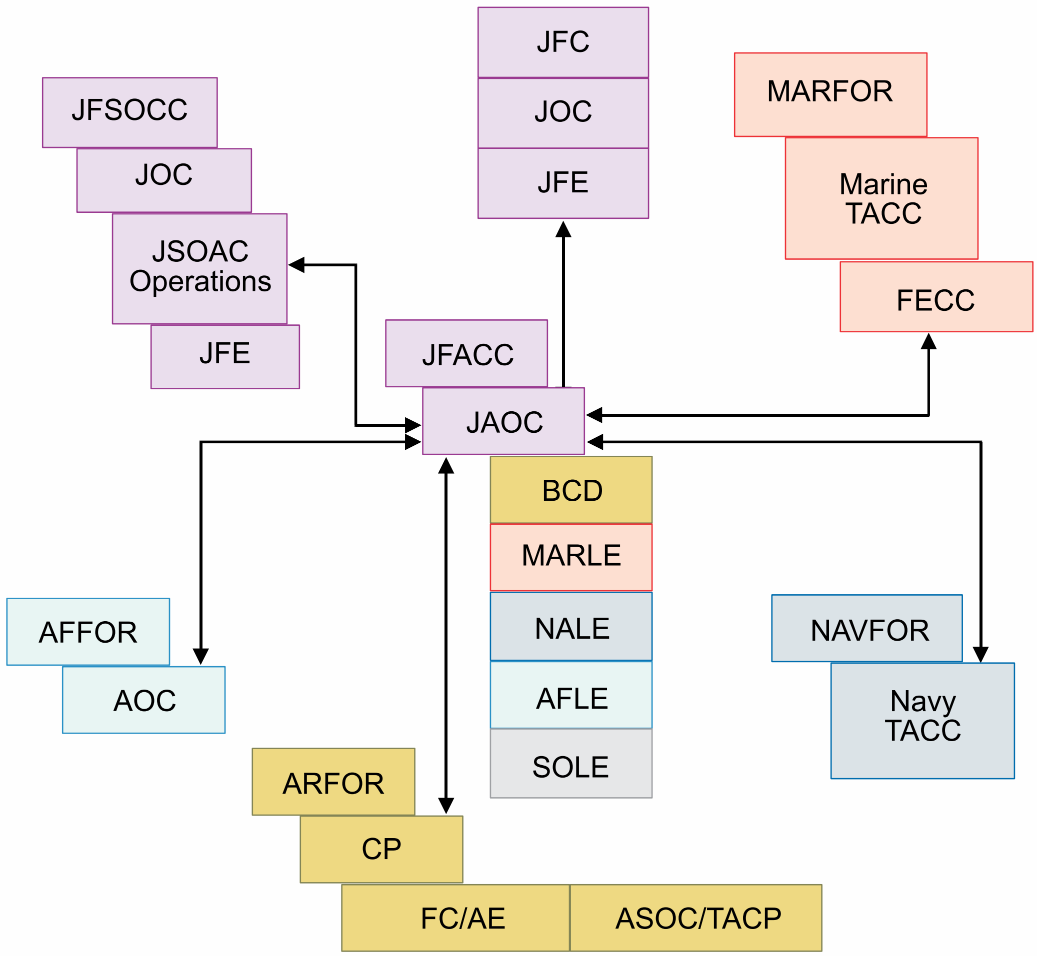
b. The JFC normally exercises operational control (OPCON) through component commanders. Most CAS in support of joint operations is allocated and tasked via the JFACC's staff located in the joint air operations center (JAOC), using host-component organic C2 architecture. Figure II-1 graphically illustrates 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).

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 fires and effects coordination center (FECC) 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.

Notional Joint Force Close Air Support Connectivity



Legend

AE	airspace element	JFSOCC	joint force special operations component commander
AFFOR	Air Force forces	JOC	joint operations center
AFLE	Air Force liaison element	JSOAC	joint special operations air component
AOC	air operations center	MARFOR	Marine Corps forces
ARFOR	Army forces	Marine TACC	Marine Corps tactical air command center
ASOC	air support operations center	MARLE	Marine liaison element
BCD	battlefield coordination detachment	NALE	naval and amphibious liaison element
CP	command post	NAVFOR	Navy forces
FC	fires cell	Navy TACC	Navy tactical air control center
FECC	fires and effects coordination center	SOLE	special operations liaison element
JAOC	joint air operations center	TACP	tactical air control party
JFACC	joint force air component commander		
JFC	joint force commander		
JFE	joint fires element		
		↔	communication and coordination

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

c. There is no single C2 structure for CAS when participating 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

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
Theater Air-Ground System	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 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 Joint Force Air Component Commander/ Joint Air Operations Center	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	Direct air support 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	Fires and effects coordination center/ fire support coordination center	Joint fires element
Tactical Air Support Control Agency	Tactical air control party			Tactical air control party	
Terminal Attack Control 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/ forward air controller (airborne)

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

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 operations. **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.

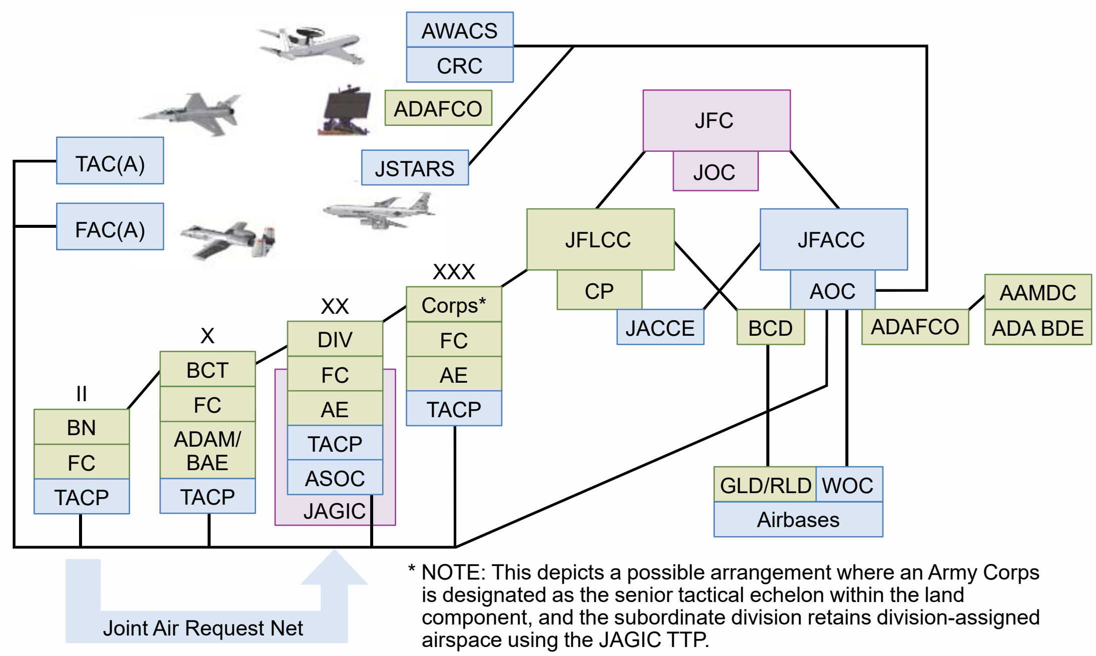
For further information on a JAOC, see JP 3-30, Joint Air Operations.

(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 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

Theater Air Control System / Army Air-Ground System



Legend

AAMDC	Army air and missile defense commander
ADA	air defense artillery
ADAFCO	air defense artillery fire control operations
ADAM/BAE	air defense airspace management/ brigade aviation element
AE	airspace element
AOC	air operations center
ASOC	air support operations center
AWACS	Airborne Warning and Control System
BCD	battlefield coordination detachment
BCT	brigade combat team
BDE	brigade
BN	battalion
CP	command post
CRC	control and reporting center
DIV	division
FAC(A)	forward air controller (airborne)
FC	fires cell
GLD	ground liaison detachment
JACCE	joint air component coordination element
JAGIC	joint air ground integration center
JFACC	joint force air component commander
JFC	joint force commander
JFLCC	joint force land component commander
JOC	joint operations center
JSTARS	Joint Surveillance Target Attack Radar System
RLD	reconnaissance liaison detachment
TAC(A)	tactical air coordinator (airborne)
TACP	tactical air control party
TTP	tactics, techniques, and procedures
WOC	wing operations center

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

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 (e.g., AI, ISR, SEAD, and personnel recovery). The ASOC processes include handling immediate air support requests, coordinating the execution of scheduled and on-call CAS sorties, and coordinating manned/unmanned aircraft transiting through the assigned airspace. When delegated the authority, the ASOC retargets/re-roles/redirects airborne assets, provides target updates, and launches ground alert aircraft on call in support of 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. The 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. The ASOC, as a tactical-level element, normally collocates with the division's FC, airspace element, air and missile defense, and aviation elements to form the joint air-ground integration center (JAGIC).

(5) **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/FSCMs 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 BN ALO—a specially trained and experienced noncommissioned officer or officer.

(b) **JTAC.** The JTAC is a 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 LNO.** The space LNO 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 of space support to operations.

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

(a) **AWACS.** The 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. The AWACS supports the CAS mission by providing the coordination link with the JAOC, ASOC, DASC, and JSTARS. The AWACS provides imminent threat warning for assets under its control, via voice or data links. The AWACS air weapon officers have the ability to provide initial holding instructions to CAS aircrews prior to hand-off to the JTAC/FAC(A).

(b) **JSTARS.** The JSTARS provides ground and air commanders with situation development, targeting, attack planning and limited post-attack assessment information. The JSTARS supports CAS by providing targeting information to the ASOC, FSCC/FC, tactical operations centers (TOCs), and DASC. When requested, the 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, the 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. The FAC(A) can serve as another terminal attack controller 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 or two-aircraft formations. FAC(A) aircraft can be equipped with targeting pods that 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. Munitions that aid the FAC(A) in the marking of targets for CAS aircraft include white phosphorus (WP) and red phosphorus (RP) rockets. For night missions, FAC(A) platforms can carry overt or IR illumination rockets and LUU-series flares (LUU 2/19). 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).** Within the TACS, a TAC(A) provides communications relay between the TACP and attack aircraft, as well as other agencies of the TACS, in the absence of the JSTARS or a FAC(A). Air Force two-aircraft 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 hand off during “heavy traffic” CAS. 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 naval surface fire support (NSFS); and assisting strike coordination and reconnaissance missions.

(7) **Joint Air Component Coordination Element (JACCE).** When the COMAFFOR is designated as the JFACC, a JACCE may be established to liaise 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 a 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 that 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. AFLE manning is based on a cadre concept with personnel selected for their battle management expertise and knowledge of C2 authorities 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 Command and Control

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 the 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, 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 (CA). **The AAGS coordinates and integrates 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 HQs 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 and 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 conduct 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.** JFOs are typically found on FISTs but may also be trained to fill positions in scout platoons, teams, or others as identified by commanders. JFOs are positioned to support CAS and employed in the same manner as forward observers, and they are normally positioned at the lower tactical levels (e.g., company or platoon). They normally report to the company fire support officer (FSO) or fire support noncommissioned officer. The JFO may be collocated with the platoon leader or with the scouts. During planning, commanders must evaluate options for integration of joint fires, provide clear guidance on fires, and provide a risk assessment determination identifying guidance for types of CAS TAC. Units that have a reasonable expectation to conduct CAS have a responsibility to employ JTACs/FAC(A)s. JFOs support CAS by providing targeting data to JTACs/FAC(A)s. JFOs cannot perform TAC of CAS missions and do not replace a trained and certified JTAC/FAC(A).

(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; and coordinating the integration of Army forces requirements for ACMs, FSCMs, and airlift. The BCD is not an FC; however, it can perform many fire support functions.

(8) **Airspace Elements.** The division's airspace element oversees airspace control for division-assigned airspace, 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 may delegate airspace management authorities to the BCT. As the airspace functional lead for the 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 a CRC, the AWACS, a DASC/tactical air operations center (TAOC), and other airspace control elements 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 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 Army fire support coordinator (FSCOORD); USMC fire support coordinator (FSC); Army or Marine Corps component operations staff officer (Army division or higher staff, Marine Corps brigade or higher staff) (G-3); or battalion or brigade operations staff officer (Army) or operations and training officer (Marine Corps) (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 air and missile defense cell, and airspace and aviation elements teamed with ASOC/TACP coordinate the airspace use within the JAGIC. Within the assigned airspace, the JAGIC integrates CAS, fires, airspace control, interdiction coordination, friendly force ID, and information collection for the unit. CAS coordination occurs through the ASOC and the unit's ALO/ASOC director.

c. **Figure II-4 depicts** USAF and United States Army (USA) agencies and communications nets that 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**

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

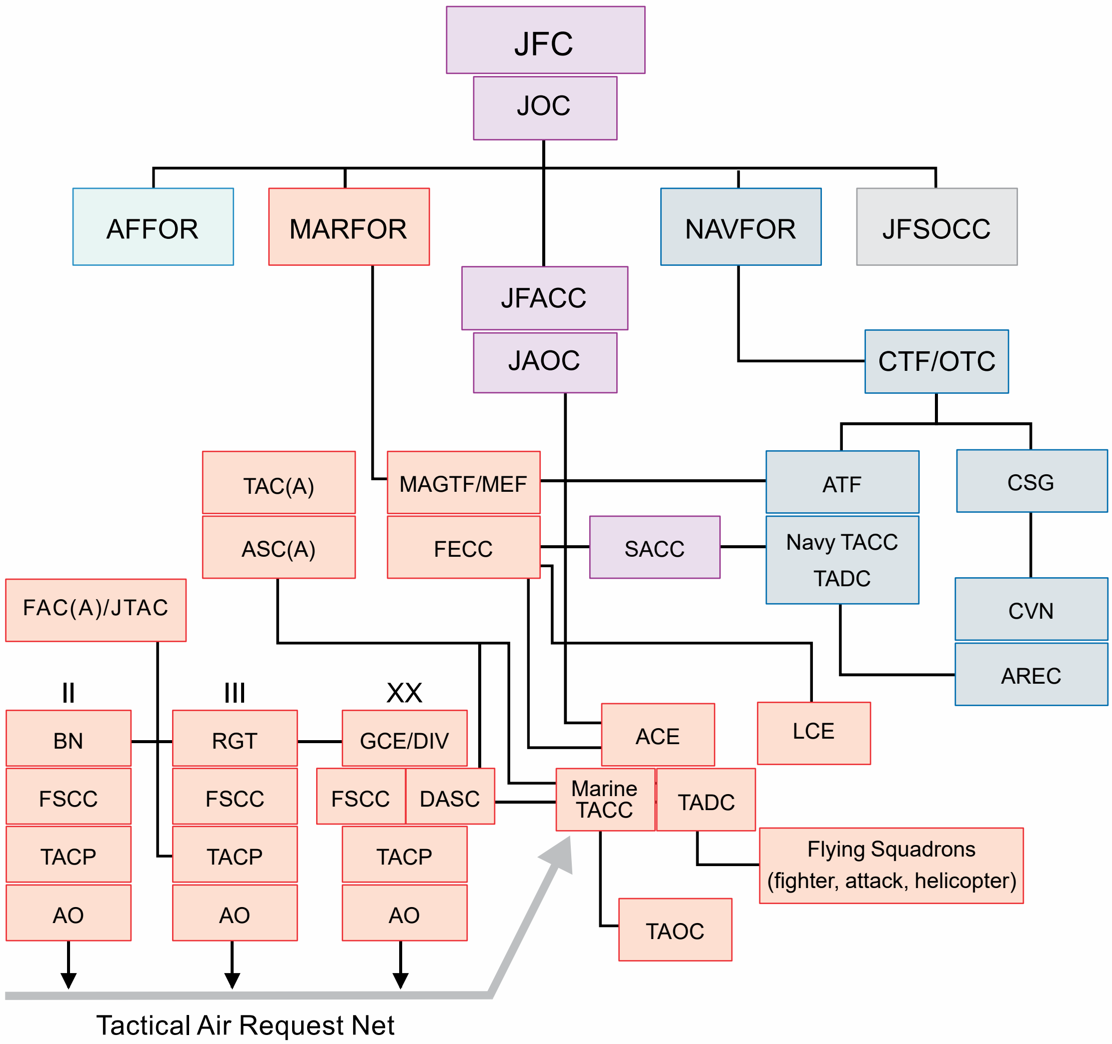
"X" indicates normal participation in the specified net.
"#" indicates participation when directed, or as required.

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 (USMC)
AFFOR	Air Force forces
AO	air officer
AREC	air resource element coordinator
ASC(A)	assault support coordinator (airborne)
ATF	amphibious task force
BN	battalion
CSG	carrier strike group
CTF	combined task force
CVN	aircraft carrier, nuclear
DASC	direct air support center
DIV	division
FAC(A)	forward air controller (airborne)
FECC	fires and effects coordination center
FSCC	fires support coordination center
GCE	ground combat element (USMC)
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 (USMC)
MAGTF	Marine air-ground task force
MARFOR	Marine Corps forces
Marine TACC	Marine Corps 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)
USMC	United States Marine Corps

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

(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 designated as the JFACC, COMNAVFOR 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 requested by the landing force (LF). Ideally, the Navy TACC is collocated with the supporting arms coordination center (SACC) onboard amphibious warfare ships. The SACC is the naval counterpart to the LF's FSCC. 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.

(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) **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 generally in control until the LF is firmly established ashore, at which time some or all coordination may be shifted to the FSCC ashore.

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

(5) **Airborne C2 Elements**

(a) The E-2 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-2 functions as an extension of the JAOC, Marine TACC, ASOC, DASC, or Navy TACC. In this overland mission, the E-2 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-2, 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 wings. Some 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.

(6) **Naval and Amphibious Liaison Element (NALE).** The COMNAVFOR provides a NALE to the JFACC's JAOC. The NALE communicates all matters pertaining to Navy and Marine amphibious operations to the JAOC. The NALE processes COMNAVFOR requests for air support and monitors and interprets the maritime battle situation for the JAOC. An amphibious task force representative at the JAOC will facilitate the following:

(a) Processing of ACM requests.

(b) Integration of amphibious force air missions into the ATO.

(c) Resolution of current operations issues such as ATO change requests, ACM activation, and re-role 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 that provide the MAGTF aviation combat element (ACE) commander with the ability to monitor, supervise, and influence the application of Marine Corps aviation's six functions (antiair warfare, offensive air support, electronic warfare [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 Corps aviation's philosophy is one of centralized command and decentralized control. The Marine TACC is the focal point for tasking and exercising OPCON over Marine Corps air assets.

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, the Marine TACC will be augumented 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 TDLs 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 FECC. Synchronization between the DASC and the FECC/FSCC is vital to the effective coordination of direct air support missions and the employment of other supporting arms.

(5) **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.

(a) **Forward Air Controller (FAC).** In the Marine Corps, the FAC is an aviation officer certified and qualified as a JTAC who, from a forward ground or airborne position, coordinates, integrates, and directs actions of combat aircraft engaged in support of ground combat operations.

(b) **JTAC.** The JTAC is a certified and qualified individual, usually with a ground combat arms background.

(c) **JFO.** JFOs may be assigned or attached to maneuver units down to the squad level. JFO responsibilities may be either a primary or collateral duty. It is necessary for the supported maneuver commander and TACP to specify the relationship between the

JFO, JTAC, FAC(A), and maneuver element. If aviation support is required (e.g., CAS and/or assault support), the JFO will serve as the key enabler.

(d) **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.

(6) **Air Support Element.** An 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 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.

(7) **Air Support Liaison Team (ASLT).** The ASLT is task-organized by the Marine air support squadron to maintain face-to-face liaison between the DASC and the FSCC and is normally employed where the DASC cannot remain physically collocated with the senior FSCC or subordinate FSCCs during Marine expeditionary force-level operations. Depending on the nature of operations, the Marine air support squadron commander or the supported commander could determine that it is in their best interest to have an ASLT collocated with the supported unit. In these instances, the DASC will provide an ASLT to maintain face-to-face liaison with the supported unit to enhance direct air support for those forces. Mission requirements identified during planning determine the size of this entity.

(8) **Airborne C2 Entities**

(a) **FAC(A).** 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. FAC(A)s coordinate supporting arms missions and CAS missions. FAC(A)s conduct detailed planning with supported maneuver units to achieve the commander's objectives. To accomplish this, the FAC(A) must 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, Marine TACC, and/or FSCC. The ACE commander will identify and delegate specific TAC(A) authority. The TAC(A) coordinates with TACPs, FSCCs, subordinate FAC(A)s, artillery units, NSFS ships, and other elements of the MACCS. 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) and DASC is established by the ACE commander. Within the MACCS, the TAC(A) is the senior air coordinator and has air authority over all aircraft operating in an assigned area. The TAC(A) works 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.

(9) **FECC/FSCC.** To conduct CAS, detailed coordination is required between the MACCS and the FECC/FSCC. The MAGTF FECC plans, coordinates, and executes fires that create lethal and/or nonlethal effects in support of the MAGTF commander's objectives. The FECC 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 objective is integrating fire support assets and maneuver to create the desired effects from the air attack without suspending the use of the other supporting arms or unnecessarily delaying the scheme of maneuver. An additional objective is to offer a reasonable measure of protection to the aircraft from our own surface fires and enemy fires.

(10) **ANGLICO.** ANGLICO is a BN-level command that provides the MAGTF commander with a liaison capability to plan, coordinate, and employ fires, as well as conduct TAC of CAS 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 to joint and multinational forces. ANGLICO support is normally broken down as follows:

(a) **Company HQ.** The 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. It is 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 10 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 TAC for CAS and surface fires employment 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.

(11) **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 ship, will normally be established as the agency responsible for controlling all air operations within an 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, ASLTs, and naval surface fire spotting teams.

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

Amphibious Tactical Air Control System Communications Network

Net	Frequency	Navy TACC	Marine TACC	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
Marine TACC Marine Corps tactical air command center
Navy TACC Navy tactical air control center
TACP tactical air control party
TADC tactical air direction center
TAOC tactical air operations center (USMC)
UHF ultrahigh frequency
USMC United States Marine Corps
VHF very high frequency

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

(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 TADC assumes the role of the Marine TACC, 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 Navy Tactics, Techniques, and Procedures (NTTP) 3-02.1.3, Amphibious/Expeditionary Operations Air Control.

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).

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 US Special Operations Command have JTACs.

(3) **FAC(A).** 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.

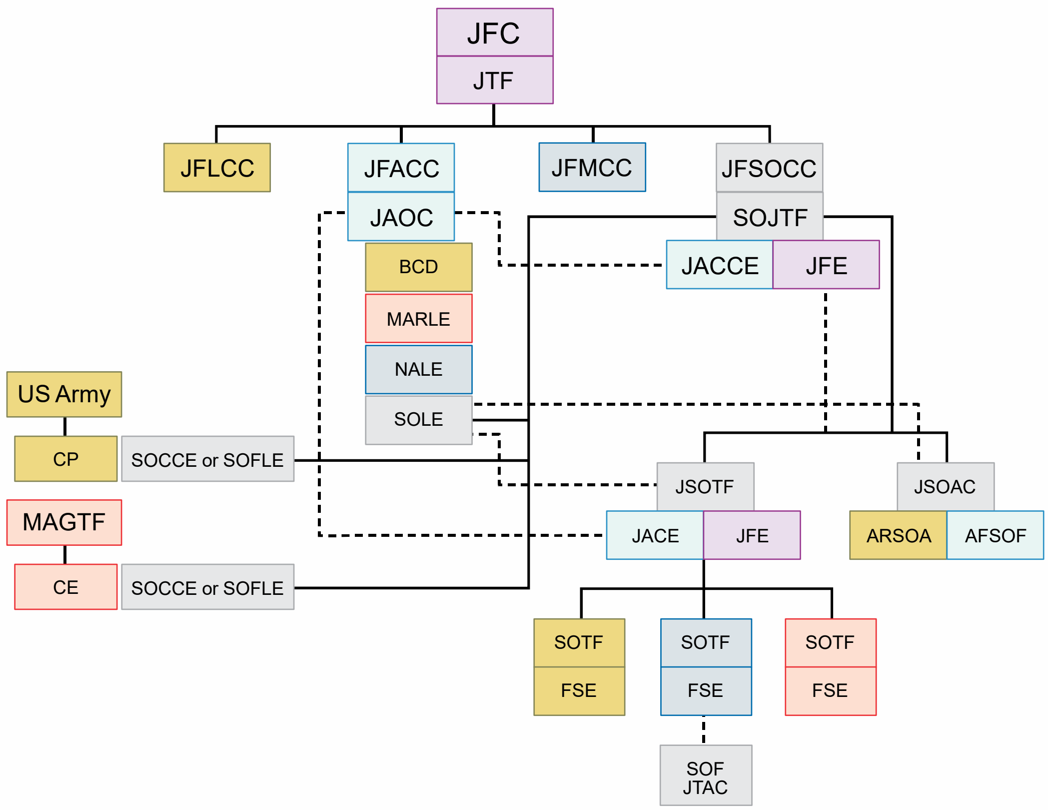
(5) **Special Operations C2 Element.** A special operations C2 element performs C2 or liaison functions according to mission requirements and as directed by the JFSOCC. Its level of authority and responsibility may vary widely. It is the C2 focal point for CAS requests for SOF units in support of a conventional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

For more information see JP 3-05, Special Operations.

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 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

Special Operations Air-Ground System



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 Air-Ground System

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. Data link should also be used to transmit information whenever possible.

However, **the nonavailability of these methods should not 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 and 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's 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. The JFACC ensures 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/FAC(A)s** 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 call 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 interactions or intelligence gathering entities, use this net to pass routine operational information and intelligence. 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 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 Air Support Requests.** Digital is the preferred method for transmitting/receiving air support requests

1. **Air Support Request Forms.** The authorized formats used to submit air support requests are:

a. **United States Message Text Format (USMTF) D670, Air Support Request.** USMTF D670 is used to process both preplanned and immediate air support requests. USMTF D670 digitally parses into theater battle management core systems (TBMCSs) from the Advanced Field Artillery Tactical Data System (AFATDS).

b. **Department of Defense (DD) Form 1972, Joint Tactical Air Strike Request.** Used for immediate air support requests via SECRET Internet Protocol Router Network, Tactical Air Control Party Close Air Support System, or voice over the JARN.

2. **Transmission Media.** The methods of processing air support requests include:

a. **AFATDS.** Air mission information window (that consists of USMTF D670 and DD Form 1972) is the Army's preferred method for processing air support requests. Only the USMTF D670 portion digitally parses into the TBMCS for sourcing.

b. **JARN.**

c. **TBMCS.**

(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 Form 1972. 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 USA/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/JTACs use their UHF-amplitude modulation (AM) 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 (INFLTREP) Net.** 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/DASC. 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 OPTASKLINK.

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

(a) **USMC Command Net.** This net is used for C2 of all USMC 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 SACCs/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. 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 TATC net include reporting aircraft launches by mission number, clearing aircraft to their assigned control agencies, diverting aircraft as necessary, and relaying INFLTREPs 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.** Special operations communications nets provide a means for both SOF air assets to provide preplanned/immediate CAS and SOF surface teams to request immediate CAS.

(a) **SOF Air.** Communications between the aircraft and the JSOAC commander are used to coordinate preplanned/immediate CAS requests. For preplanned CAS missions in support of another component, SOF air accesses the established network of the requesting component. For immediate CAS (after JFSOCC approval), SOF air accesses 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) forwards the request to the JFACC via established communication links (through the SOLE). Once the asset is assigned, that information is passed to the requester via the JFSOCC (again, by means of the JSOAC). The requesting unit communicates 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 Techniques Publication (ATP) 3-09.32/Marine Corps Reference Publication (MCRP) 3-31.6/NTTP 3-09.2/Air Force Tactics, Techniques, and Procedures (AFTTP) 3-2.6, *Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower,* 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. **Communications Networks and Systems.** A collection of networks and systems are connected specifically to enable the exchange of data between the terminals that are committed to DACAS or used to support DACAS. Their use is planned and coordinated in advance to ensure capacity and interoperability.

(1) **Operational Network Integration and Interface.** In support of a joint task force (JTF) or multinational force, the supported JFC (or US-multinational force commander) typically delegates responsibilities for joint networks for air support to the JFACC at a JAOC (or director of the Air Force AOC). That responsibility includes choosing existing networks and link designs and disseminating information related to the TDLs employed in the region. In support of the JFC/JFACC, the JICO, in concert with the joint data networks officer, develops network plans and helps issue appropriate tasking orders to subordinate JTFs and the components for support. Theater-level C2 assets between the JAOC and the JTACs, such as the ASOC or the DASC, establish network requirements and submit them for inclusion in the tasking message. With the introduction of systems such as the Master Air Attack Planner Toolkit, theater planners can generate the updated tasking messages that specifically call out the DACAS combat net radio (CNR)

design and other tactically important information (e.g., call signs, frequencies, and roles) that can be parsed at the unit level.

(2) **Digital Systems.** Digital systems in aircraft and ground kits provide several benefits that aid in the conduct of CAS planning and execution. Although voice transmissions remain the principal means of communication during CAS, technological advances have allowed for greater use of digital messages to expedite communications and target acquisition, quickly build SA through the use of digital reference points (DRPs), enhance target correlation, and shorten the engagement timeline. DRP is a generic term for any digital point (e.g., target point, mark point, sensor point).

(3) **Communication Pathways.** Digital aids for CAS use line of sight (LOS), extended line-of-sight (ELOS), and beyond line-of-sight (BLOS) communications systems. When combined, LOS, ELOS, and BLOS digital capabilities provide aircrews greater SA of the battlefield layout (e.g., location of JTAC, friendly forces, hostile forces, and targets) earlier in the CAS mission process and over extended ranges.

(4) **TDLs.** A data link is the means of connecting one location to another for transmitting and receiving digital information. A TDL used by US or North Atlantic Treaty Organization (NATO) armed forces is regulated by a military standard (MIL-STD) or NATO standardization agreement (STANAG) to standardize communication. All military C2 systems use standardized TDLs to transmit, relay, and receive tactical data, ensuring interoperability. The three most common TDLs used for DACAS are CNR using variable message format (VMF), situation awareness data link (SADL), and Link 16.

(5) **CNR.** The CNR standard enables digital communications over a variety of radio frequency (RF) waveforms and wired networks with common message formatting and network access methods. CNR is a key enabling technology for the exchange of information via digital messages. The two most common types of messages that can be used are K-series (VMF) and J-series (Link 16 and SADL) messages. CNR's greatest benefit is that it transmits and receives digital messaging over RF voice frequencies, which means a ground user does not require an additional radio to employ CNR. When coupled with VMF, CNR is considered a TDL and is commonly referred to as VMF over CNR.

(6) **VMF.** VMF is a message protocol described in MIL-STD-6017, *Variable Message Format (VMF)*. The VMF message set can be transmitted and received over a wide variety of networks but is most commonly implemented in DACAS using the CNR standard on single-channel UHF voice frequencies. A benefit of using VMF for DACAS is that the message set is designed to support common CAS information exchanges such as the on-station report (OSR)/aircraft on station (AOS), standardized 9-line, and the aircraft target designation.

(7) **SADL.** SADL is a TDL that has been customized from the US Army Enhanced Position Location Reporting System to meet USAF mission requirements. SADL provides air-to-air, air-to-ground, and ground-to-air data links that are robust, secure, jam-resistant, and contention-free.

(8) **Link 16.** Link 16 is a communication, navigation, and ID system governed by MIL-STD-6016, *Department of Defense Interoperability Standard: Tactical Data Link (TDL) Link-16 Message Standard,* that supports supporting near real time information exchange between tactical communications systems. It is a frequency-hopping, jam-resistant network that allows participants to share the battlespace picture, greatly enhancing SA. Link 16 is the fastest, most reliable, and most widely employed TDL on-air platforms. Link 16 networks can be accessed by JTACs via handheld Link 16 radios and tactical gateways.

(9) **Network-Tactical.** Network-tactical is a hub and spoke, high-bandwidth network that leverages VDL and uplink frequencies to pass digital messages between aircraft advanced targeting pods/sensor-enhanced pods and ground/surface video receivers. The aircraft sensor pod acts as a central hub of the network with the ground users as the spokes. Airborne pods typically provide streaming video and metadata from various onboard sensors via downlink. Utilizing the network, users are able to share messages such as DRPs and video to enhance SA to all users on the network.

(10) **Adaptive Networking Wideband Waveform (ANW2).** The ANW2 is a self-healing, Internet protocol networking waveform. When nodes move in and out of range, they are automatically added to or removed from the network. The ANW2 can facilitate transmission of video or image, chat, SA and mapping data, text messaging, and e-mail. The ANW2 is not a true mobile ad hoc network because it requires planning. However, ANW2's operational behavior is utilized for DACAS as an option for achieving the benefits of a mobile ad hoc network for ground networks because of its wide bandwidths and ability to combine multiple ANW2 sub-networks for sharing SA.

(11) **Gateways.** Gateway is a generic term for a network node designed to provide interoperability by interfacing between incompatible systems or networks. Gateways provide data/information sharing and battlespace visualization between isolated network environments. Gateways have two functions, data forwarding and/or message translation.

(a) Data forwarding moves data from one network to another, can occur between similar or dissimilar networks, and may or may not require message translation.

(b) Gateway message translation, dictated by MIL-STD-6020, *Data Forwarding Between Tactical Data Links*, allows dissimilar or incompatible systems to communicate with each other by translating message formats.

Note: Due to different message formats, translations from one message to another (e.g., K-series to J-series) may result in some of the information not being received by the recipient.

(12) **Ground Kits.** Ground kits are designed to facilitate mission planning, execution, and integration of JTAC/JFO devices, including, but not limited to, VDL, LRFs, GPS, and radios. Ground kit software enables users to build SA, acquire targeting data, and expedite communications through use of various digital message sets and map/imagery

capabilities. These kits can connect across various TDLs that reach both CAS aircraft and engagement approval authorities. Services have adopted different digital ground kits with unique interfaces but similar functionality.

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 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 retasking. 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, 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, 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 the JSTARS, discussed previously.

(2) A variety of ISR platforms (e.g., USAF RC-135 Rivet Joint, EC-130, USN EP-3 Aries, USA 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 ATP 3-09.32/MCRP 3-31.6/NTTP 3-09.2/AFTTP 3-2.6, 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 radars are 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 (e.g., planning, collection, dissemination), 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, 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 also provide reachback support to 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 the CAS integration model and the five steps for CAS planning, identifies specific CAS-related command and staff responsibilities, outlines basic CAS planning considerations (i.e., mission, enemy, terrain and weather, troops and support available-time available [METT-T]), and identifies procedures for requesting CAS and CAS-related air support. The focus will be at the brigade level and below, with the joint fires team consisting of TACP personnel and the FC/FSCC. The FC is the USA 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, which begins when the unit receives an order from higher headquarters (HHQ). This chapter also discusses the methods of attack and types of control, as well as specific platform and weapon considerations that form a baseline of understanding for the preparation and execution of CAS. Finally, while the chapter focuses on the tasks 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, and joint security area (JSA) activities that may not have the formal staff agencies discussed in the chapter.

2. Close Air Support Integration Model

The CAS integration model in Figure III-1 is a continuous, three-phase cycle (i.e., plan, prepare, and execute) tailored for joint fire support and focused specifically on CAS. The CAS integration model assists the commander and staff in making CAS fire support plan decisions by integrating the planning and preparation of the supported and supporting components. The Army FSO and USMC FSC play a crucial role in the process, both as the staff fire support experts and as members of the targeting team. For the purpose of this publication, the fire support staff officers, AOs/ALOs, and the BN/brigade/division S-3s are **CAS planners.** CAS planners actively participate with the ground commander to provide CAS-related input to the plan or OPORD. **The planning phase (see Figure III-2) 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, which focuses the staff on the commander's end state. 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).

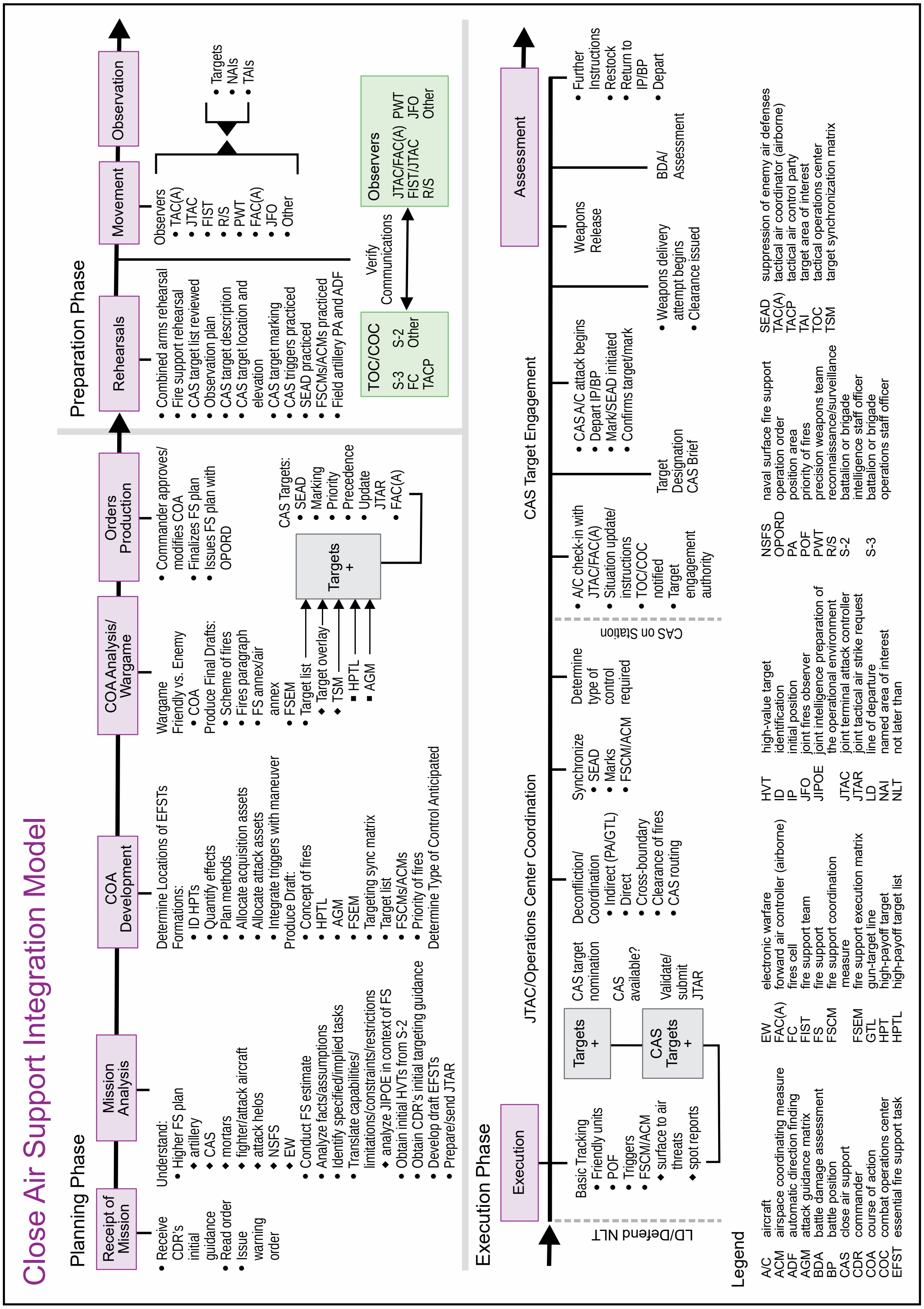
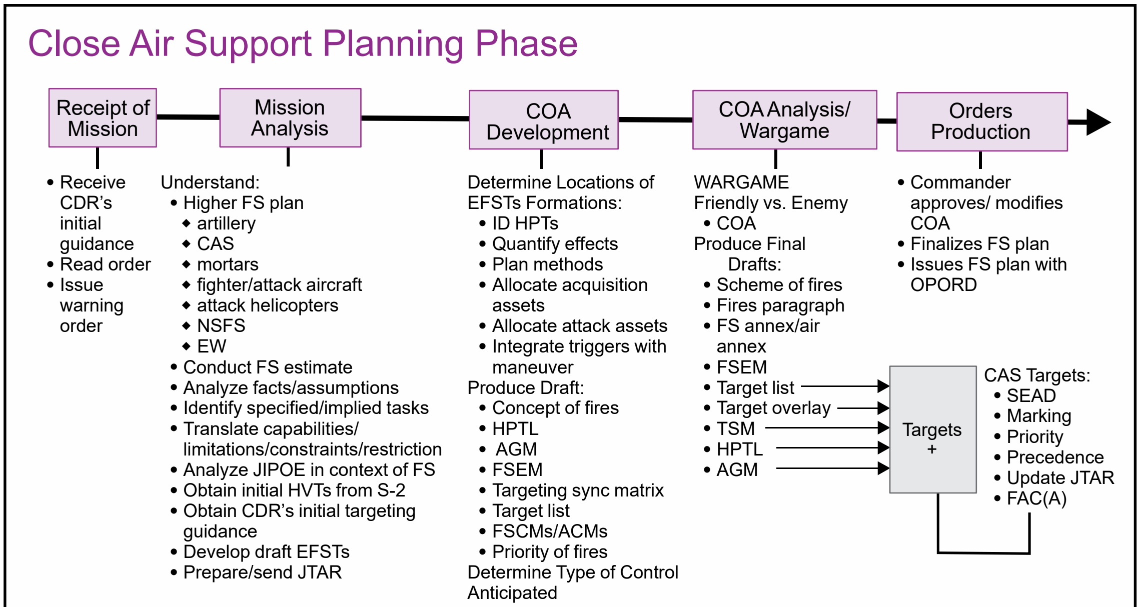


Figure III-1. Close Air Support Integration Model



Legend

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

Figure III-2. Close Air Support 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 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 (e.g., ATO, ACO, SPINS).

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

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

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

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

(f) Consider METT-T.

(g) Assist in developing the mission statement.

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

1. HHQ priority of fires (POF).

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 (e.g., ground alert CAS and airborne alert CAS response times, weather limitations, tactical directives, ROE).

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 (e.g., deliberate attack, hasty defense)? How do ROE impact CAS?

2. **Scheme of Fires/Fire Support Tasks (FSTs).** What is the commander's desired task, purpose, method, and effect for fires? How can CAS contribute? What joint functions (i.e., C2, information, 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 impact will time of day, terrain, and weather have on CAS? 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 battlefield sensors/observers? 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 USA 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. Guidance and intent focus staff creativity on producing a comprehensive, flexible plan within available time constraints. During this step, CAS planners:

(a) Obtain latest products (e.g., ATO, ACO, SPINS).

(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 comprised of branches, enable 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 and 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 (e.g., battle graphics). This part involves brainstorming to mass the most effective combat power against the enemy (e.g., CAS, EW, ISR, and surface fire support).

(i) **Key Considerations.** 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 fulfill? 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 they be killed or their actions be affected? When will they be there? What can they do to kill or hamper others? How can they be killed/influenced?

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.** 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 achieves the commander's objectives. 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 9.d., "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/other 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 not 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 seven joint functions.

2. Map.

3. Radio.

4. Other.

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

1. Event logs.

2. Timetables.

3. Reaction times.

(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 two 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.** Describes how the task and purpose will be accomplished. It ties the detect function to the deliver function in time and space and describes how to accomplish the task. Normally described in terms of priority, allocation, and restriction. 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 scheme of fires. Orders and plans provide all necessary information that subordinates require for execution 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 also produce a fire support annex 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 articulates how fires, as a joint function, will be synchronized with the other joint functions.

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.

3. 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, scheme of fires, 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 that assists the commander in the direction and control of operations, beginning with planning and through completion of specific operations. The operations officer integrates CAS into the OPORD and fire support plan.

d. **FSC/FSO.** The FSC/FSO is the staff officer in charge of the FSCC/FC. 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 an 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 LNO.** The ground LNO is the primary ground officer assigned to air commanders' staffs, such as fighter wings, AOCs, and related HQs. They provide expert advice and information and interface on all matters pertaining to ground operations to enable more effective air planning in support of ground operations.

h. **ISRLO.** The ISRLO translates JFACC ISR capabilities, limitations, and processes into terms that ground forces can understand, 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 Advisor.** The legal adviser advises on the law of war and applicable policy when considering collateral damage risk associated with CAS attacks.

See JP 3-60, Joint Targeting, *for more information on the role of the legal advisor in targeting.*

j. **Joint Meteorological and Oceanographic Officer (JMO).** The JMO's duties typically include, but are not limited to, integrating meteorological and oceanographic (METOC) impacts into JIPOE, the joint planning process, commander's SA, C2, and decision making. The JMO assists the JFC, staff, and components to understand the METOC environment in which friendly and enemy weapon systems and/or their supporting infrastructure will operate.

4. 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 combat power of CAS also make it a valuable asset for exploiting friendly success, disrupting rapid enemy maneuver, and attacking a retreating enemy.

(3) **JSA Operations.** CAS is effective for countering enemy penetrations. The responsiveness of CAS greatly augments the combat power of forces, including those in a JSA. However, the potential for friendly fire is high in a JSA because of the larger number of support personnel and activities located there. CAS aircrews and JTACs/FAC(A)s must take special care to identify friendly forces and ensure 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 and defensive 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 (e.g., 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 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 fires 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 action 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 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 they are not subject to direct attack or weapons effects.

5. Considerations—Enemy

CAS planners 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, deception, decoys, and camouflage? Note: High-payoff and high-value targets are usually defended by surface-to-air missiles (SAMs), air defense artillery (ADA), and/or automatic weapons. Joint force use of "standoff weapons" and varying initial point (IP) location/attack geometry will enhance aircraft survivability by reducing exposure and predictability.

(3) What is the enemy capability to conduct EW or affect C2 systems (e.g., 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 aircrew, 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 the aircrew 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.

6. 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 platform has inherent capabilities and limitations that are considered in planning. Unique or high-demand C2 assets in support of the mission may generate specific request requirements. At 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? At a minimum, review the following:

(a) **JSTARS.** The JSTARS provides C2 of strike resources in support of a ground conflict. The JSTARS can support a brigade-sized operation with battle management when no ASOC/DASC is available.

(b) **TAC(A).** The TAC(A) extends the ASOC's/DASC's range and ability to send and receive tactical information. For SOF, a TAC(A) provides that same extension for their joint operations center. 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-hand off 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 Army 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 the commander 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? At 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 may support the JTAC/FAC(A) by acquiring and/or marking targets. Communication is required between a JFO contributing to a CAS mission and the controlling JTAC/FAC(A). This communication may be direct or indirect

(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. 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 DD Form 1972, Joint Tactical Air Strike Request, (Section I, Block 8, "Remarks") to ensure the ASOC/DASC has all the pertinent information concerning the mission for transmittal to supporting aircrew.

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/MACCS, 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/FAC(A)s via electronic, digital, 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/FAC(A)'s immediate needs. Aircrews, JTACs/FAC(A)s, 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, noncombatants, and civilians on the battlefield.

c. **CAS Aircraft Weapons and Capabilities.** The weapons and capabilities of FW and RW aircraft can be found in ATP 3-09.32/MCRP 3-31.6/NTTP 3-09.2/AFTTP 3-2.6, *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, effects, and flexibility. The weapons load, arming, and fuze settings are tailored for the desired level of destruction, neutralization, or suppression of enemy CAS targets. Cluster and general-purpose munitions are very effective against troops and stationary vehicles. However, hardened, mobile, or point targets may require specialized weapons, such as laser-guided, electro-optical (EO), and IR munitions; PGMs; or 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.

7. Considerations—Terrain

a. **How Terrain Affects CAS.** Terrain can affect communications and visual LOS for identifying the target and/or aircraft. RW attack assets are extremely vulnerable to LOS limitations. Planners overcome this shortfall by leveraging other C2 capabilities (e.g., other airborne C2, remote relay) or accept this condition as part of the mission environment. SA-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/FAC(A)'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 examples 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 should assume the enemy will concentrate air defenses along the most likely

routes CAS aircraft will fly. CAS planners should 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 ID 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 effectiveness due to lack of obstructions. Targets in prepared defensive positions (e.g., revetments) 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 (GEOREFs).** 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 or forested 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 should 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/TAC.** 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. These include operations in urban canyons, deconfliction in confined airspace, restrictive ROE, difficulty in threat analysis, the presence of civilians, 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 ADA, man-portable air defense systems (MANPADSs), and SAM systems. Light to medium ADA may be employed from ground sites, 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 to remain less predictable and adjust for attack timing and geometry. FW aircraft should hold in airspace over nonhostile terrain yet still be positioned closely enough to the fight to allow the aircrew to build SA and deliver timely support.

(b) **IR 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 unaided 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. The presence of urban lighting may preclude the use of IR strobe lights as

effective marking tools, as it can be difficult for aircrew to discern one particular light source from a multitude of others.

(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, 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. 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, 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 necessary for continued JTAC/FAC(A) and aircrew CAS proficiency in urban environments. All CAS participants should keep in mind the differences between the ground and airborne perspectives. The JTAC/FAC(A) may not be in a position to observe all buildings containing friendly forces due to intervening buildings and battlefield confusion. It's likely a JTAC/FAC(A) will be marking and engaging targets within 100 meters of their own or friendly positions, within danger close parameters. **Historical studies prove, 90 percent of all urban engagements occur where friendly and enemy forces are within 50 meters of each other and urban engagements using supporting arms occur with less than 250 meters between the same. The JTAC/FAC(A) must select the appropriate ordnance to limit the potential of friendly fire incidents, particularly in an urban environment.** 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. 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. 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 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 with regard 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 gridded reference graphic (GRG), GPS, and handheld pointers or designators eases the problems associated with night navigation, orientation, and target ID. 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, and other coordination measures (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, and other terrain features.** 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 Aircraft Fundamentals–Joint Terminal Attack Controller*, or the* USMC TACP TAC SOP.

4. **Target Reference Points (TRPs).** TRPs are generated by labeling buildings or distinctive urban structures in and around the objective area. TRPs should be visually significant and distinct from both the ground and aerial perspectives. These can be labeled sequentially (e.g., TRP#1, TRP#2). TRPs are useful in expediting the transmission of a call for fire or conducting a talk on.

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. 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 features (e.g., color, type of roofing, window structure), as it relates to surrounding structures, can greatly assist aircrews 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

Urban Grid

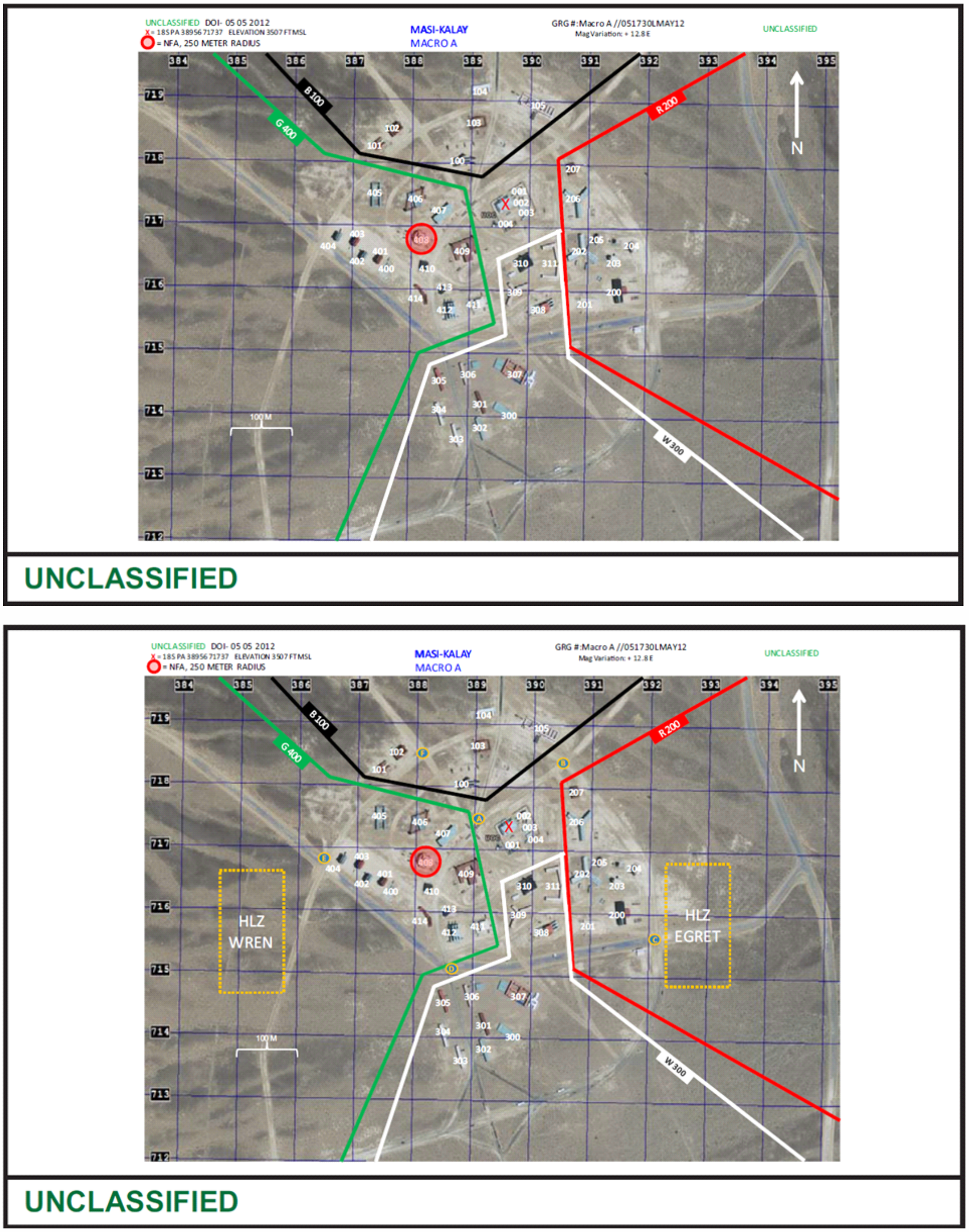


Figure III-3. Urban Grid

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 transmit a brief and then conduct a talk-on will decrease as the level of pre-mission planning increases.

(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 focus on rapid employment, the target set, avoidance of excessive collateral damage, rubbling, the ability to employ in proximity to ground forces, and high precision.** The potential for friendly fire or collateral damage is considered whenever ordnance is employed. Detailed planning of weapons and delivery tactics minimizes 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 an 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 point targets may require specialized weapons such as laser-guided, EO, and inertially aided munitions (IAMs) or aircraft with special equipment or capabilities. JTACs/FAC(A)s need a working knowledge of commonly used aviation ordnance and fuzing to make appropriate decisions.

(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 **should 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. Aircrews 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.** During night visual employment, JTACs/FAC(A)s and aircrews must contend with lower ambient light conditions and must use cultural lighting, battlefield fires, or artificial illumination to successfully attack targets. Threat-permitting and type of TAC-dependent, 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**

1. **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 to maintain visual contact with the target. 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 aircrew 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 effects. 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 (e.g., a person, vehicle, or location) or an area target (e.g., 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, the JTAC/FAC(A) and aircrew adapt to rapidly changing light conditions and visual acuity limitations when transitioning from NVDs to unaided vision (or vice versa). Aircrews and JTACs/FAC(A)s should use all available means to ensure correct target ID. These means include, but not be 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 aircrews 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 aircrew will be using night-vision goggles (NVGs) or forward-looking infrared (FLIR) equipment and will not require overt illumination of the target area. However, battlefield illumination (BI) employment may be required in certain circumstances. Any use of BI must be coordinated with the ground commander and should be employed in such a way that friendly positions are not illuminated.

a. Artillery, mortars, and NSFS can provide BI.

b. FW and RW aircraft can also provide BI.

For more information, see ATP 3-09.32/MCRP 3-31.6/NTTP 3-09.2/AFTTP 3-2.6, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower.

7. **Marks.** WP or 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 ID.

(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 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.** During severe weather or when the target cannot be marked, this type of weapons delivery may be the only option available. Advances in synthetic aperture radar systems have significantly increased the target ID and employment capabilities of aircraft equipped with a synthetic aperture radar system. 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 (e.g., type of target, desired weapons effects, target movement) 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, collateral damage, and civilian casualties.**

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

(e) **HMCS.** In an air-to-ground role, the HMCS is used in conjunction with targeting sensors (e.g., radar, FLIR) to accurately and precisely attack surface targets. HMCS provides the pilot with aircraft performance, targeting, weapons, 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 should ensure there is no confusion between conventional and NVD terms. JTACs/FAC(A)s use 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.** Aerially delivered illumination can be used effectively at night with NVDs. They provide a very accurate reference for target area ID 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 aircrew 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 is taken, and detailed coordination between ground forces and aircrews is essential, to ensure 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.

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. Overt artillery illumination that provides bright, visible light is not normally used due to the negative impacts on NVD performance. 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/RP Rockets.** WP/RP rockets produce a brilliant flash lasting one to five seconds. The radiated heat from the rocket can usually 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 explosive munitions 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 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's/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 pulse 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 codes). 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 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 aircrews. IR lights should be placed where aircrews 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. The majority of these devices operate in the near-IR spectrum and are visible with NVDs but not with unaided vision or targeting pods. Flashing devices are easier to visually acquire. When possible, ID 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. **Gated Laser Intensifier (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. ID 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 aircrews 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, include the pointer-to-target line (PTL), in degrees magnetic, 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 ADA 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, with additional consideration 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 locations, enemy locations, and targets and maintaining SA become acute in the night or adverse weather CAS environment. Effective training, equipping, planning, tasking, and execution processes will recognize these challenges.

8. Considerations—Time

a. **Time Available for Planning.** Time is the critical element in coordinating events and massing fires to create the desired effects. Planners estimate the amount of time necessary to plan, coordinate, 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 the 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/DASC. 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.

9. Essential Planning Factors for Effective Close Air Support

It is critical for JTACs and COC/TOC elements to coordinate their efforts in the planning stage. Their plans consider such key issues as communications, battle tracking, target nomination, tactical risk assessment, target engagement authority, methods of attack, types of TAC, airspace deconfliction and coordination, synchronization of CAS with fires and movement of the supported ground forces, and which JTAC/FAC(A) will provide TAC. **Only through effective coordination can the CAS team successfully achieve the supported commander's objectives for CAS.**

a. **Support Relationships.** For CAS, 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. 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 achieve the ground commander's objectives. At the end of the day, the two individuals on either end of the radio are working to assist the ground commander who needs aviation fires. Aircrews should interpret a CAS brief as an order. Supporting units, including aircrews, should provide the supported commander with as much information as necessary for the commander to make an engagement decision. **It is the supported commander's decision to employ ordnance.**

b. **Battle Tracking.** Battle tracking is the process of building and maintaining an overall tactical picture of the operational environment that is accurate, timely, and relevant for joint fire support and other combat support. Effective battle tracking increases the probability for successful CAS by ensuring its application at the proper time and place. The level of detail required and scope of the tactical 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. 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 incidents. Effective methods of battle tracking include maintaining up-to-date maps, imagery, and status boards and utilizing computerized tracking and display methods (e.g., friendly force tracking). **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 require the most current information:

(1) **FSCMs/ACMs,** as applicable: IPs, CPs, holding areas (HAs), 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, 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, fire support plan, immediate target locations/coordinates, and associated TLE.

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

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

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 depend on the tactical scenario. TTT/TOT should not be delayed to generate more coordinate precision and/or accuracy if the current coordinates, TLE, CAS asset, ordnance, and mark plan will create the desired effects. Target coordinates 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 (FEBA) 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, 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 elevation. Targeting applications require the errors inherent in both the source for measurement, as well as the measurement processes, 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 a 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 for targeting, 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.

For additional information on certification, see CJCSI 3505.01, Target Coordinate Mensuration Certification and Program Accreditation.

(2) **LRFs 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.

(a) TLE is expressed primarily in terms of circular error (CE) and vertical error (VE) or, infrequently, as spherical error (SE).

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

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

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

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

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

(d) To facilitate the communication of targeting accuracy, TLE is characterized in six CATs. The first row presents the CATs 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-4.

(e) Follow proper coordinate generation procedures 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.

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-4. Target Location Error Categories

(f) Aim point is a significant factor in the TLE of all coordinate generation systems. As an example, portable, tactical target mensuration tools may be capable of generating CAT I coordinates, but a JTAC will not be able to produce a CAT I solution for a vehicle that is not depicted in the imagery data. Likewise, an 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.

Note: If the JTAC/FAC(A) desires to communicate the TLE of a coordinate prior to transmitting 10-digit grid coordinates or a latitude/longitude in a CAS brief, the JTAC/FAC(A) could state the TLE CAT and the coordinate format to expect in the game plan. TLE can also be communicated in the remarks section of the CAS brief (e.g., "CAT II, 10-digit grid to follow, advise when ready for 9-line").

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 (e.g., HUMINT, signals intelligence, geospatial intelligence, visual).

(b) Stationary or moving.

(c) Ability to mark the target.

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

(8) Ordnance available for attack.

(a) Capabilities.

(b) Limitations.

(c) Restrictions.

(d) Proximity of friendly forces and 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/FAC(A)s 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 CAS participants 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).

For further information on risk estimate distances and computations and casualty criterion, refer to ATP 3-09.32/MCRP 3-31.6/NTTP 3-09.2/AFTTP 3-2.6, 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 they accept the risk inherent in ordnance delivery inside the 0.1 percent P_i distance.

(11) **Collateral Effects.** Avoidance of collateral effects during CAS begins in the planning phase and is then continuous throughout the preparation and execution phases. Collateral effects are unintentional or incidental effects to objects that would not be lawful military targets in the circumstances ruling at the time. Collateral damage is a narrower term used to refer to a form of collateral effect that is unintentional injury to persons or damage to objects that would not be lawful military targets in the circumstances ruling at the time. Discussion in this publication will be focused on minimizing collateral effects and damage during CAS.

(a) **Impacts and Importance.** The failure to mitigate collateral effects below acceptable risk levels may expose national and military leadership to adverse consequences in assigned military missions and national security goals. Excessive collateral effects can lead to reduced public support for operations, more restrictive ROE, and prolonged reconstruction operations. Generally, excessive collateral effects can turn a tactical success into a significant strategic setback, particularly in counterinsurgency and other operations where support of a relevant population can be a decisive point or center of gravity.

(b) **Methodology.** Per CJCSI 3160.01, *No-Strike and the Collateral Damage Estimation Methodology*, a formal collateral damage estimation (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 may not be required for certain air-to-surface, direct-fire weapon systems. ROE and SPINS must be considered when determining if formal CDE is required. The law of war principles of military necessity, humanity, proportionality, distinction, and honor will still be considered for employment of these direct-fire weapon 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. Whether during deliberate or dynamic targeting, and especially for time-sensitive target nominations, if the CDM indicates possible presence of military chemical, biological, radiological, or nuclear materials, or toxic industrial materials, the chemical, biological, radiological, or nuclear cell in the JAOC/AOC and/or joint operations center should be coordinated. 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 the CDM can assist the CAS planner in making targeting decision.

1. Has PID of the target been established? (PID is a type of ID derived from observation and analysis of target characteristics, including visual recognition; EW support systems; non-cooperative target recognition techniques; identification, friend or foe systems; or other physics-based ID techniques.)

2. Are there collateral objects, including civilian and noncombatant personnel; chemical, biological, and radiological plume hazards; or significant environmental concerns, within the effects range of the weapon selected to attack the target?

3. Can damage to those collateral objects be mitigated by engaging the target with a different weapon or method of employment yet still accomplish the mission?

4. If not, how many civilian and noncombatant casualties will the attack be expected to cause?

5. Would the collateral effects exceed the guidance published by the combatant commander, requiring elevation of this decision?

(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 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 national 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, *(U) 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 civilians and noncombatants 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 objective. 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.

(d) CJCSI 3160.01, *No-Strike and the Collateral Damage Estimation Methodology,* 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. **Target Engagement Authority.** For CAS, the intent is to enable the lowest subordinate echelon representing the supported ground force commander to authorize weapons employment within the constraints established during risk assessment and by the ROE. Prior to CAS target engagement, supported commanders may delegate target engagement authority that allows clearance for weapons release to JTACs/FAC(A)s for specific engagements. See Figure III-5 for JTAC/FAC(A) clearance calls. **The authority and responsibility for the expenditure of any ordnance on the battlefield rests with the supported commander.** Target engagement authority delegated from the JFC and through the supported ground force commander for decentralized execution grants JTACs/FAC(A)s the authority to provide the following clearance calls to attacking aircraft:

(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, "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.

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 / TYPE 3 CONTINUE DRY	Continue present maneuver, ordnance release not authorized.
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-5. Terminal Attack Controller Clearance Calls

(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.

For communications brevity codes and meanings, see ATP 1-02.1/MCRP 3-30B.1/NTTP 6-02.1/AFTTP 3-2.5, Multi-Service Tactics, Techniques, and Procedures for 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, the supported commander develops and approves a PLA plan 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 authorizes the use of PLA and clearly establishes the requirements (e.g., CDE, pattern of life.) 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/FAC(A) 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/FAC(A)**, and the aircrew must explicitly be given PLA authority, including the criteria for executing the procedure. **If the JTAC/FAC(A) 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/FAC(A)s 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) If PLA is approved, "post-launch abort approved as briefed" must be transmitted by the aircrew.

1. An example of a capable 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.

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

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 13.d., "FAC(A) Duties and Responsibilities."

i. **Threat to CAS Aircraft Considerations.** 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.

j. **JTAC/FAC(A) Mutual Support.** The majority of CAS aircraft shot down during combat operations were unaware of the presence of the threat system that targeted/engaged them. The JTAC/FAC(A) 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 monitor the attacking aircraft and the target area for changing threat levels. Depending on the threat level, aircraft may need to expend ordnance on ADA 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 ADA/SAM system as an actual target. The JTAC/FAC(A) can provide attacking aircraft with mutual support by providing descriptive communications during threat activity. In the case of a SAM launch, the JTAC/FAC(A) 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 ADA is observed in or around the target area, then transmit, "(Aircraft call sign), ADA," followed by the firing location in relation to the target.

Note: During CAS at night, JTACs/FAC(A)s should be aware that SAM and ADA 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.

10. Types of Terminal Attack Control and Methods of Attack

a. **Types of TAC.** There are three types of TAC (1, 2, and 3). Types of TAC are tools that give the ground commander the greatest chance of accomplishing the mission while mitigating friendly fire and collateral damage. Type of TAC shall be passed as part of the game plan before the attack brief for aircrew SA but imposes no requirement on the aircrew. The type of TAC conveys the JTAC's/FAC(A)'s intent on how best to control individual attacks based on the tactical risk assessment. 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 TAC 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 TAC 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 "CLEARED TO ENGAGE" 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.** 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 system (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, and aircrew should call "TALLY," "CONTACT", or "CAPTURED," when able.

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

7. Attack aircrew will provide "IN" call, indicating entering terminal phase of an 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. 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. For example: "IN from the West" or "IN heading 090." All attacking aircraft are required to provide an "IN" call unless coordinated otherwise.

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 10.c., "Additional Considerations for All Types of Control," for amplifying information. For examples of Type 1 missions, see Appendix E, "Examples of Radio Communications During Close Air Support Missions," Examples 1 and 2.

(2) **Type 2 Control**

(a) 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 and/or is unable to visually acquire the target. The JTAC/FAC(A) must visually acquire the target or utilize targeting data from another asset with accurate real-time targeting information. Examples of targeting data can be targets passed by a JFO, a VDL feed from ISR or CAS assets, or COC/TOC TAC in support of distributed ground forces. **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 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 procedure**s 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 an air-to-ground attack, prior to weapons release. The 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 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 10.c., "Additional Considerations for All Types of Control," for amplifying information. For examples of Type 2 missions, see Appendix E, "Examples of Radio Communications During 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, 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 (e.g., visual, voice, digital). 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 10.c., "Additional Considerations for All Types of Control," for amplifying information. For examples of Type 3 missions, see Appendix E, "Examples of Radio Communications During Close Air Support Missions," Examples 5 and 6.

b. **Methods of Attack.** The method of attack and type of TAC 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 extent of the aircrew's correlation requirement, and is completely independent of the type of TAC. 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.** The method of attack is broken down into two categories, **BOT** and bomb on coordinate (**BOC**)**.** 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 (i.e., BOT) or not (i.e., BOC). Any type of TAC can be utilized with either method of attack, and no type of TAC is attached to one particular method of attack (see Figure III-6).

(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. Effective use of BOT and BOC 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. The readback meets the correlation requirement for BOC missions.

(2) A **BOT** attack requires that the **JTAC's/FAC(A)'s intended target or mark is TALLY/CONTACT/CAPTURED by the aircrew.** Coordinate accuracy and precision

Summary of Types of Terminal Attack Control and Methods of Attack

Type of TAC	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 close air support brief.

Legend

BOC	bomb on coordinate
BOT	bomb on target
FAC(A)	forward air controller (airborne)
JTAC	joint terminal attack controller
TAC	terminal attack control

Figure III-6. Summary of Types of Control and Methods of Attack

(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 of 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 is required by the aircrew for weapons employment solutions. 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 to generate a coordinate for BOC employment will increase the time to kill or result in missed targeting opportunities.**

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

(3) 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 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 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 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. Aircrews will not modify coordinates once read back. For a BOC attack, aircrews readback will be from the weapon or aircraft system.

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

c. **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, 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.

BOMB ON TARGET EXAMPLES INCLUDE:

-Laser-guided weapons employed autonomously (self-lased) by the delivering (close air support) CAS aircraft.

-Unguided ordnance dropped with CAS aircraft TALLY or CONTACT and employing on the target or mark.

-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.

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), joint fires observer, or another flight/section), and there is no requirement for the close air support (CAS) aircraft to be TALLY/CAPTURE/CONTACT.

- Unguided ordnance dropped from medium to high altitude above an overcast on coordinates accurate enough to achieve the supported commander's objective for CAS.

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

- Weapons employed on a Global Positioning System coordinate and then lased by remote source.

(2) JTACs/FAC(A)s will provide the type of TAC and method of attack as part of the game plan. It is not unusual to have two types of TAC 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's/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 prior to the IN/CLEARED TO ENGAGE call within guidelines established by the supported commander and must be coordinated with the appropriate fires approval agency. The JTAC/FAC(A) must ensure 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.

11. Considerations for Planning with Laser-Guided and Inertial-Aided Munitions

Laser-guided weapons (LGWs), IAMs, and GPS-based systems can assist weapons guidance and provide better accuracy during CAS.

a. **Laser-Guided Systems.** Laser-guided systems provide the joint force with the ability to locate and engage 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 remote 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 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, fog, smoke, haze, snow, 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 an LTD has a beam spread or divergence of one milliradian, its spot would have a diameter of approximately 1 meter at a distance of 1000 meters in front of the designator. If this spot were aimed at a 3-square-meter box, 3000 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.

(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.

Warning

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

(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 laser-guided bombs (LGBs) and laser-guided missiles (LGMs). 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.

(b) **LTDs.** 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 are carried on aircraft and provide the same function as the GLTD. Airborne laser target designators are capable of very long-range lasing and are normally employed below 30,000 feet (ft) above ground level (AGL). See Figure III-7 for advantages and disadvantages of airborne and ground designators.

Note: 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 ATP 3-09.32/MCRP 3-31.6/NTTP 3-09.2/AFTTP 3-2.6, *Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower,* for a listing of aircraft with LSTs.

(7) **Laser Procedures**

(a) **FAHs.** 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

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-7. Airborne and Ground Designators Advantages and Disadvantages

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-8).

Note: The optimal attack zone must be used when a GLTD 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 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

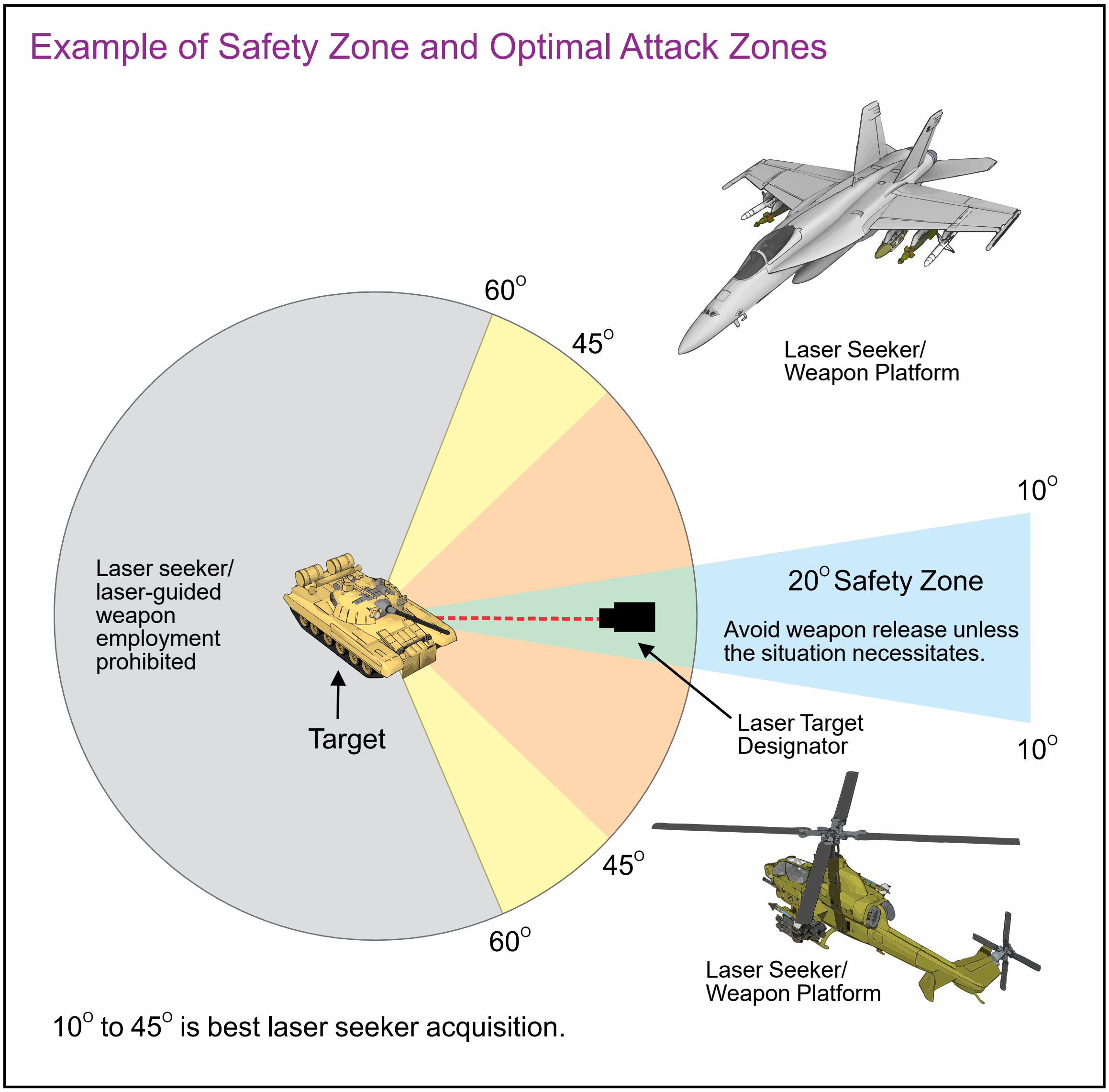


Figure III-8. Example of Safety Zone and Optimal Attack Zones

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 ID. 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 LGWs in conjunction with coded LTDs is either autonomous or remote.** Autonomous LGW employment uses the CAS aircraft's LTD for terminal weapons guidance. Unless specified by the JTAC/FAC(A), buddy lasing internal to the flight/section is considered autonomous lasing. Most aircraft capable of delivering LGWs can provide autonomous designation. Remote LGW employment uses an LTD that is external to the employing aircraft flight/section for terminal weapons guidance. This is typically accomplished by a ground team operating an LTD, FAC(A), or another aircraft (known as "buddy lasing"). Codes are assigned to LGWs and directly relate to the PRF that harmonizes the designator and seeker interface. Certain LGWs, such as LGBs, are coded prior to takeoff and cannot be changed once the aircraft is airborne. 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. Laser codes are always passed as four-digit codes 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. Refer to appropriate tactics manuals for 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 Radio Communications During Close Air Support Missions," Examples 5 and 8.

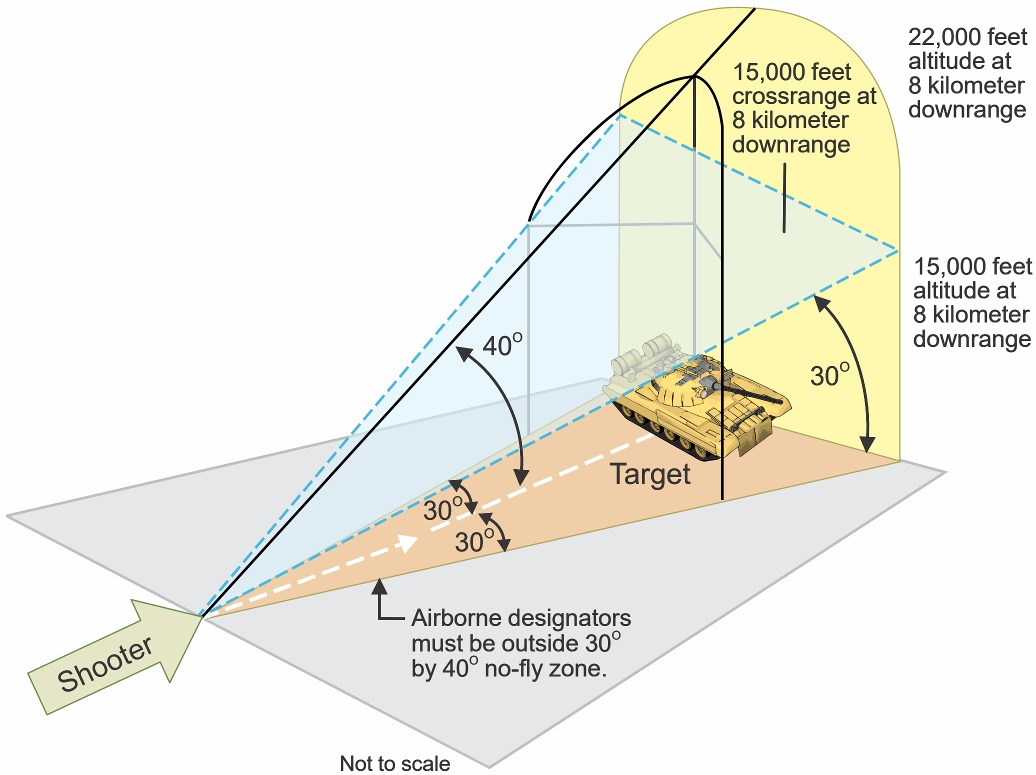
(8) **Hellfire Laser-Guided Systems Employment and Characteristics**

(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 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)s/designator.

(c) **Safety Considerations.** See Figure III-9 for Hellfire designator safety zone.

Rotary-Wing Hellfire Designator Safety Zone



NOTE:
Normal laser operations per the two-dimensional laser safety and optimal attack zones diagram (Figure III-9) still apply.

Figure III-9. Rotary-Wing 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.

1. **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.

2. **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.

(f) **Launch Modes.** The two basic types of launch modes are lock-on before launch (LOBL) and lock-on after launch (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 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) 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 IAMs/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 aircrews can use the standoff capability of these weapons to potentially avoid threats in the target area.

(c) **All-Weather Capability.** IAMs/GPS-aided munitions will normally offer an all-weather capability because they do not require designators for guidance.

INSs/GPS-aided weapons do not require the aircrew to see the target or to maintain a clear LOS to the target.

(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 IAMs/GPS-aided weapons, the effect of vertical TLE (elevation error) is greatly reduced.

(2) **Limitations**

(a) **Moving Targets.** Certain varieties of IAMs/GPS weapons have more inherent capability against moving targets than others. All CAS participants must be familiar with the capabilities and limitations of the specific weapon system being employed.

(b) **Location Error.** These weapons require extremely accurate coordinates, in both the horizontal and vertical planes, for point targets. 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 DOD-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. Aircrews will not adjust coordinates that are passed and put into the system for any reason. **Therefore, great care must be taken to ensure 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, 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 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.

12. 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 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's/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 objective 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. **FSCMs.** 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 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-10 depicts common FSCMs.

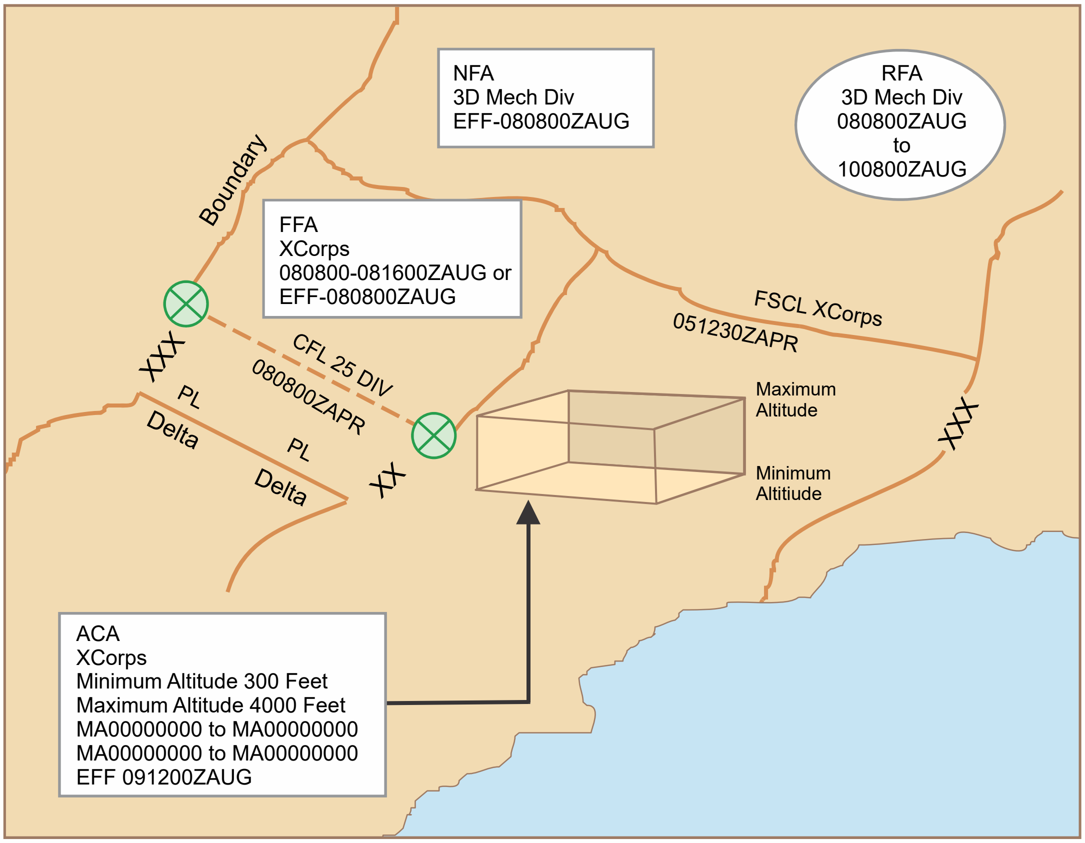
For further details of FSCMs, refer to JP 3-09, Joint Fire Support.

(1) **Permissive Measures.** Permissive measures facilitate target attacks.

(a) **CFL.** A CFL is a line beyond which conventional, surface-to-surface direct fire and IDF support means may fire 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.

For further details on the CFL, see JP 3-09, Joint Fire Support.

Fire Support Coordination Measures



Legend

ACA	airspace coordination area	FSCL	fire support coordination line
CFL	coordinated fire line	Mech	mechanized
Div	division	NFA	no-fire area
EFF	effective	PL	phase line
FFA	free-fire area	RFA	restrictive fire area

Figure III-10. Fire Support Coordination Measures

(b) **FSCL.** An FSCL is an FSCM established by the land or amphibious force commander to support common objectives within an area of operation. Short of the FSCL, all fires must be coordinated with the establishing commander prior to engagement. Beyond the FSCL, all fires must be coordinated with affected commanders prior to engagement.

For further details on the FSCL, see JP 3-09, Joint Fire Support.

(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. When established, the primary purpose is to allow MAGTF aviation to attack surface targets without approval of a GCE commander in whose area the targets may be located. To facilitate air-delivered fires and deconflict air and surface fires, an ACA will always overlie the area between the BCL and the

FSCL. Additionally, ground commanders may strike any targets beyond the BCL and short of the FSCL with artillery and/or rockets without coordination, as long as those fires deconflict with the established ACA overhead.

(d) **Free-Fire Area (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. A kill box will not be established for CAS missions. If CAS is required within an established kill box, the responsible C2 element should change the fires status to COLD for the portion of the kill box in close proximity to ground forces where fires need to be integrated and synchronized. Authority to engage is not automatically granted by the establishment of a kill box. All aircrews 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 ATP 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 are established to safeguard friendly forces.

(a) **NFA.** An NFA is land area designated by the appropriate commander into which fires or their effects are prohibited. Two exceptions are:

1. When the establishing HQ approves fires temporarily within the NFA on a mission-by-mission basis.

2. 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 that 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 FC/FSCC 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-11).

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.

a. **Lateral Separation.** (See Figure III-12.) 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."

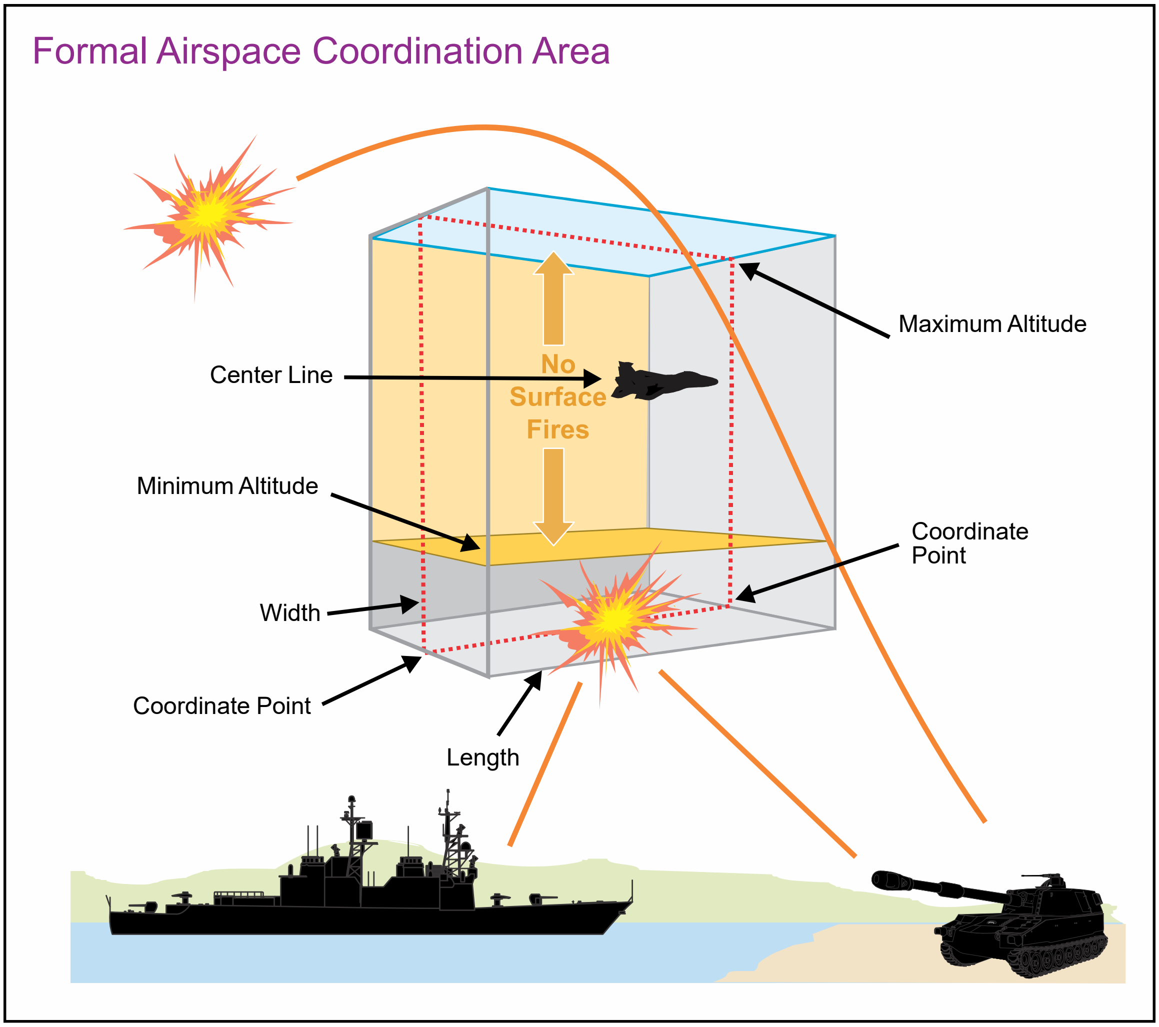


Figure III-11. Formal Airspace Coordination Area

<u>b.</u> **Altitude Separation.** Altitude separation is effective for coordinating fires when aircraft remain above or below IDF trajectories and their effects (see Figure III-13). This technique permits IDF 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 mean sea level (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/FAC(A) and FSC/FSO must coordinate with the firing unit to determine the appropriate entry argument data to use when referencing the firing tables.

<u>c.</u> **Altitude and Lateral Separation.** (See Figure III-14.) 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.

Artillery and Close Air Support Aircraft Lateral Separation

"Stay west of 62 gridline."

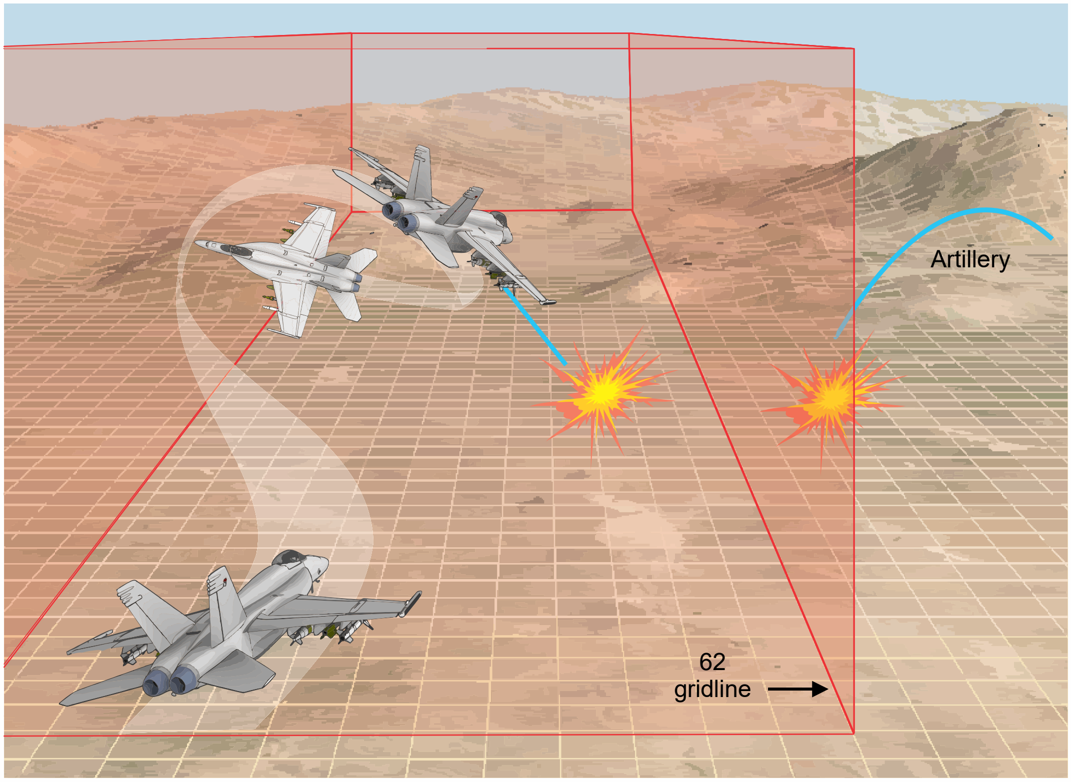


Figure III-12. Artillery and Close Air Support Aircraft Lateral Separation

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 margin of safety. For example, "Stay west of 62 gridline and remain below 3,000 ft MSL." When deconflicting by altitude always specify in feet 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 aircrew 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**

Artillery and Close Air Support Aircraft Altitude Separation

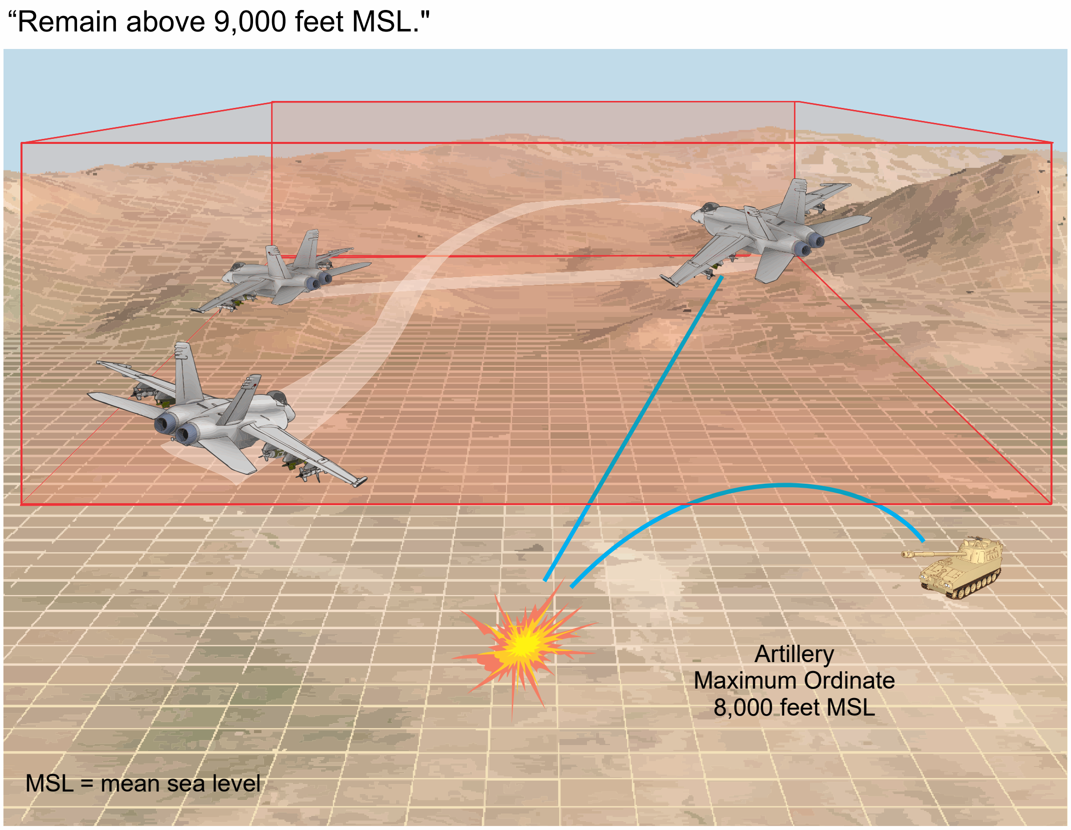


Figure III-13. Artillery and Close Air Support Aircraft Altitude Separation

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 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-15 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. The 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

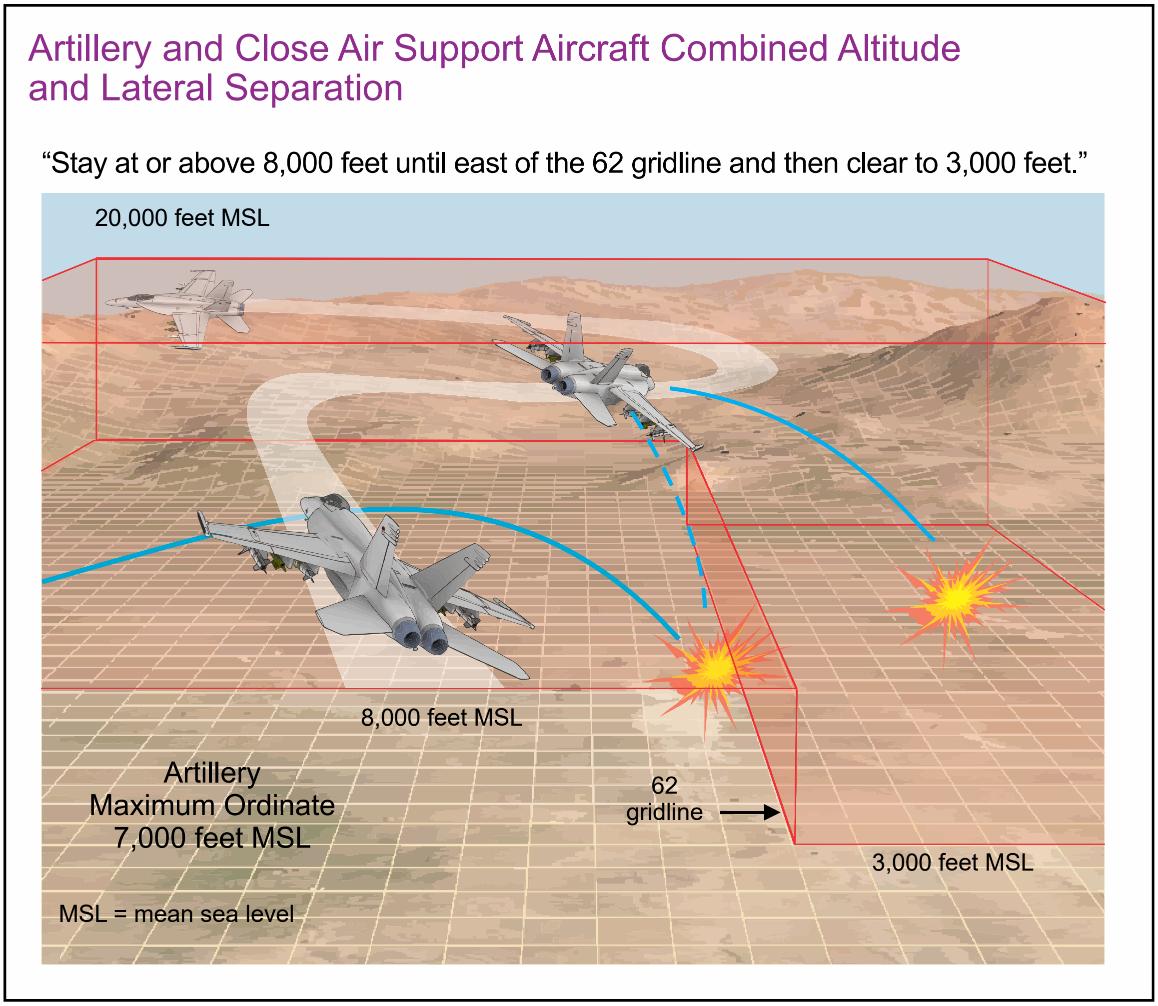


Figure III-14. Artillery and Close Air Support Aircraft Combined Altitude and Lateral Separation

uses the airspace control authority to establish formal ACMs (see Figure III-16). 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 ACO.

For more information on ACMs, see JP 3-52, Joint Airspace Control, *and ATP 3-52.1/Marine Corps Warfighting Publication (MCWP) 3-25.13/NTTP 3-56.4/AFTTP 3-2.78,* Multi-Service Tactics, Techniques, and Procedures for Airspace Control.

(1) **CA.** The CA is an ACM that uses altitude to separate users and as the transition between different airspace control elements.

(2) **Coordination Level (CL).** The CL is an ACM used to separate FW and RW aircraft by determining an altitude below which FW aircraft normally will not fly.

Artillery and Close Air Support Aircraft Time Separation

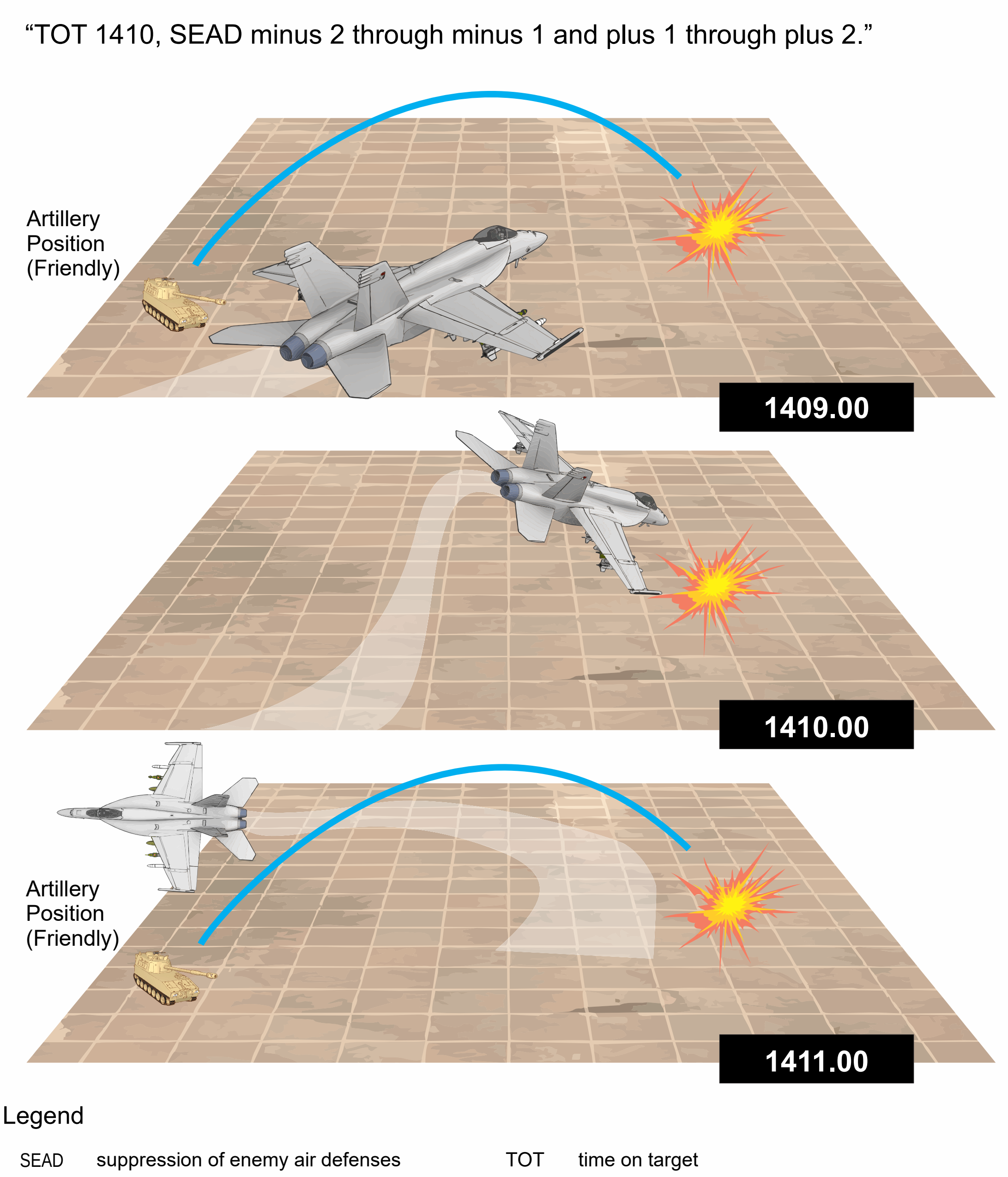


Figure III-15. Artillery and Close Air Support Aircraft Time Separation

(3) **HIDACZ.** A HIDACZ is 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 that 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

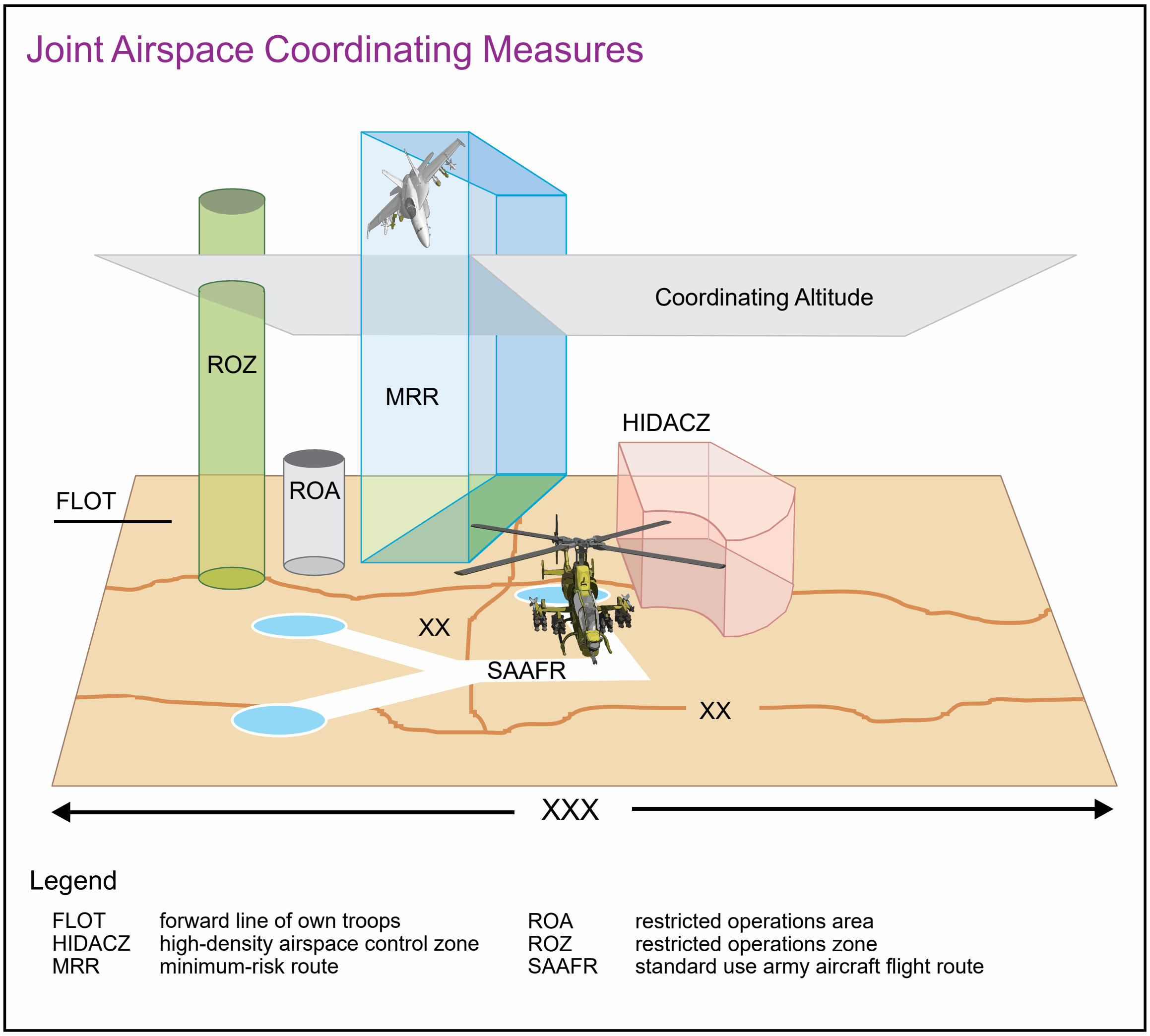


Figure III-16. Joint Airspace Coordinating Measures

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.

(4) **ROZ.** Airspace reserved for specific activities in which the operations of one or more airspace users is restricted. ROZ airspace usages more clearly delineate the actual intended use of the airspace (e.g., UA, CAS).

(5) **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.

(6) **Standard Use Army Aircraft Flight Routes (SAAFRs).** A SAAFR is a route established below the CL 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 CL.

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 or the common HHQ COC/TOC.

(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 aircrews, 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 aircrews 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 one to five 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/FAC(A), ensuring the weapon will remain deconflicted throughout its entire route of flight.

(b) **Keyhole Template.** Keyhole template is an efficient method for establishing an IP or HA/BP in the absence of control points or when their location does not sufficiently support target engagement. When CAS aircraft are passed to a JTAC/FAC(A) from a CP, the JTAC/FAC(A) should immediately pass an "Echo" point (typically the target) to those CAS aircrews and then anchor their hold point off of the Echo point with a direction and distance in nautical miles for FW and kilometers for RW. The standard keyhole method is to label each of the cardinal directions with a letter, such as A—North, B—East, C—South, D—West, and E—Overhead Target, or use radials when cardinal directions are not appropriate. The JTAC/FAC(A) selects the IP or HA/BP based on enemy threat capabilities, target orientation, friendly location, weather, aircraft capabilities, and fire support coordination requirements. This template allows for unlimited flexibility in IP or HA/BP selection and precludes the need to generate IPs/HAs/BPs 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.

"Alpha eight right"

Note: JTACs/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 participants.

1. **FW Keyhole** (Figure III-17).

a. FW aircraft should hold outside the distance given. If the tactical situation dictates that an IP north of the target is necessary, then holding instructions for the CAS aircrew might sound like this:

JTAC: "Stang 11, advise when ready to copy Echo point."

CAS Aircrew: "Stang 11, ready to copy."

JTAC: "Ten-digit grid to follow. NU 87138 50874."

CAS Aircrew: "I copy NU 87138 50874."

JTAC: "Stang 11, proceed to the 240 at 8, angels 15, report established."

CAS Aircrew: "Stang 11, established 240 at 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 Aircrew: "Stang 11, established 240 at 8, angels 15."

2. **RW Keyhole** (Figure III-18). The direction and distance (in kilometers) provided by the JTAC/FAC(A) will determine the center grid for a standard 2 x 2 km hasty HA/BP when integrating RW CAS using the keyhole method. Once the HA/BP is established, the RW CAS aircraft shall remain within the hasty HA/BP unless otherwise approved by the JTAC/FAC(A). While 2 x 2 km is the standard dimension for the HA/BP, the JTAC/FAC(A) may adjust the size to accommodate larger RW CAS flights (e.g., a division of 4 x H-1s) and/or to better facilitate aircraft sensor and weapon systems employment. In this case, the dimensions will be clearly stated by the JTAC/FAC(A).

Some examples of the RW CAS keyhole include (all distances for RW CAS are kilometers):

JTAC: "Venom 11, Echo point is 11S PT 965 005, hold Delta 5, angles 2 and below."

JTAC: "Deuce 23, Echo point is 11S PS 785 115, hold Bravo 5, center gird 3 x 3, at cherubs 5 and below."

JTAC: "Viper 03 (flight of 4 x H-1s), Echo point is 11S PT 965 005, proceed 330 at 8, via Bravo – Alpha 8, center grid 3 x 3, maintain angels 2 and below. Be advised Venom 11 currently holding Delta 5, angels 2 and below."

Note: Standard holding distances (kilometers) and HA/BP dimensions (2 x 2 km) are implied in the assignment of the keyhole position and does not need to be specified by the JTAC/FAC(A) unless nonstandard dimensions are required as highlighted in the last two examples.

3. 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:

(c) **Overhead.** "From the overhead." From the overhead is an attack from an orbit over the target area.

Fixed-Wing Keyhole Example

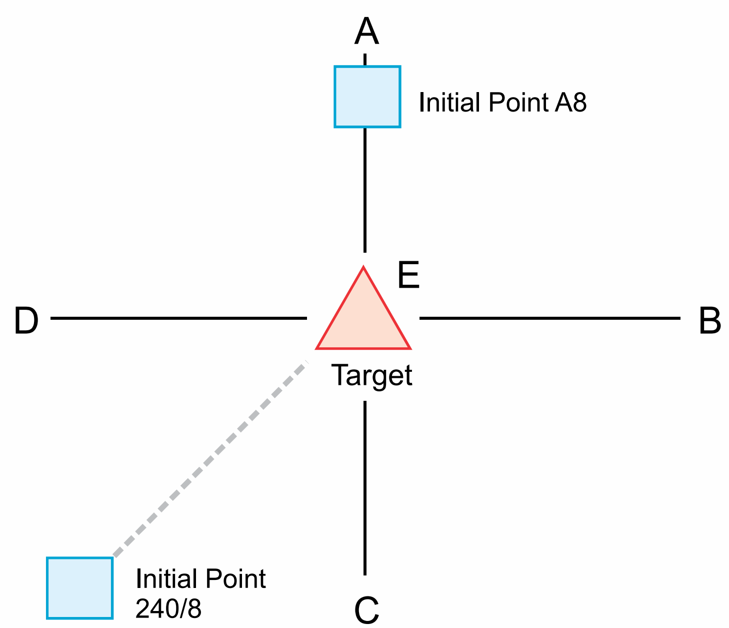


Figure III-17. Fixed-Wing Keyhole Example

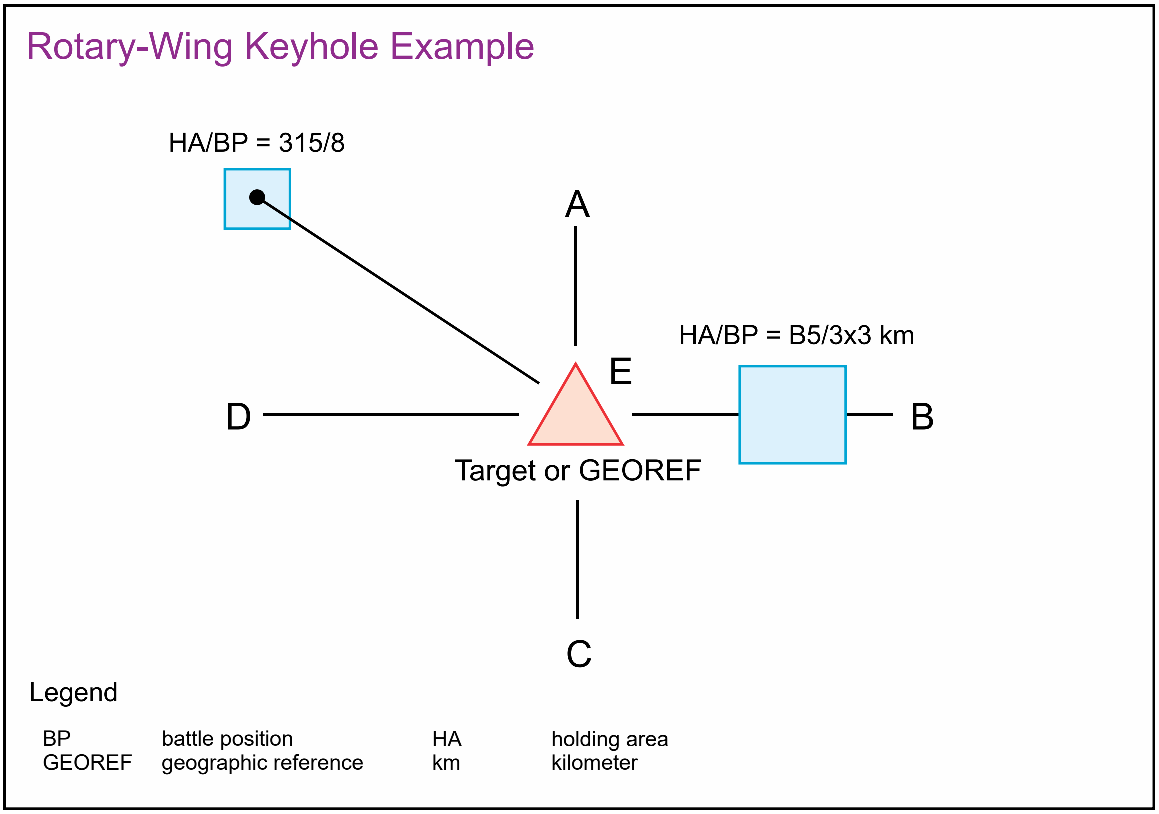


Figure III-18. Rotary-Wing Keyhole Example

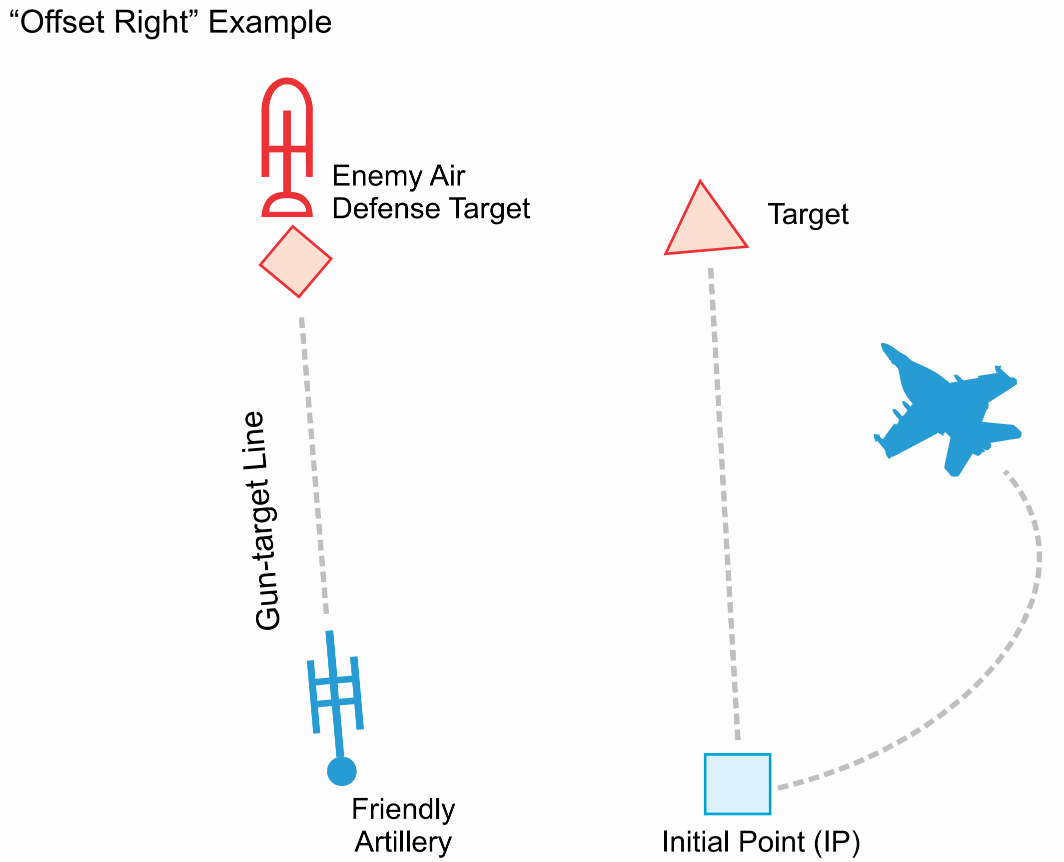
1. For FW level-laydown, or ramp/bunt deliveries, the distance required for the attack should be considered and used in lines 1-3. The airspace required for these attacks does not support "from the overhead." For example, a FW PGM delivery run will typically begin about 8 to 10 nautical miles from the target.

2. 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." If the keyhole template is in effect, lines 1-3 can be passed from the IP in which the aircraft are holding from (e.g., "Lines 1-3 from B8") as long as the Echo point is the target.

(d) **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.

(e) **FAHs.** 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. When ordnance is a factor in the safety of friendly troops, the weapon's axis of attack should be parallel to the friendly force's axis or

Offset Direction



Plot an IP and a target and connect them with a straight line. Specify the offset direction as either right or left. If told to offset right, as in the example above, proceed on or to the right of this line while inbound to the target. Aircrews cannot fly to the left of this line. An offset restriction applies from the time aircrews leave until they release their ordnance or begin egress.

Figure III-19. Offset Direction

orientation, to reduce the risk of munitions impacting long or short of the intended impact point onto friendly positions. The tactical situation may require the weapon's axis to pass over a friendly position, in which case other friendly fire mitigation techniques should be used. Attack headings also allow RW aircraft to maneuver over terrain or urban sprawl to enhance delivery while remaining survivable. Winds aloft are likely to be vastly different from winds at ground level. JTACs/FAC(A)s and CAS aircrews should take both into account when planning attack geometry and/or FAH. A significant crosswind component could cause aircraft heading to differ from its ground track. If it is likely that the crosswind will preclude the aircraft from adhering to the FAH, aircrew must advise the JTAC/FAC(A). The JTAC/FAC(A) could then adjust the attack geometry/FAH to reduce the crosswind component or allow for additional aircraft maneuver. 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. FAHs 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/FAC(A)s 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 objective 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., Joint Direct Attack Munition [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 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 fire 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 codes. 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 RP 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 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. IDF marking rounds are most effective when delivered within 100 meters of the CAS target, but those within 300 meters

Standard Marking Brevity Codes

BLIND	No visual contact with FRIENDLY aircraft, ship, or ground position. Opposite of VISUAL.
VISUAL	Sighting of a FRIENDLY aircraft, ground position, or ship. 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 Codes

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 aircrews. If the situation requires precise marks, observers or spotters can adjust marking rounds to ensure accurate marks are delivered to meet the CAS schedule.

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 (e.g., guns, rockets, missiles, or bombs).

3. **Laser Designators.** For LST-equipped aircraft, 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 four-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 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 10-second warning** to activate the mark. Use the standard laser brevity codes listed in Figure III-21.

For communications brevity codes and meanings, see ATP 1-02.1/MCRP 3-30B.1/NTTP 6-02.1/AFTTP 3-2.5, Multi-Service Tactics, Techniques, and Procedures for 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 ATP 3-09.32/MCRP 3-31.6/NTTP 3-09.2/AFTTP 3-2.6, *Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower,* for a complete listing of aircraft target marking capabilities.

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. JTACs/FAC(A)s should use IR pointers with caution, as they may expose the friendly position to an enemy with night vision capability. JTACs/FAC(A)s 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 codes. Aircrews and JTACs/FAC(A)s must be familiar with these brevity codes to avoid confusion (see Figure III-22).

Standard Laser Brevity Codes

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.
DEADEYE	Laser designator system inoperative.
NEGATIVE LASER	Laser energy has not been acquired.
LASING	The speaker is firing the laser.
STARE (with 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 Codes

For communications brevity codes and meanings, see ATP 1-02.1/MCRP 3-30B.1/NTTP 6-02.1/AFTTP 3-2.5, Multi-Service Tactics, Techniques, and Procedures for 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 aircrews 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.

7. **Marking Friendly Forces.** Marking friendly forces is the least desirable method of enabling a TALLY. Marking friendly forces 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

Night Infrared Close Air Support Brevity Codes

Call	Meaning and Techniques
SPARKLE	Mark/marking target by infrared (IR) pointer. (Joint terminal attack controller [JTAC]/forward air controller (airborne) [FAC{A}]) marks the target with an IR pointer. Can be initiated by JTAC/FAC(A) 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/FAC(A) to jiggle the IR beam on the target. This aids in 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/FAC[A] uses pulse mode available on some IR pointers. Can be initiated by JTAC/FAC[A] or aircrew. May be used by JTAC/FAC[A] 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/FAC[A] 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/FAC[A] 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. **Warning:** This technique may cause permanent blindness in aircrew. **Caution:** This technique may damage night-vision devices.
CONTACT SPARKLE	Call acknowledging the sighting (of the non-friendly end) 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 until the friendly position can be identified. Then, once the aircrew sees the IR energy and is able to discern between the friendly and target end of the pointer, a VISUAL and 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 codes listed in this figure amplify the IR communications in Army Techniques Publication 1-02.1/Marine Corps Reference Publication 3-30B.1/Navy Tactics, Techniques, and Procedures 6-02.1/Air Force Tactics, Techniques, and Procedures 3-2.5, *Multi-Service Tactics, Techniques, and Procedures for Multi-Service Brevity Codes.*

Figure III-22. Night Infrared Close Air Support Brevity Codes

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.

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 with TALLY or VISUAL with CONTACT SPARKLE when using a ground-based IR pointer as a mark. Joint terminal attack controllers/forward air controllers (airborne) must provide final attack headings to place the attacking aircraft in the laser basket for an off-board laser designation for a laser guided weapon. Laser target line shall also be passed, time and situation permitting.

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 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 create the desired effects. 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 2.a.(6), "Determine SEAD Requirements/SEAD Plan," and JP 3-01, Countering Air and Missile Threats.

13. 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. Aircrews 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 of the flight leads 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 enables the massing of fire and helps 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).

1. **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.

2. The following procedural guidelines are considered standard:

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

b. The JTAC/FAC(A) must approve reattacks (after coordination with the ground force commander).

c. If an aircraft enters another flight's sector, the aircrew will immediately notify the other flight and the JTAC/FAC(A) and then deconflict or exit that sector.

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. JTAC/FAC(A) and aircrew must coordinate munitions that may enter the other flight's sector before the attack.

(b) **Reattacks.** The aircrew's task 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/FAC(A)s and aircrews must ensure follow-on munitions used in immediate reattacks still meet the ground commander's scheme of fires and JTAC/FAC(A) restrictions before employing ordnance. For reattacks on the same target area, JTACs/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.

(c) **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 ADA 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/FAC(A) 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, 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 ADA 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 patterns that will best accomplish the mission. Considerations for holding patterns 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 to 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. JTACs/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, 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/friendly forces 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 ADA.

(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 RW and FW aircraft, CAS aircrews must be under the control of the JTAC/FAC(A) to transit above or below the CL. Low-altitude, FW CAS CPs and IPs will likely require lateral deconfliction with RW 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 high-drag ordnance and 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.

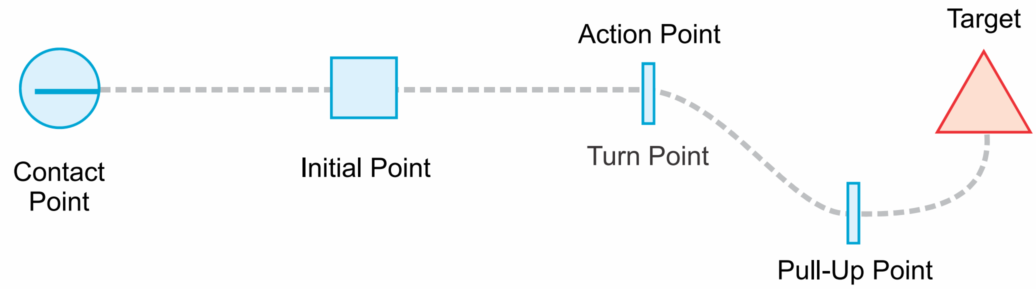
(e) **Types of Delivery:**

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

Fixed-Wing, Low-Altitude Close Air Support Attack

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)/forward air controller (airborne) (FAC[A]).
   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/FAC(A) provides:
   a. Mark on target 30 tp 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

released, the weapon continues an upward trajectory while the aircrew executes follow-on 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 CAS aircraft descends to low/very-low altitude to avoid detection by certain enemy SAM threats and/or gain surprise.

b. **RW CAS Tactics**

(1) USMC 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 AH and UH aircrews can use to perform CAS.

(2) USA AH units support maneuver commanders as a subordinate maneuver unit. They are given mission-type orders and execute these orders as a unit. USA AH units can conduct attacks employing CAS TTP when operating in support of other forces. However, their proficiency will be limited unless they have been trained as part of SOF or CAS TTP have been coordinated in advance.

(3) **Flight Composition.** Unlike FW aircraft, RW sections or flights may be a mix of aircraft types. For example, an Army flight might consist of an AH-64 and a CH-47, 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, fires, 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. RW assets 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 to maintain C2 of RW assets after launch.

(7) **En Route Tactics**

(a) **Purpose.** Ideally, en route tactics (e.g., route, altitude, airspeed selection, terrain flight profile, and formations) allow RW assets aircrews to avoid concentrations of enemy air defenses, prevent early acquisition, avoid detection, or allow the RW assets 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 NOE.

1. **Low-Level.** Conduct low-level flight at a constant altitude (normally 100 to 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 to 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, RW assets aircrews will normally elevate 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. In general, RW assets 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, to maintain visual reference with the ground. Over urban areas, RW assets 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- to 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. **RW CAS Control Points.** While CAS control points and IPs can be used for RW aircraft routing, AH aircrews use RW-specific ACMs in the CAS objective area: HAs and BPs.

2. RW ACM location and naming should be determined during the planning process. This will aid in the overall SA of JTACs/FAC(A)s, aircrews, and maneuver forces and ensure the aviation plan supports the ground tactical plan. Hasty RW control measures can be created by JTACs/FAC(A)s in the tactical environment should they be needed due to changing circumstances or requirements.

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 RW assets aircrew an area in which to loiter. HAs should 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 RW assets. 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.

3. **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 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.

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

b. **Traveling Overwatch.** Traveling overwatch is a technique 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 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.

4. **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 RW CAS 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.

(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 deliver indirect hovering fire **hidden from the enemy** by terrain when able. After delivering hovering fire, aircrews **remask or displace.** Hovering fire may reduce the accuracy of unguided ordnance (e.g., rockets, cannon/gun fire) because the aircraft can be less stable in a hover.

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

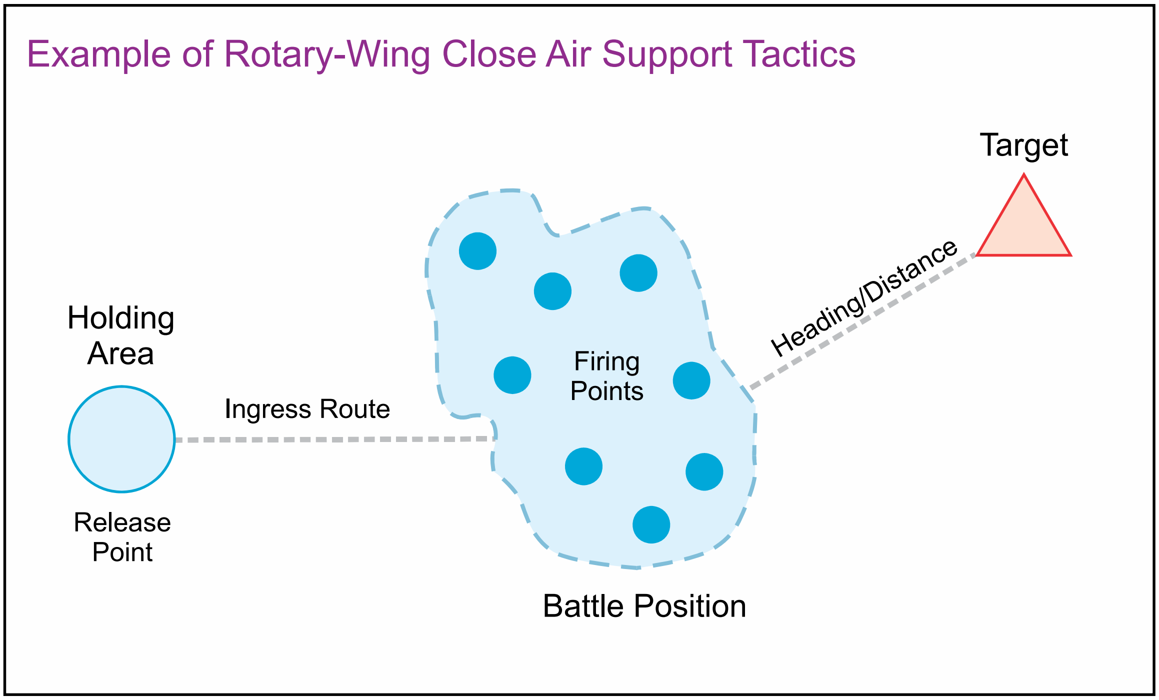


Figure III-26. Example of Rotary-Wing Close Air Support Tactics

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. While performing running fire, aircrews can use direct and IDF techniques. Aircrews deliver direct fire when they have an unobstructed view of the target or use 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 effects.** Using diving fire, the aircrew can remain above or outside the threat envelope. Diving fire is often employed by RW assets 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 RW assets 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 RW assets' 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 RW asset aircrew will make every attempt to provide BDA and a mission report (MISREP) via the AO's/ALO's C2 system. The connectivity plan for the low-altitude block will enhance the flow of information from RW assets 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 Radio Communications During Close Air Support Missions," Example 7.

14. 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 the SOF/Army aviation call for fire used with SOF and Army RW assets or AC-130 gunships. The difference between the RW CAS 5-line and other 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 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 friendly forces 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 TAC, and method of attack; the warning order may also include ordnance requested.

(2) **Friendly Location/Position Marking.** The 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.** The 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 aircrews 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.

Rotary-Wing Close Air Support 5-Line Brief

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/FAC(A) may request additional readback.

1. Observer / Warning Order / Game Plan
   "________________, ____________________ 5-line,
   (aircraft call sign) (JTAC/FAC(A) call sign)
   Type (1, 2, or 3) control, MOA (BOC or BOT), (ordnance requested)."

2. Friendly location / mark
   "My position____________________, marked by ____________________"
   (target reference point, grid, etc.) (VS-17, beacon, IR strobe, etc.)

3. Target location
   "Target location, ____"
   (magnetic bearing and range in meters, target reference point, grid, etc.)

4. Target description / mark
   "________________, marked by __________________"
   (target description) (IR, tracer, etc.)

5. Remarks and *Restrictions
   Laser-to-target line (LTL) / pointer-to-target line (PTL)
   Desired type and number of ordnance or weapons effects (if not previously coordinated)
   Surface-to-air threat, location, and type of SEAD
   Additional remarks (e.g., gun-target line (GTL), weather, hazards, friendly marks)
   Additional calls requested
   *Final attack headings or attack direction
   *Airspace coordination areas (ACA)s
   *Danger close and initials (if applicable)
   *Time on target (TOT) / time to target (TTT)
   *Post-launch abort restrictions (if applicable).
   *Approval out of battle position

Note:
The rotary-wing CAS 5-Line should be passed as one transmission. If the restrictions portion is lengthy, it may be a separate transmission.

Legend

BOC	bomb on coordinate	IR	infrared
BOT	bomb on target	JTAC	joint terminal attack controller
CAS	close air support	MOA	method of attack
FAC(A)	forward air controller(airborne)	SEAD	suppression of enemy air defenses

Figure III-27. Rotary-Wing Close Air Support 5-Line Brief

(5) **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.

(a) LTL or PTL.

(b) Surface-to-air threat.

(c) SEAD plan.

(d) Illumination plan.

(e) GTL.

(f) Hazards to flight.

(g) Weather in the target area.

(6) **Restrictions**

(a) 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. FAHs.

2. ACAs.

3. Danger close.

4. TOT/TTT.

5. PLA.

6. Approval out of BP.

(b) RW CAS 5-line briefs assume 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.

(7) Readbacks for a RW CAS 5-line should include all restrictions.

(8) RW CAS 5-line example with CAS-capable aircrews:

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."

Aircrew: "Deuce 31 copies over your right shoulder, left pull, keep all effects of fires west of MSR Clovis, pushing."

JTAC: "Deuce 31, CONTINUE."

Aircrew: "Deuce 31 and flight, VISUAL, TALLY, IN."

JTAC: "Deuce 31 and flight, CLEARED HOT."

15. 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. SATCOM should be used if available to provide updates. If BLOS communications equipment is available, SA regarding ongoing engagements may be passed well before a bomber arrives on station to support ground forces.

b. **Pre-Attack**

(1) **On-Station Time.** Bombers may remain on station eight 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. Bombers that are capable of DACAS access to Link 16 networks via Joint Range Extension Applications Protocol for extended 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 advanced targeting pod) 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 advanced targeting pod) and are able to observe general target areas from this distance but may require LSS 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 five 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. See Figure III-28.

c. **Attack Phase**

(1) **Target Considerations.** Bombers traditionally employ weapons using the BOC method of attack. However, targeting pod usage with video feeds can provide aircrews with correlation capabilities for BOT attacks. Some bombers can generate coordinates using targeting pods, as well as using synthetic aperture radar for radar significant targets, 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 bombers to locate typical CAS targets.

(b) **CAS in Urban Environment.** Because bombers have a larger turn radius and typically employ at higher altitudes, correlation of targets in urban environments will be more challenging. The effects of "urban canyons" on target ID 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 must be used to ensure the correct coordinates are being generated and transmitted. 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 to 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) Bombers not equipped with targeting pods 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).

Note: Expect weapons system readback in DD-MM.MMMM.

(2) **Target Marking**

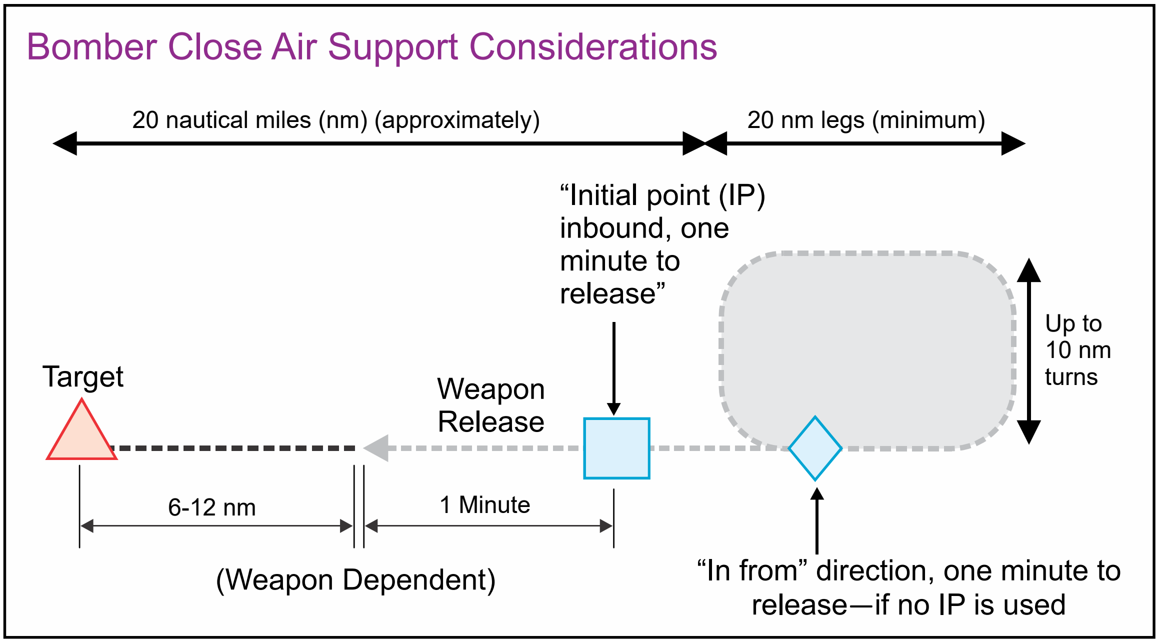


Figure III-28. Bomber Close Air Support Considerations

(a) The preferred technique of target marking is via lasing. 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) Bombers have 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 types of 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.

(c) 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 Radio Communications During Close Air Support Missions," Example 6.

16. Unmanned Aircraft Systems Close Air Support

This section identifies capabilities, planning considerations, and tactics used by UASs to support and conduct CAS.

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. UAS capabilities may include:

(1) **EO.** Permits color identification; limited utility at night with illuminated/ lighted targets.

(2) **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.)

(3) Near-IR passive night optics and low-light television cameras. Work the same spectrum as NVGs.

(4) **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.)

(5) **IR Pointer.** Permits nighttime marking of targets for NVD-capable platforms or personnel.

(6) **Synthetic Aperture Radar.** Provides detailed pictures of radar-significant objects and geo-features, regardless of weather.

(7) **Ground Moving Target Indicator.** Allows for automatic tracking/cueing of sensors onto moving targets.

(8) Chemical, biological, radiological, nuclear, and enhanced conventional weapons detection.

(9) LGWs (high off-boresight capability with Hellfire) and GPS-aided munitions.

(10) Increased communications connectivity (possibly including data links) and reachback capability.

(11) Capability to carry various signals intelligence or other pods that can improve overall support to ground units.

b. **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.

(1) 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).

(2) Communications capabilities/detailed plan for no radio.

(3) Lost link procedures and UAS contingency routes.

(4) 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.

(5) Difficult to retask certain UAS in flight over large distances due to low transit airspeeds.

(6) 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*.

(7) UASs must adhere to all laser restrictions.

(8) 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.

(9) 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.

(10) Weather is a major consideration for UAS flight operations, particularly the launch and recovery. Sensor degradation may occur in less than optimal weather conditions.

(11) 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.

c. **Armed UAS Tactics.** UAS flight crews use the CAS check-in and 9-line format. However, 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 to 250 knots). The UA will generally orbit over the target area for weapons delivery, using the following flight profiles:

(1) 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 will vary based on ordnance, sensor capability, and target, but a wheel orbit is typically between five km (2.5 nautical miles) and eight 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 operator may off-set to minimize masking.

(2) 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

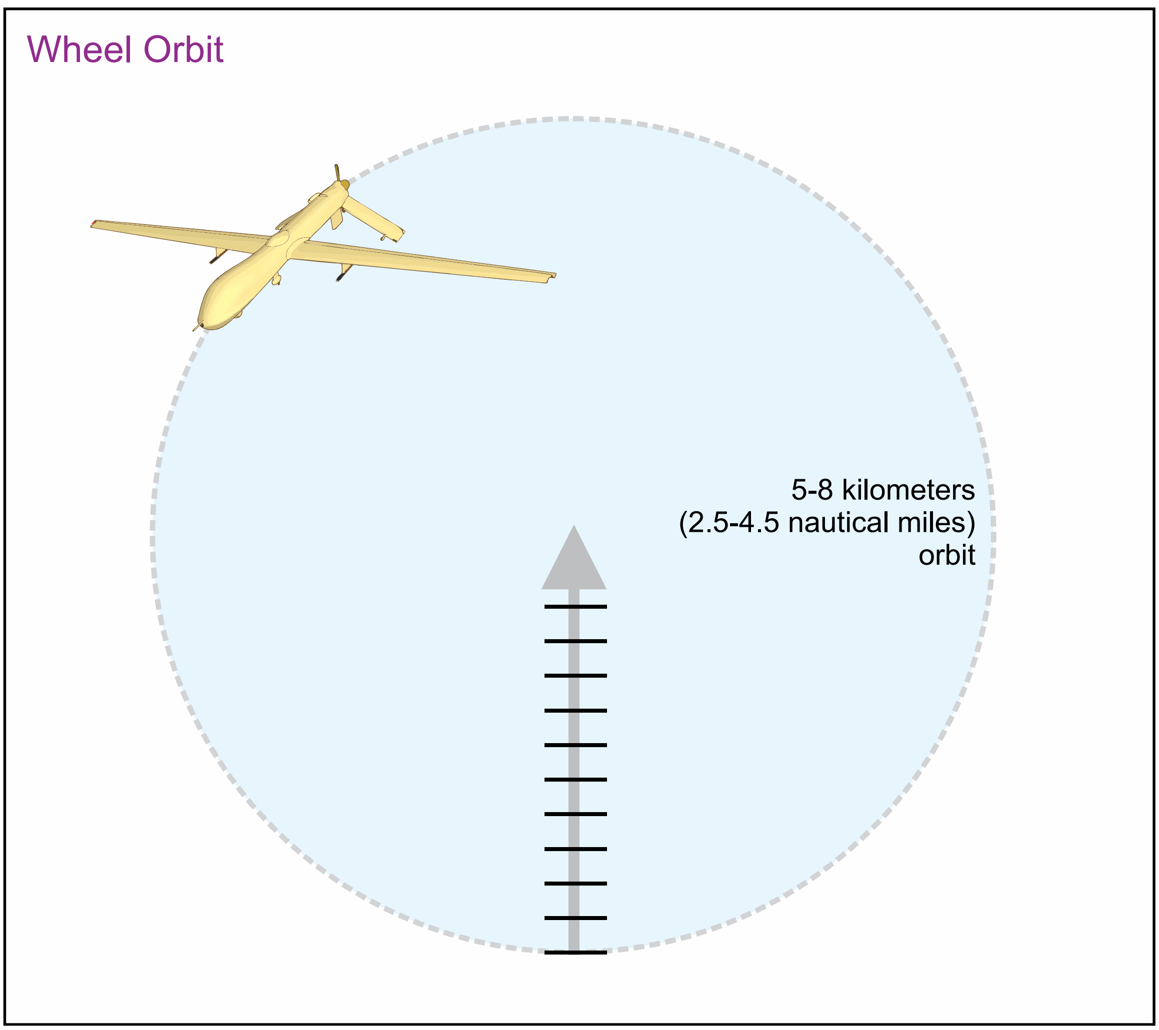


Figure III-29. Wheel Orbit

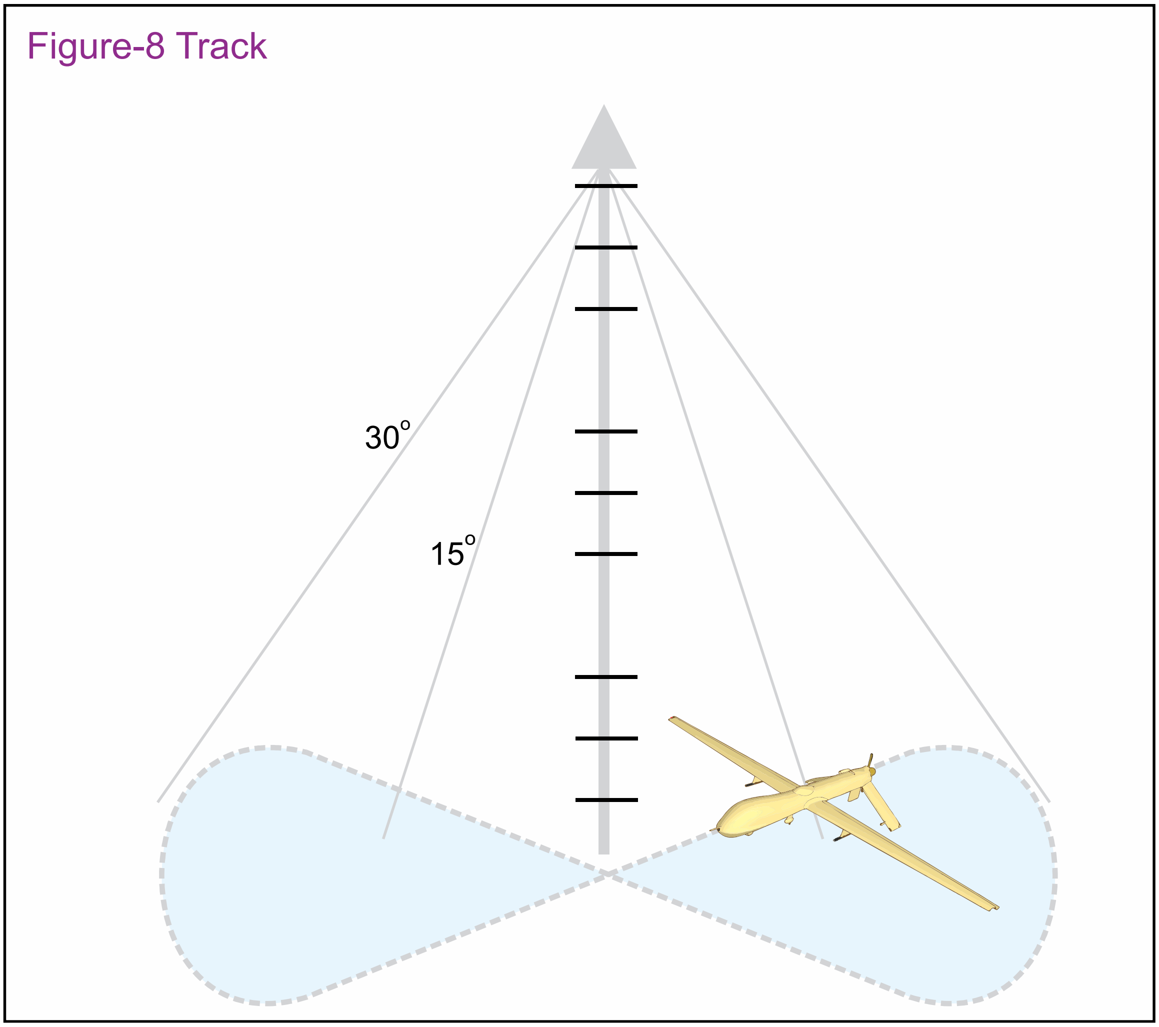


Figure III-30. Figure-8 Track

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.

17. Special Operations Forces Gunship Close Air Support

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 TAC, "CLEARED HOT," and "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 or when pre-coordinated for gun engagements. The format shown in Figure III-32 is also used for an Army attack aviation request. If JTAC/FAC(A) is on scene, the SOF gunship will work directly with them. The following paragraphs cover 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.

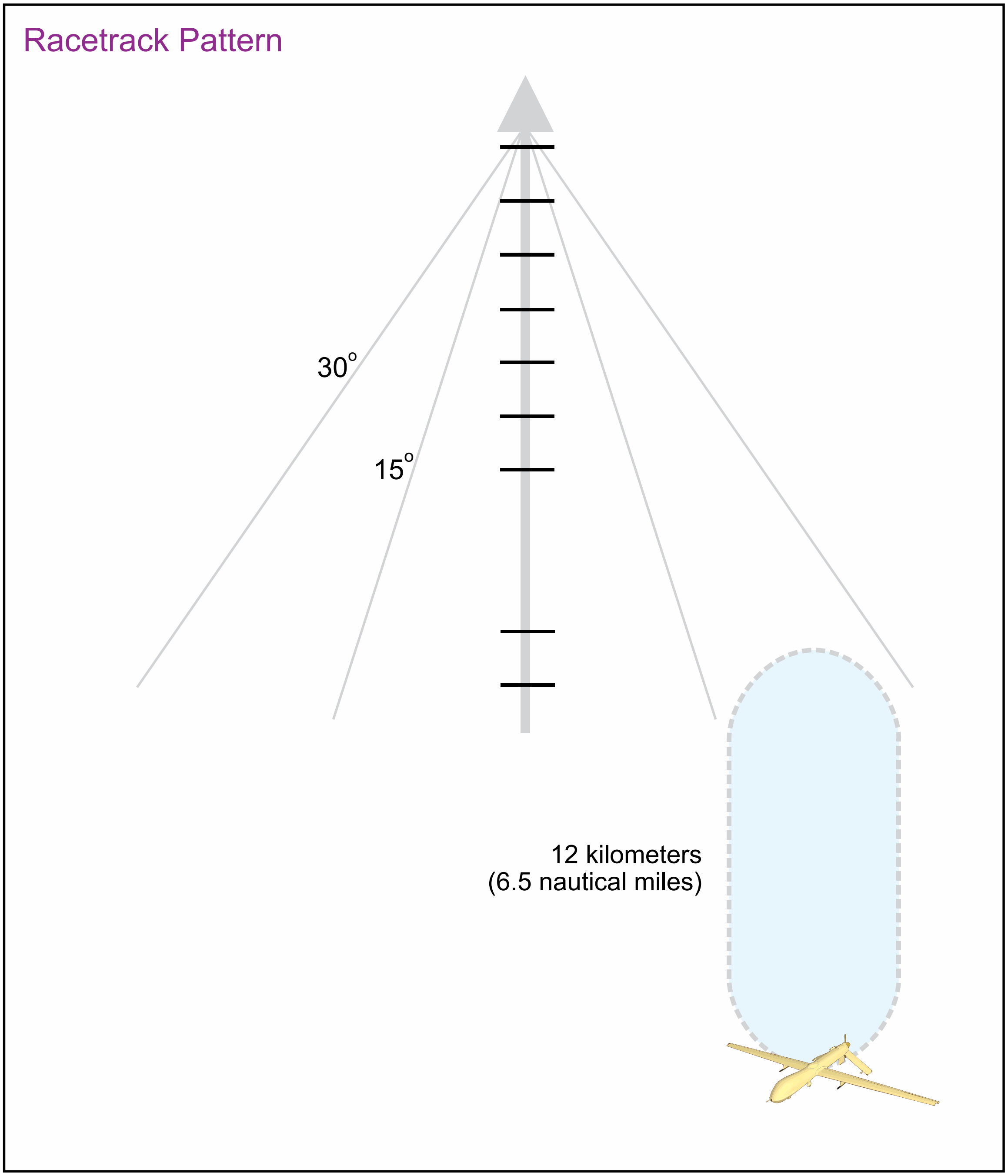


Figure III-31. Racetrack Pattern

(1) **Sensor Alignment/Gun Tweak.** The SOF gunship should complete airborne sensor alignment and gun tweak (test fire) procedures before any mission. Only under extreme circumstances will a mission be attempted without 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

Special Operations Forces Gunship Call for Fire*

Special Operations Forces Gunship Call for Fire

1. Observer and Warning Order
"______________, this is ________________, fire mission, over"
(aircraft call sign) (observer call sign)

2. Friendly Location and Mark
"My position ____________, marked by ____________________"
(TRP, grid, etc.) (strobe, beacon, IR strobe, etc.)

3. Target Location
"Target Location ______________________________________."
(bearing (magnetic) and range (meters), TRP, grid, etc.)

4. Target Description and Mark
"____________________, marked by ______________________."
(target description) (IR pointer, tracer, etc.)

5. Remarks:
"____, over."
(threats, danger close clearance, restriction, at my command, TOT, etc.)

Notes:

1. Clearance. If airspace has been cleared between the employing aircraft and the target, transmission of this brief is clearance to fire unless "danger close," "at my command," or an additional method of control is stated.

2. Danger Close. For danger close fire, the observer or commander must accept responsibility for increased risk. State "cleared danger close" in line 5 and pass the initials of the on-scene ground commander. This clearance may be preplanned.

3. At My Command. For positive control of the aircraft, state "at my command" on line 5. The aircraft will call "ready to fire," when ready.

4. For synchronization of fires, methods of fire and control may be included in line 5. Reference Table 5, "Methods of Fire and Control," for additional measures.

*Also used for Army attack aviation request.

Legend

IR	infrared	TRP	target reference point
TOT	time to target		

Figure III-32. Special Operations Forces Gunship Call for Fire

study of the terrain, 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 or JTAC/FAC(A) 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.

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) **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:

(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.

(3) **Procedures.** One factor that distinguishes AC-130 SOF gunships from other weapon systems, other than precision night strike capability, is their ability to deliver fires under conditions of low ceilings and/or poor visibility using radar beacons instead of visual cues for fire control.

18. Show of Force Considerations

a. **General.** The ground commander may determine the best COA for the current situation is an escalation of force rather than using fires that create lethal effects. 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. A show of force can be conducted as a nonlethal air operation and may 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/FAC(A) 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.

(3) The current situation does not meet ROE to allow weapons employment.

(4) Friendly forces and/or the pilot are unable to get a precise fix on the enemy's position.

(5) A unit, which the JTAC/FAC(A) does not have direct communications with, is in a "troops in contact" or an escalating situation and the JTAC/FAC(A) uses a show of force to reassure the unit that there is air support on station.

(6) Civilians have gathered and the ground force commander would like them to disperse. The JTAC/FAC(A) can use a show of force over the personnel to attempt to disperse them.

(7) Unidentified personnel are displaying possible hostile intentions and the ground force commander does not want to escalate to weapons employment. The JTAC/FAC(A) 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.

19. Digital Information Networks and Systems Considerations

a. **Network Construct.** During planning phases, ensure network architectures, with or without gateways, are properly constructed. The coordination with communications network authorities must begin early in the planning 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 operation task document. The JICO community manages the link OPTASKLINK and CNR segment for the VMF network. The ASOC/DASC will need to participate with the JICO in preparing these products. The JTAC is responsible for programming the communications networks into the ground kit.

b. **Gateway Construct.** Gateways are hardware and/or software applications that allow operators to route data between incompatible systems. A gateway system allows the JTAC/FAC(A) and/or aircrew to communicate on networks other than the one on which they are operating, without the need for additional radios. For instance, at the gateway, the JTAC's/FAC(A)'s targeting and SA information can be broadcast to aircrew in the Link 16 and/or SADL networks while the JTAC/FAC(A) is using VMF over CNR. The planning phases will determine what gateway systems will be set up and managed by the JICO or 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. **Digital Systems.** Digital systems in aircraft and ground-based JTAC kits provide several benefits that 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 LOS, BLOS, and ELOS communication systems. When combined, LOS, BLOS, and ELOS 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) **LOS Communications.** LOS communication directly connects two or more independent users through point-to-point RF communications without an intermediary.

(2) **BLOS Communications.** BLOS communications links personnel or systems that are too distant or too fully obscured by terrain for LOS communications. HF and SATCOM are examples of BLOS communications.

(3) **ELOS Communications.** ELOS communications such as Link 16 and SADL connect the JTAC/JFO and the aircraft using a relay platform. ELOS communications require CAS participants to specify the information exchange requirements to relay and share information via data link. A major advantage is the elimination of the shorter-range LOS requirement between CAS participants. However, CAS participants must coordinate with the network planner and electromagnetic spectrum managers for communication through a relay.

d. **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 sensor point, designated ground target (DGT), or aircraft attack position target designation (APTD), 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.

e. **DACAS Limitations.** Some disadvantages of digital communications include potential 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.

For more information on planning for DACAS, see Appendix D, "Digitally Aided Close Air Support Planning and Execution Considerations."

20. 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 and 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 ID method.

b. 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, it is necessary to deconflict frequencies between transmitters to reduce mutual interference. In flights of multiple aircraft, aircrew keep the VDL transmitter on and set to a constant frequency, while the ground personnel switch frequencies to view desired FMV from each VDL platform.

(1) **Aircraft Check-In.** Aircrews identify themselves as VDL-capable and confirm downlink frequency with the operator.

(2) **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-33 for VDL brevity codes).

(3) 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.

(4) 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.

(5) 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 code SET. This technique, deliberately stepping to each

Video Downlink Brevity Codes

Code	Meaning and Techniques
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 joint terminal attack controller wants to change in or out. Recommend only 1 full-motion video FOV change at a time, in or out.)

Figure III-33. Video Downlink Brevity Codes

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.

(6) 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.

(7) **Ground references.** The operator directs the aircrew to follow an identified reference until it gets to a specific object or point.

(8) Operators may request aircrews to switch sensors or views through brevity codes. Operators should understand that aircrew will provide the most appropriate video available within the limits of their sensor.

c. **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 code HOLLOW. In addition, aircrews should communicate to operators when they anticipate the feed to be lost due to aircraft maneuvers with the brevity code 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 aircrews for coordinate accuracy prior to using those coordinates for targeting purposes.

For communications brevity codes and meanings, see ATP 1-02.1/MCRP 3-30B.1/NTTP 6-02.1/AFTTP 3-2.5, Multi-Service Tactics, Techniques, and Procedures for Multi-Service Brevity Codes.

21. 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, while 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 air operations by providing planning expertise in aircraft capabilities and requirements, weapons effects, and CAS TTP. 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 possible a FAC(A) will not be able to be physically 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 should that be the case. 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 air operations 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 the FSCOORD/FSC/FSOs and AO/ALOs is critical to mission success. The 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, and triggers.

2. **High-Payoff Target List.** The purpose of a high-payoff target list is to have a prioritized list of high-payoff targets whose loss to the enemy will significantly contribute to the success of the friendly COA, 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 deconfliction 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 and 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, including DACAS and gateway availability.

b. Planned voice and data nets, including VMF and TDLs from OPTASKLINK.

c. Communications-electronics operating instructions for authentication procedures.

d. Communications security (COMSEC) procedures.

5. **Air Operations Section**

a. TAC procedures.

b. FAC(A) procedures.

c. MISREP procedures.

d. Target marking for air attack.

e. Interdiction and armed reconnaissance.

f. CAS briefing.

g. AH 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 operation plan (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 (e.g., mission number; type, model, and/or series; ordnance; time on station).

b. Routing (RW and FW).

c. Control points.

d. ACMs.

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 provide the daily communications plan, including monitored nets, frequencies, call signs, and encryption/authentication tables.

22. 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. 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 (e.g., OPLAN/OPORD, ATO, ACEOI). 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 hand offs 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. It will take a 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, and Marine TACC.

(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.

23. Joint Fires Observer Planning

a. 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/FAC(A), the JTAC/FAC(A) maintains TAC authority. The JFO or the JTAC/FAC(A) 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 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.

24. Multinational Operations

a. NATO and partner nations have and continue to use JP 3-09.3 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), *Tactics, Techniques, and Procedures 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.

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 STANAG will enhance the JFC's confidence in the JTAC's/FAC(A)'s abilities and should be considered when authorizing TAC.

25. 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.** DACAS capability should be considered for both preplanned and immediate air support requests. (As a minimum, JTAC unit reference number [URN] with digital TAD and/or Joint Tactical Information Distribution System unit [JU] number should be provided in the request.)

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 Form 1972, Joint Tactical Air Strike Request, (see Appendix A, "Joint Tactical Air Strike Request") or USMTF 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 timeframe, 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 through 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-34).

(5) **Coordination.** Approved and prioritized requests are forwarded to the JAOC for inclusion into the ATO planning cycle.

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

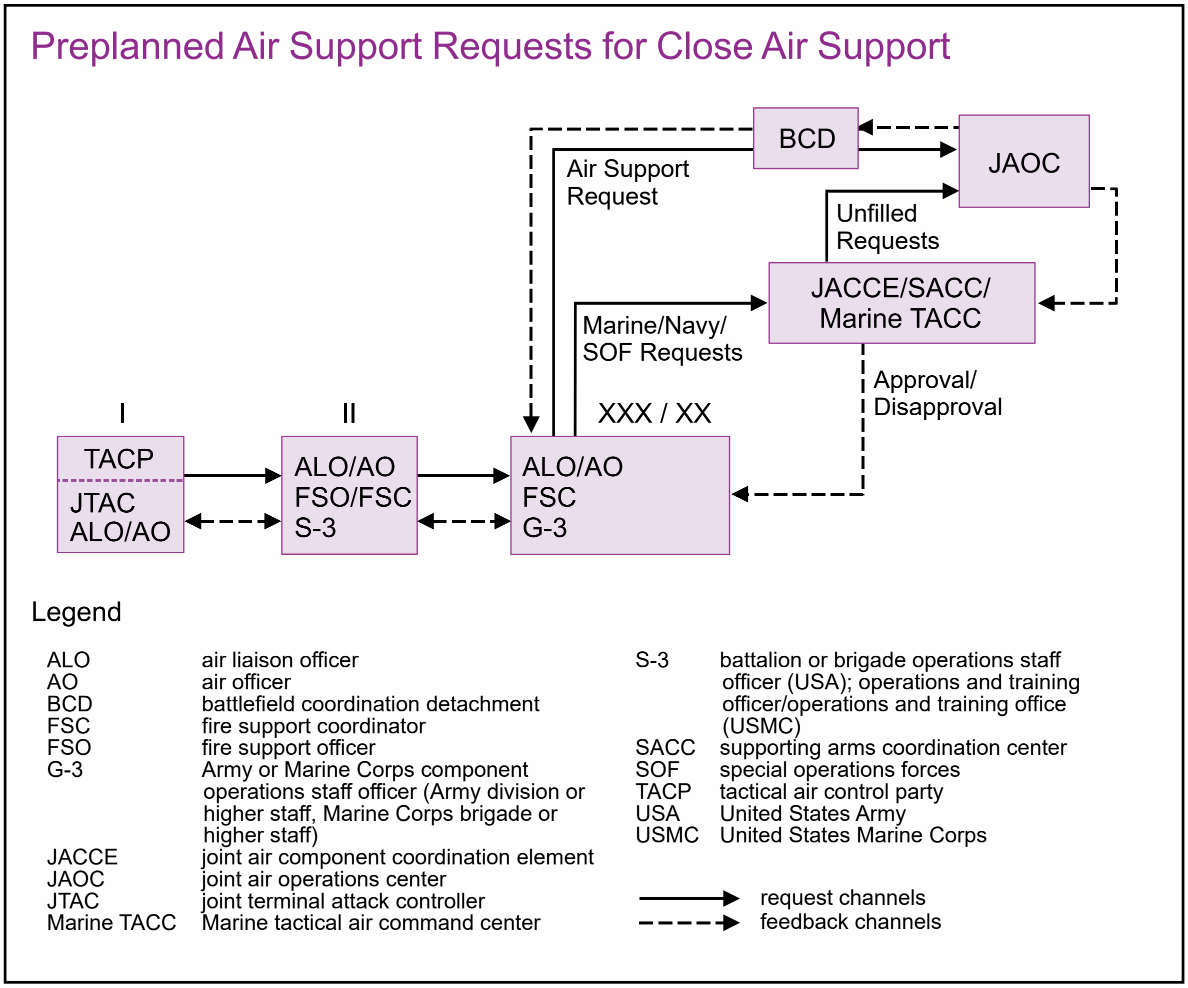
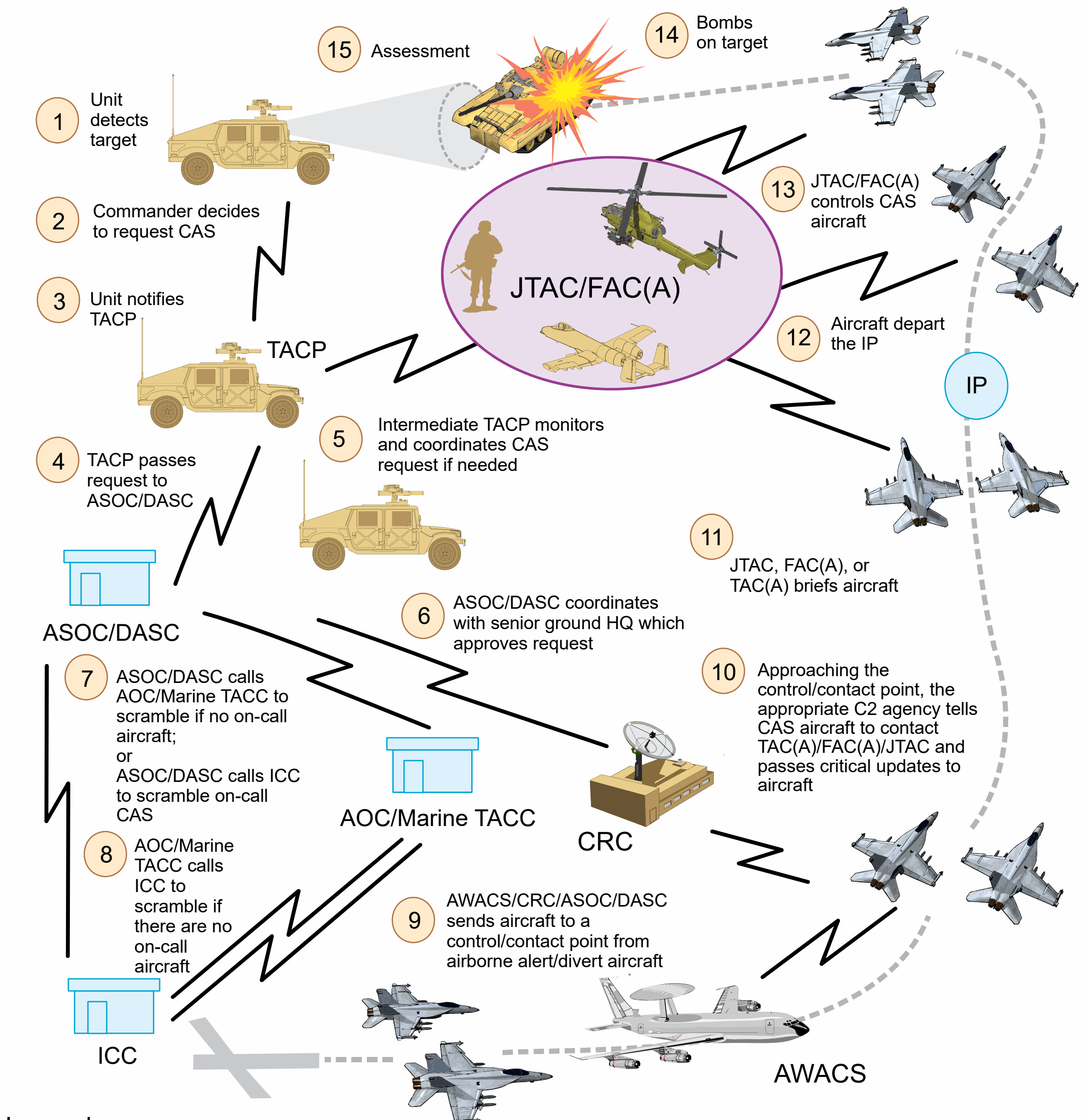


Figure III-34. Preplanned Air Support Requests for Close Air Support

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's staff (e.g., ASOC) may need to redirect missions to support immediate air support requests for CAS (see Figure III-35).

(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-36). Commanders anticipating contact may submit immediate requests that will result in missions dedicated to the maneuver force for near-term planning. Immediate air support requests/JTARs 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 II data of DD Form 1972, Joint Tactical Air Strike Request, back to the requestor. Silence by the intermediate HQ implies consent to the request.

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	ICC	installation control center
AWACS	Airborne Warning and Control System	IP	initial point
C2	command and control	JTAC	joint terminal attack controller
CAS	close air support	Marine TACC	Marine tactical air command center
CRC	control and reporting center	TAC(A)	tactical air coordinator (airborne)
DASC	direct air support center	TACP	tactical air control party
FAC(A)	forward air controller (airborne)		

Figure III-35. Immediate Air Support Request Process for Close Air Support Using the Joint Air Request Network

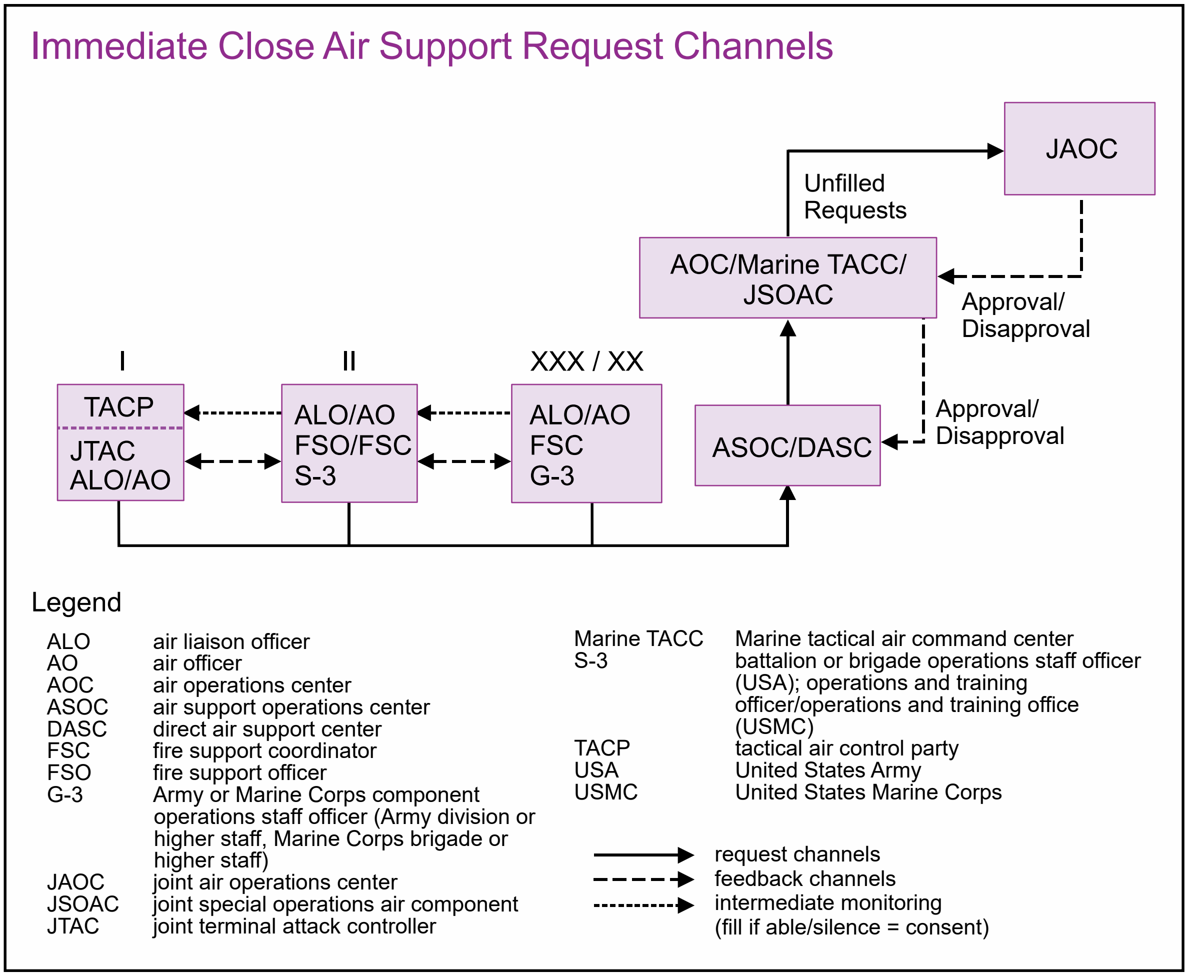


Figure III-36. Immediate Close Air Support Request Channels

(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 4, "Situation Update."

(5) **Request Format.** DD Form 1972, Joint Tactical Air Strike Request, 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 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) to provide accurate situational updates for commanders. Whether incorporated into a formal process or not, the staff's preparatory activities (e.g., JIPOE, targeting, fire plan refinement) 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.**

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

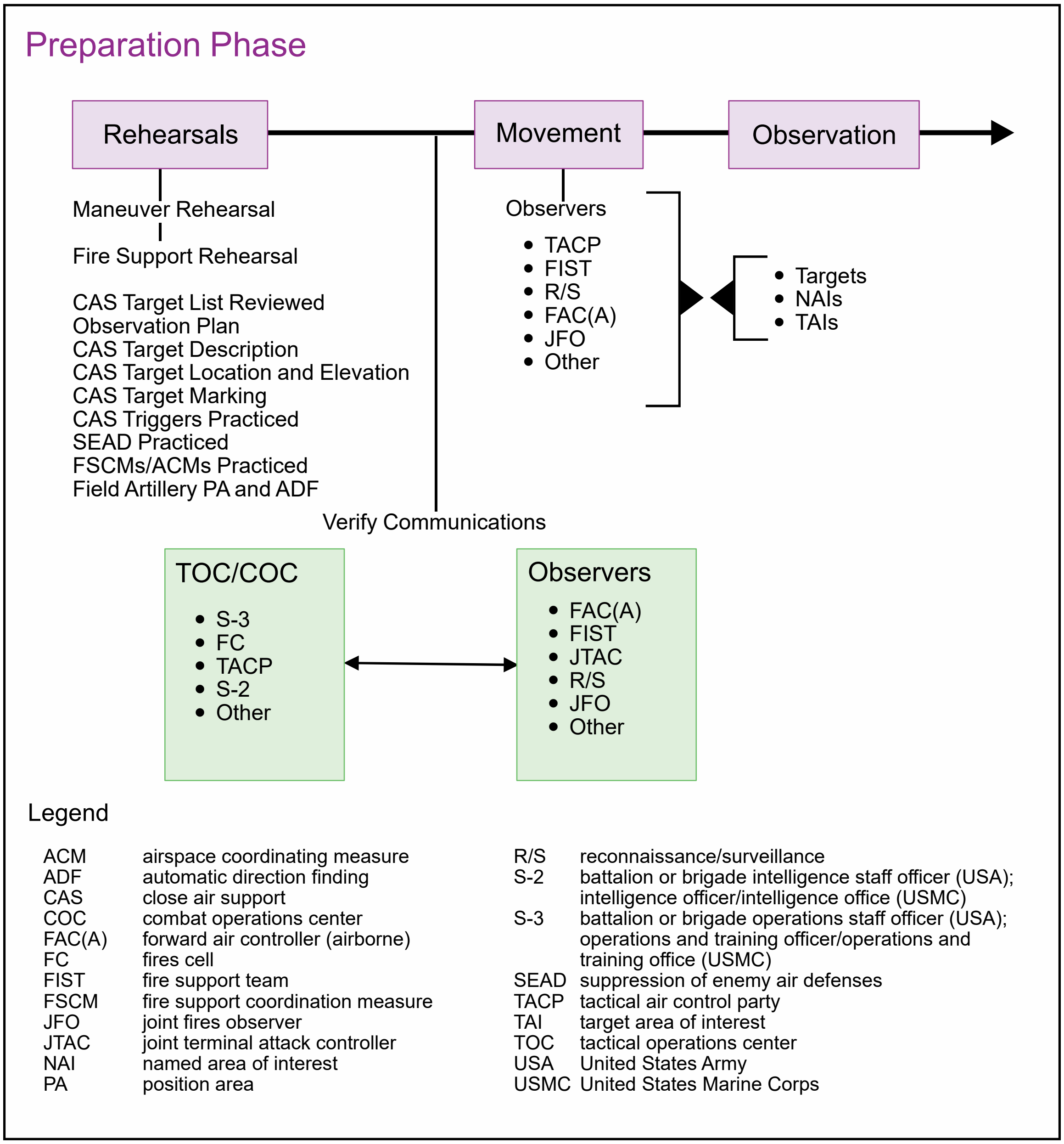


Figure IV-1. Preparation Phase

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) **Scheme of Fires and CAS.** The commander's scheme of fires should include 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 scheme is developed. Requests for CAS should clearly describe the desired effects to meet

the commander's objectives. JAOC planners should then tailor aircraft and weapons loads to create the desired effects. There is no "intent for or scheme of CAS" defined; the commander's scheme of 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 effects are, 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) TAC types to be utilized.

(h) Which JTACs/FAC(A)s will provide TAC of aircraft conducting CAS.

1. Availability of FAC(A)s.

2. Plan for effective use of excess CAS sorties (e.g., release back to ASOC/DASC for retasking, hand off to another sector or FAC[A]).

3. 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.

(b) Number of CAS sorties expected.

(c) Aircraft type.

(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) TAC 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 3900.01, Position (Point and Area) Reference Procedures.

(5) Verify each CAS target has a clearly defined task, purpose, method, and effect and 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): JTAC, FAC(A), forward observer, JFO, FIST, 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 [Fire Support Coordination Plan] of appendix 19 [Fire Support] of annex C [Operations] of the OPORD).

(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.

(g) Check DACAS kits.

1. Network settings.

2. Check kit connectivity.

3. Auto learn function.

(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 TAC 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/S-3(Air)/NGLO recap critical fire support, CAS, and naval surface fire events.

(e) Make refinements as necessary.

(f) FSCMs discussed/understood.

e. 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, IR pointer, laser range finder/designator, IR strobe light, chemical lights, GLINT tape, VS-17 panels, spotting scope, multi-band radio, radar beacon, pyrotechnics (smoke/illumination), access to illumination and smoke rounds, compass, mirror, DACAS system, 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 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 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 essential operational data 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 (CID) plan.

3. Essential friendly coordinating documents (e.g., GRG).

(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. FSEM/FSTs.

3. Established FSCMs.

4. Expected target arrays.

5. Asset integration plan.

(e) Communications plan.

1. Terminal control nets.

2. Air request nets.

3. TACP administrative nets.

4. Ground force nets.

5. Air spot nets.

6. Code words.

7. TDL for DACAS and digital addressing information.

(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) TAC 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/sensors.

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)s 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) CPs 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.

(c) Plan/submit DD Form 1972, Joint Tactical Air Strike Request.

(d) Update locations for preplanned targets.

(e) Update/FSCMs/operational graphics.

(f) Plot IPs, CPs, ACMs, and FSCMs.

(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 (e.g., authentication table, Ramrod).

(w) Confirm digital communications such as digital address and connectivity.

(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 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.

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) OPTASKLINK with CNR segment, via JICOs.

(2) SPINS.

(3) ATO.

(4) ACO.

(5) Respective Service 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.** One or more of the following target mensuration/imagery exploitation tools should be loaded onto DACAS systems if the JTAC is certified in their use:

(1) **PSS-SOF.** Windows-based Target Mensuration Only (TMO) tool that provides CAT 1 TLE coordinates using DPPDB imagery data.

(2) **DPSS-SM [Digital Precision Strike Suite-Scene Matching].** Windows-based software that combines recent imagery with DPPDB.

(3**) PFIG [Precision Fires Image Generator].** Windows-based software that creates precision fires images to be used for conducting TMO on Android devices.

(4) **DIEE [Digital Imagery Exploitation Engine].** Windows-based software capable of target coordinate mensuration, weaponeering, and creating CDEs.

(5) **PSS-SOF Mobile.** Android version of PSS-SOF mensuration tool. This allows for CAT 1 TLE coordinate generation using DPPDB and/or precision fires images on mobile Android devices.

c. **JTAC DACAS Mission Checklist**

(1) End user device or DACAS ground kit.

(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, and communication nets.

(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) VMF preplanned (canned) free text messages (FTMs).

For a detailed example of VMF preplanned (canned) FTMs, see Appendix D, "Digitally Aided Close Air Support Planning and Execution Considerations."

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. However, some tactical radio networks require the use of tactical gateways or joint range extenders to maintain ELOS communications.

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. Liddell Hart,**
> ***Thoughts on War,* 1944**

1. Introduction

Having integrated the necessary forces, capabilities, and established support relationships, 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 executing the detailed integration of CAS with the fire and movement of the supported unit.

2. Close Air Support Target Engagement

a. 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.

b. **JTAC/FAC(A) Actions for Developing a CAS Brief.** Once a ground commander has nominated a CAS target, the JTAC/FAC(A) 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/FAC(A) 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/FAC(A) needs to begin the CAS attack planning: target elevation, target description, target location, friendly location (both maneuver and fires units), and commander's desired effects on the target.

(a) **Target Elevation (Line 4).** The default target elevation is in feet MSL. It can be given in feet 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 weapon impact angles.

(b) **Target Description (Line 5).** Line 5 should be a concise, accurate description of the target (e.g., "Five APCs [armored personnel carriers] in the open"). The

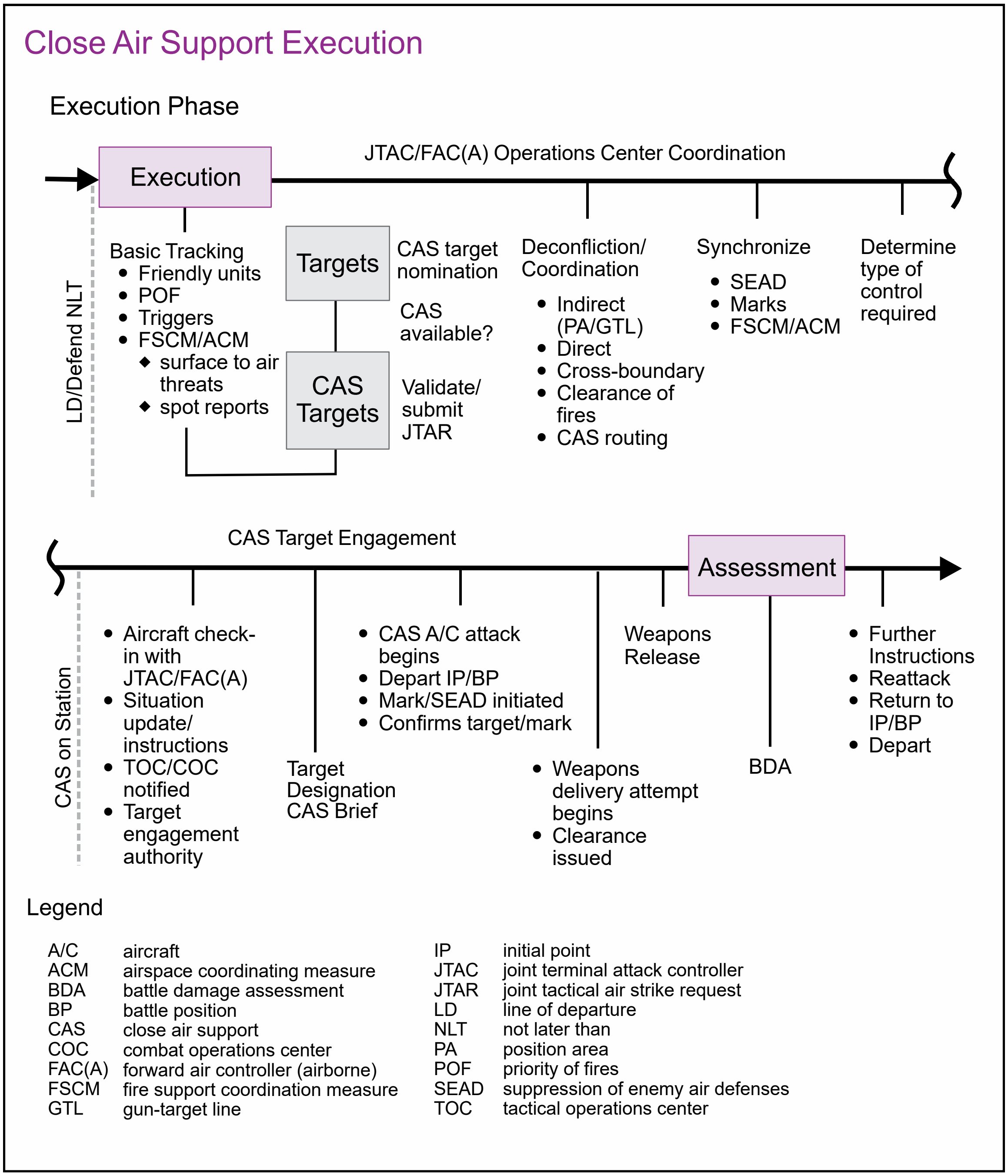


Figure V-1. Close Air Support Execution

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, line 5 should be "HVT [high-value target] 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 objective 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 create the desired effect. 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/FAC(A)s 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 incidents have occurred when JTACs/FAC(A)s 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. Additionally, JTAC DACAS ground kits enable the JTAC to generate digital JTARs by extracting and transmitting the battlefield information populated on the kits through the appropriate channels.

(b) **JTAR Accuracy.** Ideally, the controlling agency (e.g., ASOC, DASC, Marine TACC, Navy TACC, TAC[A]) briefs the aircrew before contact with the JTAC/FAC(A) using the information from DD Form 1972, Joint Tactical Air Strike Request, (Section I, Block 8, "Remarks") (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/FAC(A). If specified by the JTAC/FAC(A), 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/FAC(A)'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 friendly forces. 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, to select the most appropriate weapon and a proposed optimum combination of ordnance and fuzing. JTACs/FAC(A)s should have a working knowledge of ordnance effects, as well as risk estimate distances, and the conditions under which those numbers were derived. Consult ATP 3-09.32/MCRP 3-31.6/NTTP 3-09.2/AFTTP 3-2.6, *Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower,* for risk estimate distances and determine whether friendly troops are at risk. If so, consult with the ground commander and weigh the risks of all potential COAs before employing ordnance. JTACs/FAC(A)s may relay to aircraft the desired weapons effects and, as applicable, desired ordnance and fuzing. Aircrews 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/FAC(A)'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/FAC(A)s can request specific impact intervals based on target, threat, friendly forces, artillery/SEAD/laser deconfliction, ordnance, restrictions, and weather. The aircrew, in coordination with the JTAC/FAC(A), is responsible for tactical execution 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 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. Aircraft interval recommendations:

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/FAC(A)s should plan for allocation of the multiple sensors that may be available for a CAS attack. See paragraph 10, "Multisensor Imagery Reconnaissance and Intelligence, Surveillance, and Reconnaissance for 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 and the associated PRF code (e.g., "Blackjack laser, code 1688").

(b) BOT – line 7—the mark is specific to the attacking aircraft. If no mark is required for attacking aircraft, line 7 is "no mark."

(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/FAC(A)s 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 (e.g., JFO, scout sniper, FIST) and airborne platforms (UAS, RW, and FW) that can generate target location information, provide remote laser designation, or provide target marking.

2. **Considerations**

a. Aircrews generally use a combination of sensors and visual lookout to acquire marks and targets. JTACs/FAC(A)s 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 an 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/FAC(A)s must always be prepared for a back-up marking plan. In addition, JTACs/FAC(A)s must be ready to use marks of opportunity on the battlefield. Anything the JTAC/FAC(A) can find to cue aircraft sensors and the aircrew eyeballs to the target may be useful as a mark.

3. **Types of Marks and TGO**

a. **Laser Hand Off.** 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) Advantages

(a) High confidence in target correlation if appropriate geometries are used.

(b) May be used day or night.

(2) Disadvantages

(a) Requires LTD and LST.

(b) Requires coordination and geometry setup to ensure aircraft LST does not track ground LTD.

(c) GLTD 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) 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) FAHs shall be passed when utilizing a laser to perform TGO. Acquisition headings shall be passed when using laser handoff as a marking technique. This ensures 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) Advantages

(a) Quick.

(b) JTAC/FAC(A) has visual confirmation of what the aircrew is correlated on.

(2) Disadvantages

(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/FAC(A) 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) Advantages

(a) Does not require ground operator to expose their position to an NVG-capable enemy.

(b) JTAC/FAC(A) has visual confirmation of what the aircrew are correlated on.

(2) Disadvantages

(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/FAC(A) 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), "roping" the aircraft, or "snaking" the target.

(1) Advantage—quickly orients NVG-equipped aircrew to target.

(2) Disadvantages

(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. **VDL Talk-On**

(1) Advantage—allows JTAC to see the aircraft sensor picture.

(2) Disadvantage—requires VDL receiver.

f. **TRP/GEOREF Point Offset**

(1) Advantages

(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) Advantages

(a) Day or night.

(b) Does not require the JTAC to expose their position.

(c) Provides a starting point for talk-ons.

(2) Disadvantages

(a) Takes time to coordinate.

(b) Accuracy of most IDFs means a correction from the mark will generally be required.

(c) IDFs 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 FOV, 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) Disadvantages

(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/FAC(A), this may lead to confusion between the JTAC/FAC(A) 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/FAC(A)s should be aware of vertical surface danger zones associated with direct fire weapons and consider this when planning attack geometry.

i. **Data Link Hand Off.** Aircraft equipped with data link may select ("hook") a track that has been created on the data link network. This cues aircraft sensors to the location of that track.

(1) Advantage—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 data link-capable.

(b) Most ground-based digital CAS systems are not capable of creating a track on the data link network without a gateway.

(c) Interoperability across the joint force.

j. **Radar Beacon Offset**

(1) Advantage—day or night, all-weather.

(2) Disadvantages

(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 thermals to increase their capability.

(2) BI may also be used to illuminate targets. Illumination should be planned to be offset from the target 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 (e.g., other fires in the area, burning structures, vehicle traffic).

(5) **Develop Attack Geometry.** JTACs must consider many factors when determining attack geometry and make an educated compromise among these factors.

(a) **FAH.** 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, observation posts). However, on linear battlefields where aircraft traditionally hold behind friendly positions, JTACs/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 deconfliction 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/FAC(A)s determine IP/BP and egress plan to support attack geometry (lines 1, 2, 3, 9). JTACs/FAC(A)s should strive to use control points for ingress and egress that do not make it necessary for aircraft to make inordinately large turns 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 ATP 3-09.32/MCRP 3-31.6/NTTP 3-09.2/AFTTP 3-2.6, *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 nonstandard 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.

(d) EW SEAD—modern RF threat systems may also require EW support to effectively employ CAS, requiring detailed planning and coordination.

(e) Threats may also be mitigated:

1. Laterally—use of standoff PGMs.

Indirect Fire Suppression of Enemy Air Defenses Timing Considerations

- 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 8 nm/min (A-10 5 nm/min)
- RW CAS 4 km/min
- Example: FW section strafing attack, 1 min separation, Threat has 5 nm max effective range, threat collocated with CAS target.
  - Assuming 8 nm/min, 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	min	minute
FW	fixed-wing	nm	nautical mile
IDF	indirect fire	RW	rotary-wing
km	kilometer	SEAD	suppression of enemy air defenses
max	maximum	TOT	time on target

Figure V-2. Indirect Fire Suppression of Enemy Air Defenses Timing Considerations

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 Radio Communications During Close Air Support Missions," Examples 1 and 7.

3. Close Air Support Execution Template

a. 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 CAS aircrews and JTACs/FAC(A)s have a standard, repeatable format to expect in the highly dynamic CAS environment. The execution template (Figure V-3) is a

Close Air Support Execution Template

1. Routing/Safety of Flight
2. Close Air Support Aircraft Check-in
3. Situation Update
4. Game Plan
5. Close Air Support Brief
6. Remarks/Restrictions
7. Readbacks
8. Correlation
9. Attack
10. Assess Effectiveness
11. Battle Damage Assessment
12. Routing/Safety of Flight

Figure V-3. Close Air Support Execution Template

technique used to organize the flow of events from when an aircraft first checks in with a JTAC/FAC(A), through a CAS brief and attack, to when the aircraft checks out. (Some of the items of the template are presented as major paragraphs rather than subparagraphs.)

For detailed DACAS execution, see Appendix D, "Digitally Aided Close Air Support Planning and Execution Considerations."

b. **Authentication.** While not an element of the execution template, if not using secure communications, authentication should be used to determine if a station on the net is friendly.

c. **Routing/Safety of Flight**

(1) JTACs/FAC(A)s should immediately advise newly checked-in aircraft of other AOS, their call sign, operating altitude, and frequency as soon as possible. JTACs/FAC(A)s should be prepared to deconflict assets (e.g., aircraft from aircraft, aircraft from surface fires, and aircraft from known hazards). JTACs/FAC(A)s should advise aircrews of available airspace and desired IP/hold point locations for the attack. At initial aircraft check-in, AO/JTAC/FAC(A) shall respond with, in order:

(2) **Aircraft Routing/Holding Instructions.** Upon initial contact, each controller shall at least give "maintain" instructions to establish control of aircraft (see Figure V-4 for an example of routing calls).

"Razor 53, maintain Chevy-Dodge 14-15"

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-4. Example Routing Calls

(3) If unsure of aircraft's current position and altitude, the JTAC/FAC(A) must request this information prior to giving routing/safety of flight instructions to avoid potential conflicts.

"Hawg 23, say current position and altitude"

(4) If using an unbriefed keyhole template for holding, the JTAC/FAC(A) 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."

(5) 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."

(6) Any other info necessary for safety of flight

(a) 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."

(b) Significant weather/terrain

(7) To maintain SA to where aircraft are during routing, JTACs/FAC(A)s may request status calls from aircrews.

(8) Routing and safety of flight (RSOF) 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."

d. **CAS Aircraft Check-In**

(1) 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.

(2) JTACs/FAC(A)s should be directive about when they want the aircraft check-in.

Example: "Latch 65 send your check-in"

(3) There may be a reason to delay taking or to abbreviate the aircraft check-in such as an attack in progress, JTAC/FAC(A) not ready to copy, or JTAC/FAC(A) 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-5. This briefing may be shortened for brevity or security ("as fragged" or "with exception"). Capabilities examples include FAC(A), sensors, and Link 16. JTACs/FAC(A)s and CAS aircrews should strive to minimize multiple unnecessary check-ins. If the JTAC/FAC(A) is planning on passing the aircraft to another controller, consideration should be given to waiting to speak to the JTAC/FAC(A) 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"

(4) Depending on the situation, a JTAC/FAC(A) may ask for only those parts of the check-in he currently needs.

Example: "Latch 65, hold your full check-in, say ordnance and PLAYTIME."

Example: "Venom 15, do you have Papa Hellfire aboard?"

(5) The mnemonic "MNPOPCA" is useful for remembering the order of the check-in. (See Figure V-5.)

(a) **M**ission number.

(b) **N**umber and type of aircraft.

(c) **P**osition and altitude.

Close Air Support Check-In Briefing

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 rounds 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.")

Legend

ATFLIR	advanced targeting forward-looking infrared
ATO	air tasking order
CAT	category
C/S	call sign
FAC(A)	forward air controller (airborne)
GRG	gridded reference graphic
JTAC	joint terminal attack controller
mm	milimeter
MSN	mission number
nm	nautical mile
SITREP	situation report
UAS	unmanned aircraft system
VDL	video downlink

Figure V-5. Close Air Support Check-In Briefing

(d) **O**rdnance. If not stated by the aircrew, JTACs/FAC(A)s should ask for the following:

1. Laser code for LGBs.

2. Model of Hellfire.

3. Bomb fusing options—instantaneous/airburst/delay.

(e) **P**LAYTIME/time on station.

(f) **C**apabilities. If not stated by the aircraft, the following items may be asked for by the JTAC/FAC(A).

1. VDL capability and code(s).

2. Current situation reports (SITREPs)/situation update codes (SUCs).

3. Map/reference graphic version.

4. FAC(A) capability.

5. Sensor type and capability.

6. VMF (Forest)/Link 16 (Timber).

(g) **A**bort code.

1. If secure communications are in use, an abort code is not required. If not stated, "ABORT, ABORT, ABORT" is considered the standard to abort.

2. 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).

3. If abort code is passed, the JTAC/FAC(A) should read back abort code to ensure accuracy.

(6) If the JTAC/FAC(A) is unfamiliar with any of the aircraft's capabilities, they should ask questions in plain language at this time to avoid developing and issuing unsupportable instructions.

4. Situation Update and Game Plan

a. The situation update brief is a tool used to increase all participants' SA to the level required by the tactical situation. The brief must be missionized based on the JTAC's/FAC(A)'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-6 and V-7 are format examples of a situation update.

Situation Update Example 1

Line	Close Air Support (CAS) Situation Update	Battlefield Handover (BHO)
Threat	• General locations of surface-to-air threats not already provided. • Time of last-observed surface-to-air fires.	
Targets	• General enemy disposition. • Avoid listing of grids. Targets locations will be addressed in a CAS brief.	• General enemy disposition. • Ground commander's targeting priority list. • Target location grids (may require breaking up the transmission). • Ground commander's attack guidance matrix.
Friendly	• General friendly situation and scheme of maneuver. • Use geographic references, phase lines, checkpoints, etc. The technique is to use general terms: "all friendlies are east of the 94 easting." • Avoid passing friendly grids. If needed, use no more than 6 digits. • Include all friendly forces that may be factors during time on station (TOS), not just the joint terminal attack controller (JTAC). • All CAS assets, ordnance, and TOS remaining for BHO.	
Artillery	• Indirect fire assets that could be factors during TOS, may include the general direction of fire.	• Include the firing unit's location, call sign, frequency, and status.
Clearance Authority	• Omit it if the speaker has control. • Clarify roles if there are multiple voices on tactical air direction. For example, "Savage 13 has control and is located in the combat operations center. My JFO call sign, E4B, is located with Charlie company and is up this net." • Determine who has which elements of brief, stack, mark, and control. • Pass a plan for approving fires for BHO.	
Ordnance	• Determine the expected ordnance required to create the ground commander's desired effects. • Provide any restrictions to ordnance, such as no cluster bomb units or low collateral damage bombs only.	
Remarks and Restrictions	May include the following: • Hazards - towers, min safe altitude, weather (including surface winds). • JTAC capabilities (e.g., laser, infrared, video downlink). • Intent for aircraft (e.g., CAS, multisensory imagery reconnaissance). • Additional radio calls required by terminal attack controller (e.g., initial point inbound).	May include the following: • Updates to preplanned airspace coordinating measures, fire support coordination measures, and maneuver control measures. • Provide a positive passing of the appropriate elements of brief, stack, mark, and control. • Hazards - towers, min safe altitude, weather (including surface winds).

An Example of Situation Update 1:

CAS: "The current surface-to-air threat is an SA-6 at KJ 123 456, just west of MSR Tampa. The target is a light armored company attempting to flank us to the north and two companies dug in 3 kilometers 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, artillery is located 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."

Figure V-6. Situation Update Example 1

(1) The length and depth of the situation update must be balanced with the need to pass game plans and CAS briefs 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

Situation Update Example 2

Line	Close Air Support (CAS) Situation Update	Battlefield Handover (BHO)
Threat	• General locations of surface-to-air threats not already provided. • Time of last observed surface-to-air fires.	
Enemy Situation	• General enemy disposition. • Avoid listing of grids. Targets locations will be addressed in a CAS brief.	• General enemy disposition. • Ground commander's targeting priority list. • Target location grids (may require breaking up the transmission). • Ground commander's attack guidance matrix.
Friendly	• General friendly situation and scheme of maneuver. • Use geographic references, phase lines, checkpoints, etc. The technique is to use general terms: "all friendlies are east of the 94 easting." • Avoid passing friendly grids. If needed, use no more than 6 digits. • Include all friendlies that may be factors during time on station (TOS), not just the joint terminal attack controller (JTAC). • All CAS assets, ordnance, and TOS remaining for BHO.	
Artillery	• Indirect fire assets that could be factors during TOS, may include the general direction of fire.	• Determine the firing unit's location, call sign, frequency, and status.
Clearance Authority	• Omit it if the speaker has control. • Clarify roles if there are multiple voices on tactical air direction. For example, "Broadsword 11 has control and is located in the combat operations center. My JFO call sign, Mustang, is located with Charlie company and is up this net." • Determine who has authority for brief, stack, mark, and control. • Pass a plan for approving fires for BHO.	
Hazards	• Towers, min safe altitude, weather (including surface winds).	
Remarks and Restrictions	May include the following: • JTAC capabilities (e.g., laser, infrared, video downlink). • Factor airspace coordinating measure (ACM)/fire support coordination measure (FSCM). • Intent for aircraft (e.g., CAS, multisensory imagery reconnaissance). • Additional radio calls required by terminal attack controller (e.g., initial point inbound).	May include the following: • Updates to preplanned ACM/FSCM/maneuver control measure. • Provide a positive passing of the appropriate elements of brief, stack, mark, and control during BHO.

An Example of Situation Update 2:

JTAC or FAC(A) [forward air controller {airborne}] :

"The current surface-to-air threat is an unlocated ZSU 23-4, last seen west of MSR 5. The 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; 81 mm mortars are 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 heading for all type 2 controls. I plan on using you to disrupt the light armor, advise when ready for game plan."

Figure V-7. Situation Update Example 2

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/FAC(A)s 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) **SUCs.** Situation updates are passed from the JTAC/FAC(A) to the appropriate C2 element, normally the ASOC/DASC. The C2 element will then assign alphanumeric identifiers or time stamps to identify the SUC and pass these coded/time-stamped updates to CAS aircraft. Receiving the SUC en route to the JTAC's location allows for higher aircrew SA upon check-in and alleviates the need for the JTAC/FAC(A) to pass a full situation update. Changes to the situation update may be passed by the JTAC/FAC(A) as aircraft check on station. If appropriate, JTACs/FAC(A)s may pass specific AO situation updates as well.

(4) The format should be adapted to the mission and only those items required to accomplish the expected mission should be passed. Passing redundant or nonessential information increases time to kill and should be avoided. The situation update is also a format recognized for battlefield handover between terminal controllers (e.g., JTAC to FAC[A]).

b. **Game Plan**

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."

(1) The game plan is a concise means to inform all participants 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.

(2) If there are questions regarding aircraft capabilities, ordnance, and tactics, these should be cleared up, using plain language, prior to confirmation of the CAS briefing.

(3) A game plan is utilized for attacks involving single or multiple elements. When conducting coordinated attacks, the plan should be briefed to all participants, followed by single element as appropriate.

(4) 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/FAC(A)’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/FAC(A) plans to execute the attack.

Example: “Latch 65 and Venom 11, in order, advise when ready for game plan.”

(a) For multiple elements, the following information should be included:

1. Type of coordinated attack

a. Type of attack: Combined or Sectored

b. Attack timing: Simultaneous, Sequential, or Random

2. Flow of attack

a. If combined, the order and method of separation (e.g., visual, timing, altitude) that the elements will use.

b. 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.”

(b) The JTAC/FAC(A) should read the first element’s entire game plan, CAS brief, remarks, and restrictions prior to the second element’s game plan to maintain good communication cadence. All aircrews should be paying attention to the game 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.

(c) When briefing coordinated attacks, the JTAC/FAC(A) may state, “Hold all readbacks,” in the remarks portion of each CAS brief, so the JTAC/FAC(A) transmits briefs for all elements prior to receiving readbacks. The JTAC/FAC(A) should then request readbacks when ready. The JTAC/FAC(A) may also get readbacks immediately following the attack briefs to each element if this better fits the JTAC’s/FAC(A)’s habit pattern.

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."

5. Close Air Support Brief

a. JTACs/FAC(A)s will use a standardized briefing to pass information rapidly. The 9-line CAS brief (Figure V-8), 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. Elements of a CAS brief will not be passed piecemeal over several minutes and out of sequence. The first nine lines are understood and line numbers do not need to be passed. However, if lines 1 through 3 were abbreviated, the elevation transmission should begin with "Elevation." Following are examples of lines 1 through 3 abbreviated when using the "overhead" or keyhole method with a known direction and distance from the echo point, assuming the echo point is the target.

Example 1: "Lines 1 through 3 from the overhead. Elevation, four-hundred fifty feet …"

Example 2: "Lines 1 through 3 C10. Elevation, four-hundred fifty feet …"

Note: Allied Tactical Publication-3.3.2.1, *Tactics, Techniques, and Procedures for Close Air Support and Air Interdiction,* directs that NATO JTACs/FAC(A)s will pass line titles for each line in a CAS brief.

b. When working with NATO JTACs/FAC(A)s, 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.

c. CAS brief can be prefaced by: **"Razor 53, advise when ready for 9-line."** JTACs/FAC(A)s should ensure they are ready to pass the CAS brief prior to asking the aircrew.

d. 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.

(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. Items for line 1 are:

(a) IP or BP by name

Game Plan and 9-Line Close Air Support Briefing Format

Game Plan and 9-Line Close Air Support Briefing Format

Do not transmit the numbers. Units of measure are standard unless briefed.

Lines 4, 6, and any restrictions are mandatory readbacks. The joint terminal attack controller (JTAC) may request an additional readback.

JTAC: "___________, advise when ready for game plan."

JTAC: "Type (1, 2, 3) control (method of attack, effects desired or ordnance, interval). Advise when ready for 9-line."

1. Initial Point / Battle Position: "___________________________________"
2. Heading: "____"
   (degrees magnetic, initial point or battle position-to-target)
   Offset: "____________________________________. "
   (left or right, when requested)
3. Distance: "____"
   (initial point-to-target in nautical miles, battle position-to-target in meters)
4. Target elevation: "____________________"
   (in feet, mean sea level)
5. Target description: "_________________________________"
6. Target location: "___________________________________"
   (latitude and 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)
   Position marked by: "_________________________________"
9. "Egress ___________________________________."

Remarks and *Restrictions:

- Laser-to-target line (LTL) / pointer-to-target line (PTL)
- Desired type and number of ordnance or weapons effects (if not previously coordinated).
- Surface-to-air threat, location, and type of suppression of enemy air defense (SEAD).
- Additional remarks (e.g., gun-to-target line, weather, hazards, friendly marks).
- Additional calls requested.
- *Final attack headings or attack direction.
- *Airspace coordination areas (ACAs).
- *Danger close and initials (if applicable).
- *Time on target (TOT) / time to target (TTT).
- *Post launch abort restrictions (if applicable).
- *Approval out of battle position for rotary-wing aircraft.

Legend

BP	battle position	IP	initial point

Figure V-8. Game Plan and 9-Line Close Air Support Briefing Format

(b) Hasty BP

"Hasty BP, center grid Papa Uniform One-two-three-four, 2x2"

(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. Heading is transmitted in three digits sequentially (e.g., "One eight zero"). JTACs/FAC(A)s give an offset (offset left/right) if a restriction or threat exists. 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. For FW aircraft, the distance is given in nautical miles and should be accurate to a tenth of a nautical mile. For RW, the distance is given in meters from the center of the BP and is accurate to the nearest 100 meters.

(4) **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.

(a) Read as sequential digits. It is also recommended to include the word "feet" after the digits to break up elevation from line 5.

(b) MSL is understood; if using any other datum, it must be stated (e.g., "Three six five feet height above ellipsoid").

(c) If lines 1 through 3 were abbreviated, the elevation transmission should begin with "elevation."

(d) Line 4 can be passed as a part of a target sorting message (TSM) (J12.6) index number, or land point/track number (J.35). JTACs/FAC(A)s must ensure the correct index or track number is passed and that the elevation and coordinates used to create the track are as accurate as possible.

(5) **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.

(6) **Line 6—Target Location.** The JTAC/FAC(A) provides the target location in 4 specific manners:

(a) Options for line 6.

1. **Grid Coordinates.** If using grid coordinates, JTACs/FAC(A)s shall include the 100,000 square meter identification.

2. **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. When passing latitude/longitude in line 6, say the cardinal

direction of the latitude/longitude prior to providing the degrees (e.g., "North XX...West XX").

3. **Offset from a Known Point.** Direction and distance from a geographical, man-made feature, navigational aid, or mark.

4. TSM (J12.6) index number or land point/track number (J3.5). JTACs/FAC(A)S must ensure the correct Index or track number is passed and that the elevation and coordinates used to create the track are as accurate as possible.

(b) 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 request, 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 3900.01, Position (Point and Area) Reference Procedures.

(c) The following target location considerations should be used in line 6:

1. For an area target, give the location of the target's center or location of the greatest concentration.

2. 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.

3. **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.

4. If a higher-fidelity grid is passed other than six 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. The number of digits in a grid coordinate is the level of precision of the grid, not a measurement of target location accuracy.

(d) The following are considerations to target locations being passed in a method other than coordinates for line 6. Examples include use of GEOREFs, TRPs, GRGs, and moving targets. In these cases, there must be additional correlation between the attacking aircraft and JTAC/FAC(A) to confirm the actual target location.

1. For an offset from a known point, the offset point should be established by the JTAC/FAC(A) and acquired by the aircrew prior to the CAS brief, either visually or with a sensor.

Example: "15 feet, enemy personnel in a ditch, 150 meters southeast of friendly position."

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."

2. Anytime a grid or coordinate is not used in line 6, if capable, the aircrew should state the location (lines 4 and 6) of the target from the aircraft's pod or system during readbacks to provide SA to all CAS participants and fires approval agencies.

3. For a moving target, JTACs/FAC(A)s 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.

"Heartless 21, Punisher 75, 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."

a. Prior to aircraft engagement, the aircrew and the JTAC/FAC(A) assess the current location of the target in relation to friendly forces, noncombatants, and civilians and consider any airspace/FSCM issues that may have arisen, to include adjacent units/operations.

b. As necessary, the JTAC/FAC(A) should update any or all of lines 4, 6, 8, and restrictions and will receive readbacks on all updates 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, and airspace deconfliction problems based upon the target's changed location since passing the initial CAS brief.

(e) **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 10, "Multisensor Imagery Reconnaissance and Intelligence, Surveillance, and Reconnaissance for 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 during the target correlation process does not require any further read back 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.

(7) **Line 7-Mark Type/Terminal Guidance**

(a) **Mark Type.** JTACs/FAC(A)s 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.

(b) **Terminal Guidance.** When conducting an attack using remote 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: "Cryptic 10 laser, 1688." Unless specified by the JTAC/FAC(A), buddy lasing within a flight/section is considered autonomous. When the JTAC/FAC(A) assigns laser designation to the flight/section, the JTAC/FAC(A) shall pass the flight's call sign, the word "laser," and the laser code: "Cryptic 10 Flight, Laser 1688." Remote platforms providing laser marks/guidance to other elements require detailed coordination among all participants. Templates for FW and RW lase are show in Chapter III, "Planning and Requesting," (see Figure III-8 and Figure III-9). JTACs/FAC(A)s shall also ensure they correlate with the lasing platform.

(c) **DRPs.** When utilizing a DRP derived from a third-party contributor as a mark, the JTAC/FAC(A) transmitting the 9-line will reference the index or track number and the call sign that published the DRP on the TDL: "Gator 84, Index 9."

(8) **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: Allied Tactical Publication-3.3.2.1, *Tactics, Techniques, and Procedures for Close Air Support and Air Interdiction*, requires line 8 to be a mandatory readback item. When working with NATO FACs/JTACs, aircrews should be prepared to read back line 8 as part of the mandatory readback items.

(9) **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, and Readbacks

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) PTL shall be passed if using a ground-based IR pointer (in degrees magnetic).

(3) 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.

(4) Surface-to-air threat.

(a) Type of threat.

(b) Direction and distance from Line 6.

(c) Type suppression—continuous, interrupted, or nonstandard. If non-standard, state the duration of the suppression relative to the CAS TOT.

(d) Suppression GTL.

(5) Additional fires. Gives aircrew SA to other explosions and fires on the battlefield.

(6) Additional radio calls as requested.

(a) IP inbound.

(b) In with heading or in with cardinal direction.

(c) Time to roll-in/release.

(7) 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. **Restrictions.** 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.

(a) Final attack directions/restrictions are given in sub-cardinal directions or compass heading.

(b) There is often a need to restrict aircraft run-in headings to deconflict with other assets, avoid threat, reduce collateral damage potential, or create desired effects on the target. JTACs/FAC(A)s should choose the least restrictive FAHs possible while still accomplishing the ground commander's objectives and maximizing target destruction.

(c) Overly restrictive run-in headings can 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.

(4) Lateral and/or altitude separation.

(5) Approval out of the BP for RW.

(6) TOT/TTT.

(a) Should be passed last to indicate the end of the restrictions/remarks portion of the execution template. 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.

1. **BOC.** TOTs may be assigned as part of remarks/restrictions since BOC correlation is complete with correct readbacks. JTACs/FAC(A)s 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. For a BOT attack that may require lengthy correlation, JTACs/FAC(A)s 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. 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."** There may be times when issuing a TOT is unnecessary and aircrews may proceed on a timeline of their discretion. JTACs/FAC(A)s should use the terms "Push when ready" in this case.

4. **Immediate.** The word "immediate" in relation to TOT implies a level of urgency that may result in task-shedding on the part of all participants. 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.

c. **Readbacks**

(1) Lines 4, 6, and restrictions are mandatory readback items. If a track number was passed for lines 4 through 6, lines 4 and 6 should be read back as "4 and 6 and track number (XXX).

(2) If issued, FAHs, ACAs, danger close, and TOTs shall always be considered restrictions and will be read back. If the JTAC/FAC(A) requires additional information to be read back, the aircrew shall do so.

(3) JTACs/FAC(A)s should respond to correct aircrew readbacks with "(Call sign) readback correct" or "(Call sign) good readback."

(4) If the readback is not correct, the JTAC/FAC(A) 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"

(5) 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/FAC(A) 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.

(6) 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/FAC(A) does not receive read backs from all aircraft, but desires them, he should request those readbacks that are required to positively control the attack.

(7) 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 all CAS and fires approval participants and to aid the JTAC/FAC(A) in the BDA report.

(8) Offsets are restrictions, but do not need to be read back unless requested.

(9) **Digital Readbacks.** Considerations for using digital readbacks are in Appendix D, "Digitally Aided Close Air Support Planning and Execution Considerations."

7. Target Correlation

Target correlation is 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.** Depending on the tactical situation, JTACs/FAC(A)s must determine whether the aircrew needs to acquire the target prior to commencing attack run or whether desired effects can be created by employing on an offset from a mark, GEOREF, or TRP. During correlation, the JTAC/FAC(A) coordinates actions to mark the target and/or positions the aircraft to acquire the mark and/or target. 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.

(1) Once the JTAC/FAC(A) is satisfied that the aircrew has acquired the correct target, the JTAC/FAC(A) should transmit "The xxxx is your target." Aircrew should respond with "TALLY," "(target/object) CAPTURED," or "CONTACT," as appropriate. JTACs/FAC(A)s 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."

(2) Simply saying "That's your target" is ambiguous and should be avoided. If the JTAC/FAC(A) 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. The JTAC/FAC(A) is not required to read back this updated coordinate but may do so if there is any doubt. The JTAC/FAC(A) should plot the updated target location given by the aircrew and ensure it satisfies required geometry. Requesting updated coordinates is not required and doing so must be weighed against delaying effects on target.

(3) The following paragraphs outline procedures for conducting correlation using different marking plans:

(a) **Laser Hand Off.** JTACs/FAC(A)s must be directive 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; 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.

1. Laser hand offs may be conducted as part of a target acquisition run after readbacks if airspace is permissive or during the target engagement run if aircraft standoff is required.

2. 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."

3. After readbacks, JTAC/FAC(A) begins laser hand off with:

"Latch 65 proceed inbound heading 230 to 260, stare 1688 Papa Uniform 123 456."

Note: JTAC/FAC(A) may restate laser target line as part of this transmission if comfort level dictates.

4. Aircrew initiates laser communication when in position: "TEN SECONDS…Broadsword 11, LASER ON."

5. JTAC/FAC(A) to aircrew: "Broadsword 11, LASING, 1688."

6. The JTAC/FAC(A) should ensure continuous lasing until the aircrew directs "(Aircraft call sign), SPOT, CEASE LASER."

7. Once the aircrew has called SPOT, CEASE LASER, the JTAC/FAC(A) shall confirm the aircraft's sensor was cued to acquire the correct target.

JTAC/FAC(A): "Latch 65, what do you have under your crosshairs?"

Attack Aircraft: "Latch 65 has a single armored vehicle oriented north-south."

JTAC/FAC(A): "Latch 65, that armored vehicle is your target."

Attack Aircraft: "Latch 65 CAPTURED."

Note: The terms "spot" and "capture" are not synonymous. JTACs/FAC(A)s 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/FAC(A) 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 a laser hand off, JTACs/FAC(A)s should avoid going back out to use big to small talk-ons, as this will likely induce confusion and unnecessarily increase time to engage. However, due to spot jitter, overspill and underspill, a JTAC/FAC(A) 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, to confirm that the aircrew has acquired the exact intended target and not a nearby similar target.

8. If the aircrew reports NEGATIVE LASER during the laser hand off:

a. JTAC/FAC(A) verifies proper laser setup and pointed at correct target.

b. Verifies aircraft on correct code.

c. Verifies aircraft in a position to receive reflected laser energy.

d. Many factors influence whether airborne platforms are in a position to receive properly coded laser energy (e.g., angle of incidence, reflectivity, power out, environmentals).

e. 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 Radio Communications During Close Air Support Missions," Example 5

(b) **Match Sparkle.** When matching IR sparkles, all participants must be disciplined in call sign usage to avoid confusion as to who is to SPARKLE ON or CEASE SPARKLE.

1. JTACs/FAC(A)s 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/FAC(A): "Devil 11, proceed into the overhead and advise when ready to match sparkle"

2. Aircrew initiates when in position: "(JTAC/FAC[A] call sign), SPARKLE."

3. JTAC may initiate match sparkle if required. When the aircrew reports ready, JTAC/FAC(A) turns on IR sparkle and transmits "(Aircraft call sign), MATCH SPARKLE".

4. JTACs/FAC(A)s should be prepared to facilitate SNAKE and STEADY calls by the aircrew.

5. JTAC/FAC(A) should then observe the aircraft's IR sparkle move to overlay the JTAC/FAC(A) IR sparkle.

6. Once the aircrew's IR pointer is on the correct point, the JTAC/FAC(A) confirms what the aircrew sees there.

Note: In some cases, ground-based pointers can "wash-out" the aircraft's pointer. In this case, the JTAC should cease the ground-based IR sparkle to confirm the aircraft's sparkle is on the appropriate location. JTAC/FAC(A) 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/FAC(A)s and aircrews should be aware that most current aircraft FLIRs are unable to sense IR pointers and aircrew must compare what they see outside the cockpit to what their sensor is centered on during correlation.

7. If aircrew reports NO JOY or indicates problems with skip/overspill that preclude locating the target:

a. JTAC/FAC(A) verifies IR sparkle is pointed at correct target.

b. JTAC/FAC(A) verifies aircraft is NVG equipped.

c. JTAC/FAC(A) verifies aircraft is in a position to acquire IR energy and is searching in the correct area.

d. Many factors influence whether airborne platforms can see IR sparkles (e.g., IR sparkle power out, ambient light levels too high [cultural lighting], distance from target, cloud cover, NVG performance). Generally speaking, the JTAC/FAC(A) should expect that aircrews will attempt to position themselves to have an unobstructed LOS to the target area.

e. Reinitiate match sparkle procedures. If unsuccessful and unable to resolve, attempt sparkle walk-on or choose a different type of mark.

8. JTACs/FAC(A)s 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.

(c) **Sparkle Walk-On.** When the tactical situation prevents the JTAC from using a ground-based IR sparkle (e.g., dead batteries, broken equipment, concealment from enemy observation, excessive skip/overspill), a sparkle walk-on may be used to orient the aircraft's sensor to the target. The JTAC/FAC(A) 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.

1. If holding at an IP, aircraft may need to proceed inbound to acquire the target on their sensors.

2. JTAC/FAC(A) begins sparkle walk-on with: "(Aircraft call sign), SPARKLE ON."

3. JTAC/FAC(A) observes aircraft IR sparkle and gives verbal slew commands.

a. Slew commands should be "(Aircraft call sign), SLEW, cardinal/sub-cardinal direction and distance in meters."

Example: "Latch 65, SLEW north 150"

b. Slew commands may also include a limiting feature.

Example: "Razor 53, SLEW south 50 to the east-west road"

c. Do not use "left, right, up, down" when conducting a sparkle walk-on.

d. JTACs/FAC(A)s 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 aircrews 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.

4. When the aircraft's IR sparkle overlays the target, the JTAC/FAC(A) should direct "(Aircraft call sign), STEADY."

5. JTAC/FAC(A) completes correlation by confirming what the aircrew sees and where their IR sparkle is.

6. Aircrew call "TALLY," "CONTACT SPARKLE," or "(target/object) CAPTURED."

7. JTACs/FAC(A)s may also request that aircrew sparkle the target as they ingress during the attack run to provide additional confirmation and to ensure target correlation remains the same.

(d) **Aircraft Laser Designation on Target**

1. JTACs/FAC(A)s equipped with thermal laser spot imagers or see-spot devices may correlate by directing the aircrew to lase the target with their laser designator.

2. On vertically developed targets, the aircraft laser must be on a surface that the JTAC/FAC(A) can observe.

(e) **Ground IR Sparkle Only**

1. The JTAC/FAC(A) must ensure 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.

2. Depending on target size and composition, JTACs/FAC(A)s may need to cease sparkle to avoid the IR energy washing out the target.

3. When attacking tactical size targets, attacking aircrews may be able to see the target end of the IR pointer but unable to acquire the target. In this case, aircrews 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.

4. **When ground forces employ IR sparkle, aircrews must call VISUAL and TALLY or CONTACT SPARKLE prior to receiving weapons release authorization**.

(f) **Visually Significant Mark**

1. 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.

2. Consider the timing of the mark. JTACs/FAC(A)s may coordinate a mark to arrive on deck 30 to 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.

a. For BOT attacks using IDF, direct fire, or aviation fires as visual marks that are deliberately synchronized to arrive 30 to 45 seconds prior to CAS TOTs, there is minimal time to conduct correlation. For these types of attacks, correlation is satisfied by the aircrew being CONTACT the visual mark and the JTAC/FAC(A) providing an accurate correction from that mark, "Razor 53, from the mark, east 50." (Transmitting "mark is on the deck" is redundant and, thus, not required).

b. If the CAS aircrew sees the mark before the JTAC/FAC(A), they shall call "CONTACT the mark" to advise the JTAC/FAC(A) that the CAS aircrew are ready to receive a correction. Once the correction is given by the JTAC/FAC(A), the CAS aircrew may call "CONTACT the mark" or "TALLY target" if time permits.

3. When using direct fire weapons to mark, the JTAC/FAC(A) 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/FAC(A)s should coordinate moving them to the overhead to aid in acquisition. JTACs/FAC(A)s must also be aware that the presence of multiple direct fire assets on a battlefield could lead to confusion.

4. If the IDF, direct fire, or aviation-fires mark falls out or is unusable, the JTAC/FAC(A) must weigh the risk of continuing the attack. JTACs/FAC(A)s 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 on something besides the intended mark. JTACs/FAC(A)s must be able to quickly weigh whether to use the new object identified by the aircrew as a new mark.

5. 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").

(g) **Talk-On**

1. 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:

a. Aircrew perspective.

b. Controller perspective.

c. Environmental conditions.

d. Target area relief.

e. Resolution and currency of reference graphics.

f. Ability to establish a unit of measure.

2. Figure V-9 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 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/FAC(A)s should select the most prominent structure/feature nearby the target for initial orientation between themselves and the aircrew.

3. 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:

a. Aircraft sensor capabilities (e.g., EO, IR)

b. VDL capability.

c. Aircraft INS.

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-9. General Visual Perspectives for Talk-On Consideration

d. GRGs/operational graphics.

e. Imagery products with associated elevation data.

f. TDL/DACAS systems.

4. 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 Radio Communications During Close Air Support Missions," Example 4.

5. JTACs/FAC(A)s and CAS aircrews 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. Furthermore, use of mobile mensuration tools by TMO-certified operators may enhance coordinate precision and improve data accuracy. Leveraging these, the JTAC/FAC(A) may elect to conduct a narrowly focused initial talk-on technique. 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.

6. **Enhanced Target Description.** An enhanced target description is typically used in high-threat and/or low-altitude ingress 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 aircrew 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/FAC(A) 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/FAC(A) 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/FAC(A) is describing the area.

7. When coordinating a talk-on, the JTAC/FAC(A) should be specific about which type of talk-on he will be using (e.g., map, GRG, VDL, DRP, visual). The JTAC/FAC(A) should also be specific about when he switches from one type of talk-on to another. For example, a JTAC/FAC(A) may begin a talk-on using a GRG but transition to a visual talk-on once a common frame of reference has been established. Additionally, if the JTAC/FAC(A) is utilizing a digital system, beginning the talk-on from a DRP may

exponentially decrease the time it takes the CAS aircraft to acquire the target. When using GRGs, TRPs, DRPs, or GEOREFs, it is essential that the JTAC/FAC(A) 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."

8. JTACs/FAC(A)s 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 to ensure a common starting point.

9. 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:"

a. **F**rom a point (easily recognizable start point).

b. **I**n a direction (cardinal/sub-cardinal direction).

c. **D**istance to travel (established unit of measure or meters).

d. **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."

10. Short, directive transmissions using "call contact" as an instruction are more likely to result in a successful talk-on.

11. Limiting the number of cardinal directions to two in a transmission helps to reduce confusion.

12. 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 participants to quickly reference them without having to resort to "this road" and "that building."

13. Establishing units of measure may be helpful to aid in estimating distance over the ground. JTACs/FAC(A)s should attempt to use features along the route of the talk-on when establishing these units of measures.

14. When conducting visual talk-ons, JTACs/FAC(A)s 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.

15. 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?"

16. JTACs/FAC(A)s should make aircrews aware of their avenue of observation to the target, helping the aircrew to visualize what the JTAC/FAC(A) can and cannot see.

a. When transitioning from a map or GRG talk-on to a visual talk-on, the JTAC/FAC(A) must be aware of the limitations of their perspective. The JTAC/FAC(A) should not ask the aircrew to describe features that the JTAC/FAC(A) cannot see.

b. If an aircrew describes a feature that is not observable by the JTAC/FAC(A), the JTAC/FAC(A) should inform the aircrew.

17. Once the JTAC/FAC(A) 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?"

(h) **VDL Talk-On**

1. When the JTAC/FAC(A) and aircrew are both properly equipped, a VDL talk-on provides good certainty as to what the aircrew is looking at.

2. For ease of JTAC/FAC(A) use, the aircrew should strive, within a section, to select downlink frequency with at least 30-megahertz separation. This will

allow the JTAC/FAC(A) to rapidly switch between aircraft downlinks within a section while not dealing with bleed-over from the other aircraft.

3. Most aircraft VDL feeds provide symbology, including sensor aimpoint reticle, target location and elevation, and aircraft position and elevation. JTACs/FAC(A)s should strive to be familiar with symbology, but if they are not, they may query aircrews regarding the display. Some aircraft systems are also capable of transmitting metadata that allows aircraft position and sensor point to be overlaid on the map feature of some VDL receiver systems.

4. When conducting VDL talk-ons, JTACs/FAC(A)s should use appropriate brevity codes.

5. When using the term SLEW to direct the aircrew to move a sensor, JTACs/FAC(A)s should use up, down, left, and right instead of cardinal directions, to avoid confusion. VDL talk-ons should direct the sensor from one point to another to avoid excessive slewing.

6. JTACs should keep aircrews informed of HANDSHAKE status, providing a common frame of reference to both participants.

c. **Third-Party Contributor.** Third-party correlation may occur outside the normal timeline of the CAS attack. JTACs/FAC(A)s must ensure all appropriate correlation methods described in previous paragraphs are coordinated with the third-party contributor if the third-party contributor is conducting TGO in support of a CAS attack.

d. **Correlation Using DACAS Systems**

(1) **APTD.** CAS aircraft that can transmit APTD allow a VMF-capable JTAC/FAC(A) to see where the aircraft is and the aircraft's DGT.

(2) **Sensor Point.** CAS aircraft that can transmit sensor points enable JTACs/FAC(A)s to see where the aircraft's sensor is pointed. Once the talk-on is completed, the target location can be updated and transferred to the weapon system.

(3) **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 should be accomplished to correlate the exact target. If unable to correlate via talk-on due to weather, location, or timing, verification shall be accomplished by other means (e.g., index/datalink number, updated coordinate readback).

8. Conduct the Attack

a. **Additional Considerations Prior to Conducting the Attack**

(1) After correlation, and before the attack, any questions that remain must be answered. If during correlation, either the aircrew or JTAC/FAC(A) realize that an element of the CAS brief should be changed to facilitate a successful attack, it should be discussed

and amended. 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/FAC(A) and aircrew prior to beginning the attack. Examples of this include:

(a) Delayed versus continuous lase.

(b) Section/flight versus individual clearance for simultaneous FW or RW attacks.

(c) Ground commander's intent.

(d) Ordnance selection, based on aircrew's analysis of the target.

(e) Fuzing.

(2) JTACs/FAC(A)s must remember to issue the TOT, if it has not already been issued, and confirm mission with their fires approval chain. JTACs/FAC(A)s 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/FAC(A)s can monitor the CAS attack timeline to ensure effective integration with fire and movement.

(3) JTACs/FAC(A)s may also need aircrews to state the type of delivery profile they will execute to allow the JTAC/FAC(A) to plan appropriately.

b. Throughout a CAS attack, the JTAC/FAC(A) must maintain awareness of the aircraft position, the friendly situation, and the objective area.

(1) Changes to the friendly situation must be monitored to ensure their fire and movement will remain integrated and synchronized with the CAS attack timeline. If changes occur, JTACs/FAC(A)s must weigh their ability to continue, shift, or abort the attack based on the attack timeline. For instance, if SEAD is required, the JTAC/FAC(A) must know the SEAD timeline so 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.

(2) The JTAC/FAC(A) 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.

c. **TAD Discipline.** The TAD net can become very congested very quickly. All participants on a TAD net must use "active listening" and appropriate communications discipline and cadence. Ultimately, the TAD belongs to the JTAC/FAC(A), and the JTAC/FAC(A) must control it by voice.

(1) Once an aircraft calls "IN," all other calls should be held until after the JTAC/FAC(A) has issued clearance for weapons release or an abort. An exception to this is that anyone can and should call an abort at any time they deem necessary.

(2) **Brevity.** 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 participants should always use brevity codes for clearer and more concise communications. See ATP 1-02.1/MCRP 3-30B.1/NTTP 6-02.1/AFTTP 3-2.5, *Multi-Service Tactics, Techniques, and Procedures for Multi-Service Brevity Codes,* for a complete list of all multi-Service brevity codes.

d. **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. 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.

e. **Abort Procedures.** The JTAC/FAC(A) may direct CAS aircrew to ABORT for a variety of reasons (e.g., aircraft not aligned with the correct target, noncombatants or civilians entering the target area, friendly forces being endangered by the attack, safety of CAS aircrews, or a change in situation that obviates the need for a CAS attack). JTACs/FAC(A)s shall ABORT the CAS attack if the ground force commander directs the termination of the attack.

(1) 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/FAC(A) refers to the authentication document, finds the reply, and notes but does not transmit it. The reply "letter" becomes the abort code (see Figure V-10).

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-10. Abort Call Illustration

(2) 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.

(3) If no abort code was briefed, then the CAS attack is aborted by simply transmitting, "ABORT, ABORT, ABORT."

For PLA procedures, see Chapter III "Planning and Requesting," paragraph 9.g., "Post-Launch Abort (PLA) Considerations."

9. Battle Damage Assessment

a. **Assess Effects of the Attack.** Once ordnance impacts the target, the JTAC/FAC(A) must assess whether the commander's desired effects were created. This assessment will determine whether to continue the attack, provide subsequent corrections, abort sequential attacks, set up a reattack, or issue a new game plan/CAS brief.

(1) Obscuration may preclude assessment for several minutes. JTACs/FAC(A)s should weigh the need for follow-on attacks with the need to preserve ordnance until an assessment can be made.

(2) If ordnance adjustments are required for sequential attacks, 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: **"Razor 02, from lead's hits, north 100."**

(3) Execute reattacks or issue new game plans/CAS briefs as necessary.

(a) Reattacks allow CAS aircraft to quickly reposition to attack the same target and maintain compliance with any restrictions in place. If reattacks are required, the JTAC/FAC(A) must determine if there is a need for a new game plan and also determine whether a new CAS brief is required.

(b) 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.

(c) In a high-threat or hostile environment, aircraft may be unable to make multiple passes due to enemy defenses.

(d) 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.

(e) Corrections and new restrictions can be given to the aircrew during maneuvering. If the reattack is against the same target, the JTAC/FAC(A) should state "(Call sign), CONTINUE for a reattack, restrictions remain the same."

(f) If the reattack target is in close proximity to the previous target, the JTAC/FAC(A) must ensure the aircraft is correlated to the new target but does not require a new CAS brief.

(g) JTACs/FAC(A)s shall also ensure previous restrictions are still applicable or change them if necessary.

b. **BDA**

(1) BDA is used to update the enemy order of battle. Accurate BDA is critical for determining whether a target should be reattacked. There is no standard as to who is in the best position to determine BDA. Aircrew and JTACs/FAC(A)s 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, assets/capabilities, experience, weather, terrain, employment techniques, and enemy actions. The BDA report should include:

(a) Size—number and type of equipment/personnel observed.

(b) Activity—movement direction, stationary, dug-in.

(c) Location.

(d) Time.

(e) Remarks—munitions expended, observed damage (number of tanks destroyed, number still active, and recommendation), mission number, and mission accomplished.

(2) 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.

(3) JTACs/FAC(A)s must ensure BDA is accurate and should not overestimate BDA or report BDA that they cannot observe.

(4) BDA reports may be passed throughout the time on station, or prior to aircraft egressing, and should be given for a flight, not individual aircraft.

(5) **JTAC/FAC(A) Responsibilities**

(a) Whenever possible, the JTAC/FAC(A) provides attack flights with the BDA of their attack as they egress. 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 for specific attacks, at a minimum, pass "SUCCESSFUL," "UNSUCCESSFUL," or "UNKNOWN" assessment to the aircraft and the controlling agency for the attack. That assessment reflects whether, in the JTAC's/FAC(A)'s judgment, the ground force commander's desired effects were created by that attack (e.g., has the ground commander's intent been met for that attack?). In some cases, aircrews with various sensors may be better situated to aid the JTAC/FAC(A) in assessing hit results.

(b) 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. JTACs/FAC(A)s 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).

(6) **Aircrew Responsibilities.** Use the abbreviated USMTF INFLTREP (Figure V-11) 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, ADA, 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.

c. **Routing/Safety of Flight.** JTACs/FAC(A)s are responsible for providing RSOF instructions to aircraft as they egress. This provides safe passage for exiting aircraft, and allows JTACs/FAC(A)s 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.**

10. Multisensor Imagery Reconnaissance and Intelligence, Surveillance, and Reconnaissance for 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.

Inflight Report

Inflight Report (INFLTREP)

Aircrew transmits "_____________" this is "___________, INFLTREP, over."
(Adressee) (aircraft call sign)

Authentication as required

Addressee responds "This is "_________________, INFLTREP."
(Addressee call sign)

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-11. Inflight Report

(3) Situation update/reconnaissance/surveillance briefing. Sensor allocation:

(a) JTACs/FAC(A)s should develop and brief a comprehensive sensor allocation plan that provides tasking for all available sensors. Redundancy should be minimized.

(b) Figure V-12 provides terms for tasking aircraft sensors providing overwatch for patrols and convoys.

(4) **MIR/ISR**

(a) While MIR/ISR is being conducted, JTACs/FAC(A)s should remain in contact with aircrews and update tasking and sensor allocation as the tactical situation develops.

(b) **Labeling.** Specific labels may be assigned to individuals and vehicles that aircrews acquire while conducting MIR/ISR. This enables JTACs/FAC(A)s and aircrews 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

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-12. Sensor Postures

truck 1" or "Person 2." Figure V-13 provides brevity codes that can be used with these labels to provide quick, directive tasking.

(c) Labeling 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/FAC(A) should request target coordinates 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 method. For BOT employments, the coordinate and elevation are used by the JTAC/FAC(A) 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/FAC(A) as to the level of precision required.

(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.

(a) **If aircrews are unable to provide a grid and are only tally a target,** lines 4 through 6 may be passed in the CAS brief as estimated elevation for line 4, full description of the target for line 5, and "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 readbacks will consist of elevation and the aircrew will state TALLY.**

(b) If the aircrew are CAPTURED the target subsequent to the CAS brief, and able to provide updated lines 4 and 6, the aircrew will pass the JTAC/FAC(A) an updated elevation and/or coordinate for the target. The JTAC/FAC(a) and the supporting fires approval chain will use this coordinate for final fires integration, as a starting point for future correlation (if required) and for the BDA report. The coordinate passed from the aircraft to the JTAC/FAC(A) during the target correlation process does not require any further readback by the JTAC/FAC(A) if the aircrew passed the coordinate to enhance SA

Sensor Tasking Brevity Codes

Code	Meaning
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 situational awareness on the assigned GROUP. (Directive call for assets to bring sensors onto a single point of interest.)
STATUS____	Call from joint terminal attack controller 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-13. Sensor Tasking Brevity Codes

and assist in the fires approval process. The attack will be conducted based on the aircrew's capture only. If there is a 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.

(7) **Remarks/Restrictions**

(8) **Readbacks.** An aircrew can acquire a target and derive targetable data (lines 4, 5, and 6) for the 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. Aircrew readbacks will only consist of any restrictions passed. **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 effectiveness** and repeat steps 4 through 9 as necessary.

(11) **BDA**

(12) **Routing/Safety of Flight**

b. When it appears likely that a CAS attack will be required, JTACs/FAC(A)s should be proactive in developing the game plan, CAS brief, and restrictions. Developing this information early will allow JTACs/FAC(A)s to issue a preemptive CAS brief, minimizing time to kill once the target has been acquired, updating lines 4 through 6 and 8, and the attack has been approved.

11. Special Operations Forces Gunship Close Air Support and Integration with Other Strike Aircraft

a. Due to unique systems and capabilities, SOF gunships do not require TAC for all weapons profiles. JTACs/FAC(A)s supported by SOF gunships must establish the fire/attack control and approval procedures to be used during an engagement. The SOF gunship crew will maintain radio contact with the supported forces at all times during firing.

b. The SOF gunship can accept a SOF gunship 5-line and a 9-line CAS brief. Gunship crews prefer 5 lines for gun engagements and 9 lines for PGMs. When using both gun and PGMs during a simultaneous attack, use a 9-line with gun attacks stated in the remarks. 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.

c. **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. When employing a SOF gunship with radar beacons, the JTAC/FAC(A) must give all target ranges and bearings from the location of the beacon. The beacon should be located as close as practical to the perimeter of friendly forces.

d. **Parameters for Attacking the Target.** The **type of target,** its **value,** the **proximity of friendly forces,** and the **damage already inflicted** will determine the weapon selection, ammunition type, and the number of rounds required to successfully attack the target. Munitions selection should not be dictated to the SOF gunships; rather, the JTAC/FAC(A) should request the desired effects. The SOF gunship is capable of extended loiter and SOF gunship crews can work a series of targets with a single ground party/controller. 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 targets.

e. **Adjusting SOF Gunship Fire**

(1) If there is a significant miss distance or the wrong target was hit, adjust the round impact by giving cardinal/sub-cardinal direction and range (meters) from impact to the desired target: "adjust fire northeast 200."

(2) Marking or confirming targets may be accomplished using the gunships IR pointer (SPARKLE).

(a) To move the IR pointer, JTAC/FAC(A) should say "move" or "roll SPARKLE" with direction and distance: "roll SPARKLE northeast 100."

(b) Once IR pointer is over the target, say "freeze SPARKLE."

(3) Do nots:

(a) Do not ask the gunship to identify colors at night.

(b) Do not reference clock positions.

(c) Do not pass run-in headings/no-fire headings when passing 5-line.

(d) Do not correct "left, right, short, or long."

f. **Gunship Integration with Other Strike Aircraft**

(1) Gunships fly a continuous orbit around a target. JTACs/FAC(A)should strive to keep fires massed and constant while integrating CAS aircraft and gunships.

(2) FW Integration with SOF Gunship. JTACs/FAC(A)s can use three separate integration methods to employ FW CAS with gunships. Advantages and disadvantages attributes can be found in Figure V-14.

(a) Wheel (Figure V-15).

(b) IP—target run-in (Figure V-16).

(c) Opposite sector (Figure V-17).

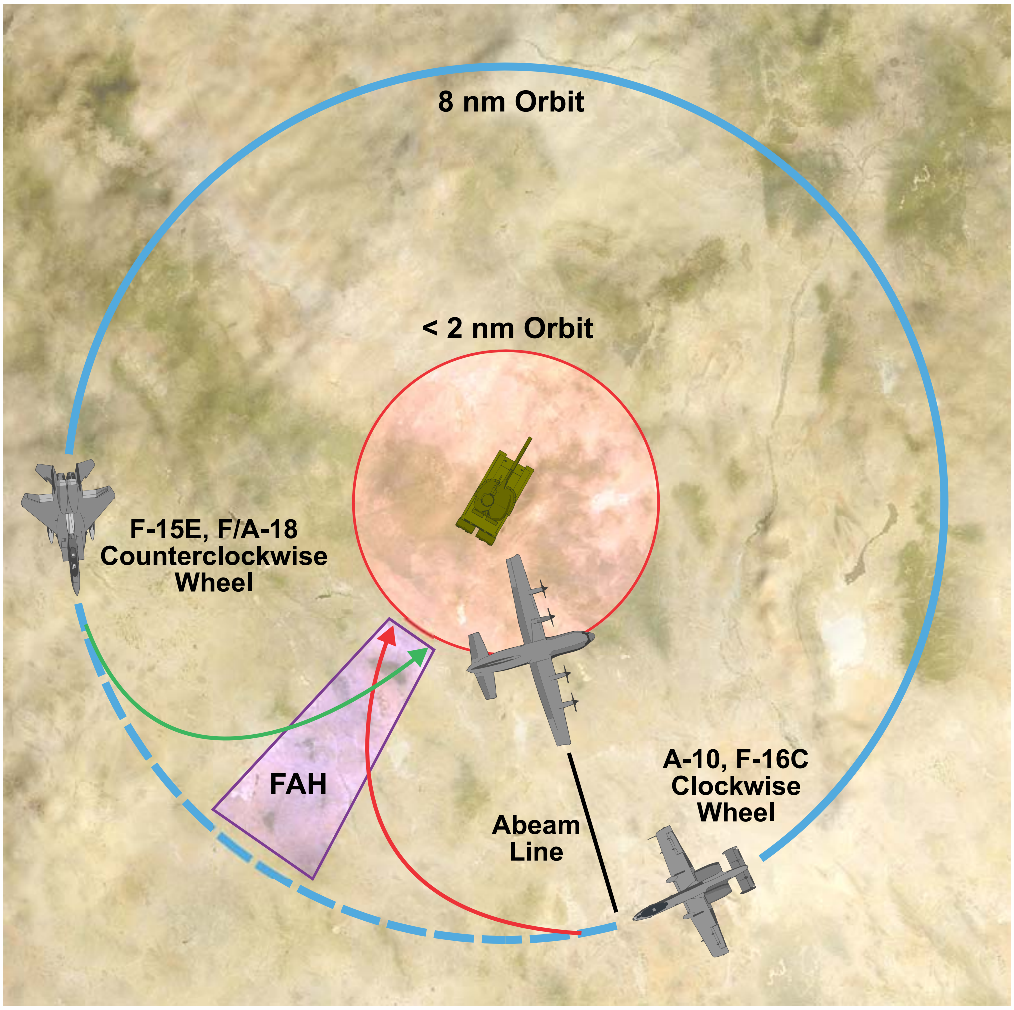
(3) RW Integration with SOF Gunship. Figure V-18 depicts RW procedures and radio calls to allow for continuous gunship support and the integration of RW CAS aircraft.

Special Operations Forces Gunship Integration Attributes

Tactic	Deconfliction	Advantages	Disadvantages
Wheel	Visual	Less airspace required.	Close air support aircraft must remain visual.
Initial point (IP) -Target Run-in	Procedural	Familiarity with standard IP-to-target attack.	Higher workload, communications intensive. Less frequent attacks.
IP-Target Run-in	Procedural	Familiarity with standard IP-to-target attack.	Higher workload, communications intensive. Less frequent attacks.

Figure V-14. Special Operations Forces Gunship Integration Attributes

Special Operations Forces Gunship Wheel Example



Legend

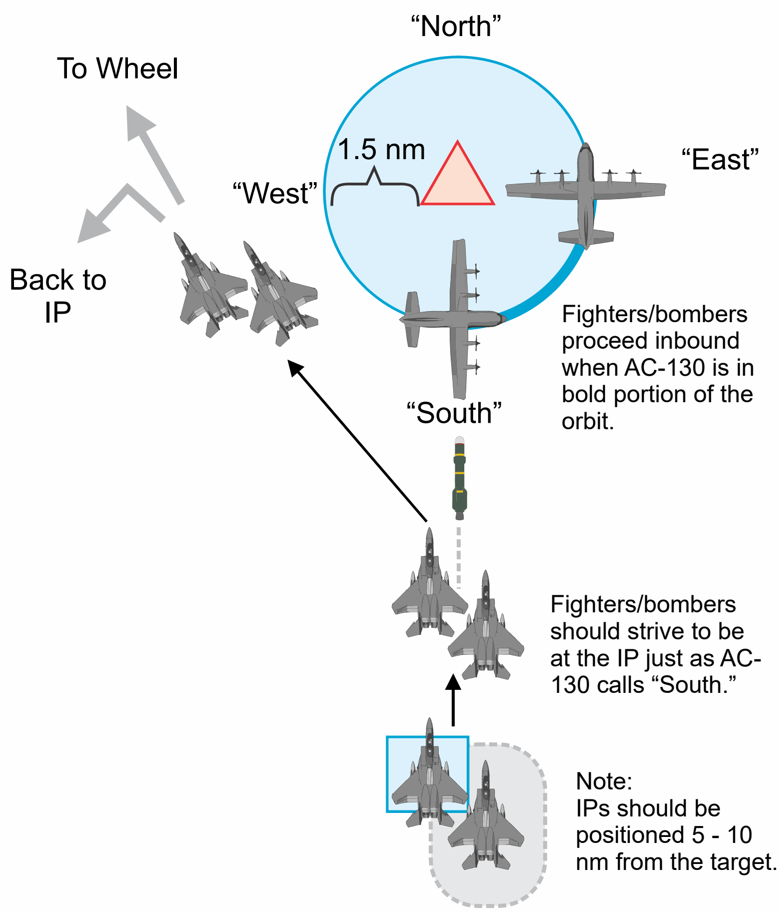
FAH	final attack heading	nm	nautical mile

Figure V-15. Special Operations Forces Gunship Wheel Example

Initial Point–Target Run-In

Initial Point Communications Example

AC-130	CAS Aircraft	Explanation
	"Ready"	"Ready" signifies the start of deconfliction procedures.
"East, North, West"		Gives the location of the AC-130 for situational awareness.
"South"	"IP inbound"	AC-130 passes through the initial point.
	"In"	CAS aircraft begins weapon(s) delivery: JTAC/FAC(A) gives clearance.
	"Weapons away. (XX) seconds."	XX seconds until weapon impact. AC-130 cease firing on the same target.



Legend

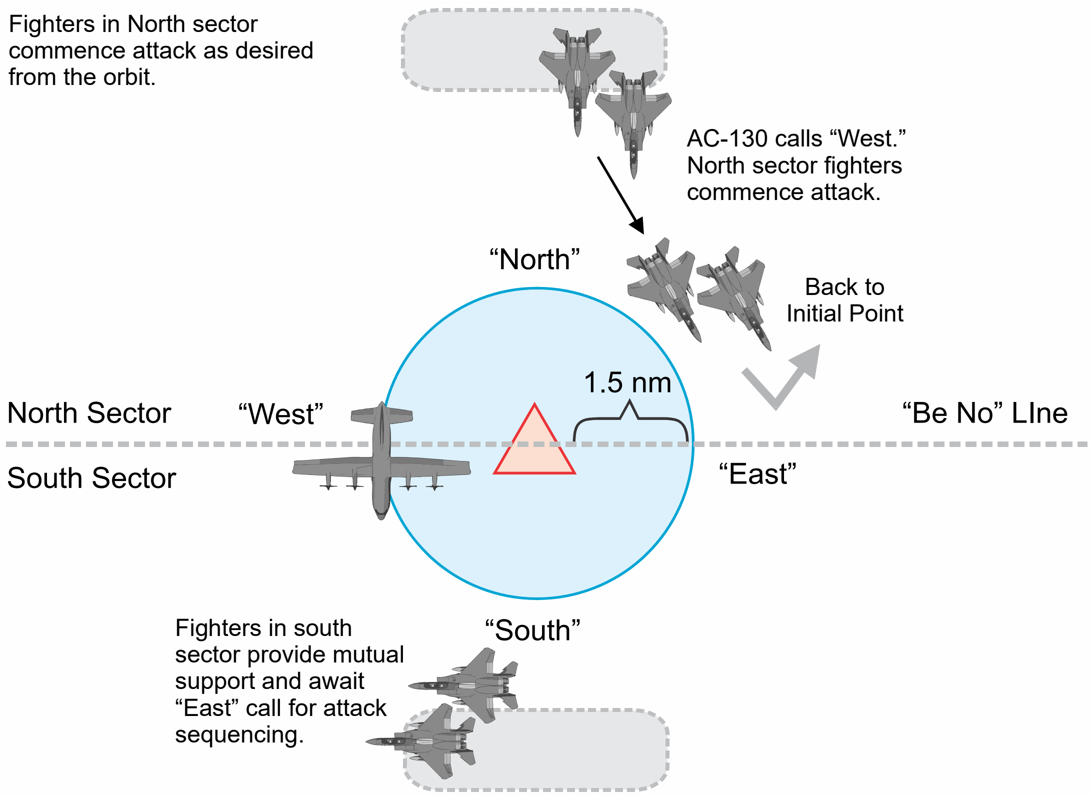
CAS	close air support	JTAC	joint terminal attack controller
FAC(A)	forward air controller (airborne)	nm	nautical mile
IP	initial point		

Figure V-16. Initial Point—Target Run-In

Special Operations Forces Gunship Opposite Sector Example

Communications Example

AC-130	Fighters
"9-Line"	"Ready"
"West"	"Inbound"
"10 seconds to mark with ______."	"Contact"/"Tally"
	"In" - Clearance from JTAC/FAC(A)
	"Altitude"/"Out" if required



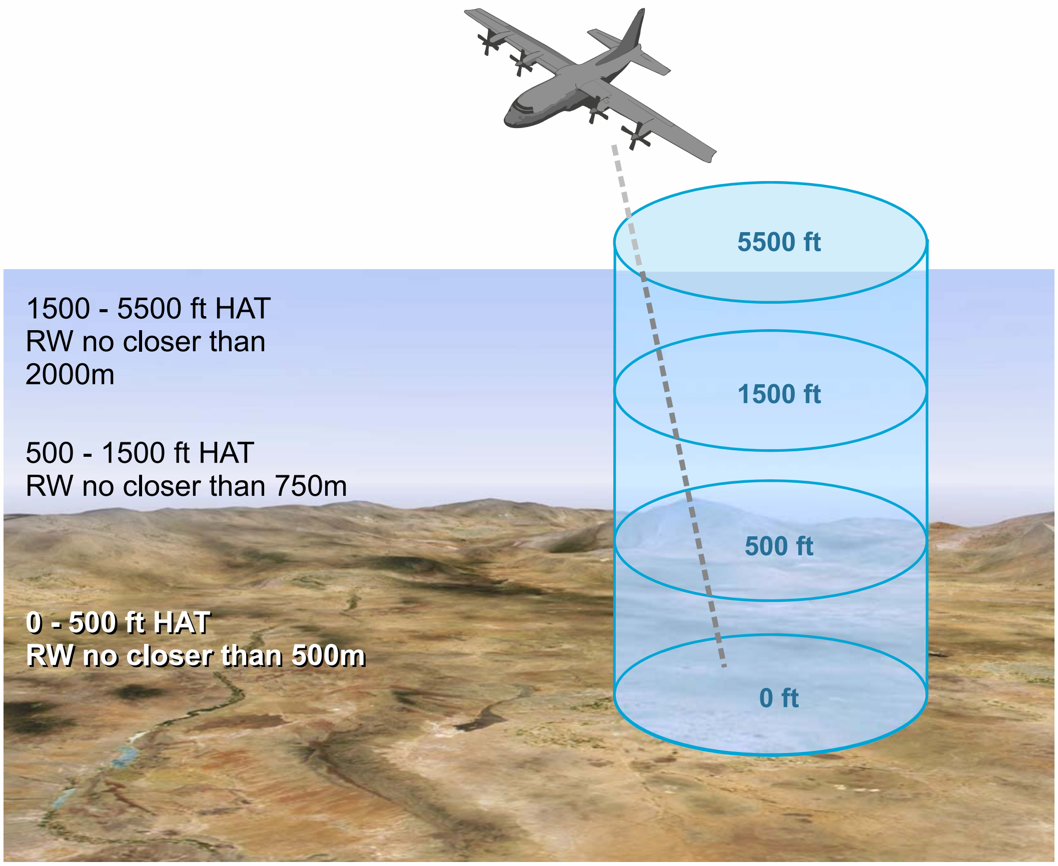
Fighter offset orbits 3 - 10 nm from the target. Actual distance determined by the aircraft sensors and ordnance loadout.

Legend

FAC(A)	forward air controller (airborne)	nm	nautical mile
JTAC	joint terminal attack controller		

Figure V-17. Special Operations Forces Gunship Opposite Sector Example

Rotary-Wing Integration with Special Operations Forces Gunship



Integrated RW/AC-130 Communications Example

AC-130	RW Aircraft	Explanation
"Sparkle on"	"Contact"/"Tally"	Both aircraft confirm the target for deconfliction.
	"Established 1000 m East of Target 200 ft AGL"	RW confirms outside engagement zone and AGL to establish distance.
"Rounds away"		
"Cold"	"Cease Fire"	If RW moves inside the engagement distance, call "Cease Fire" for AC-130 to go cold.

Legend

AGL	above ground level
ft	feet
HAT	height above target
m	meter
RW	rotary-wing

Figure V-18. Rotary-Wing Integration with Special Operations Forces Gunship

12. Close Air Support without a Joint Terminal Attack Controller

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 and synchronization with friendly forces fire and movement is still required. Aircrews executing CAS under these circumstances bear increased responsibility for the detailed integration and synchronization required to minimize friendly fire and collateral damage, tasks normally done by a JTAC/FAC(A). In these circumstances, CAS aircrews should assist non-JTAC-qualified personnel/units to the greatest extent possible, to bring fires to bear.

b. Due to the complexity of air support, the commander must consider the increased risk of friendly fire and collateral damage 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 aircrews 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 aircrews should attempt to draw the following information from the ground personnel:

(1) Target elevation.

(2) Target location (e.g., grid, latitude/longitude, direction and distance from reference point).

(3) Target description (sufficient to provide PID).

(4) Any target marks that the ground personnel are able to provide (e.g., smoke, direct fire, laser, IR pointer).

(5) Nearest friendly location (provide sub-cardinal direction and distance from target).

(6) Any restrictions the ground commander feels are necessary or SA the aircrew needs to prosecute the target safely (e.g., presence of civilians or other friendly troops). 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, to ensure the friendly forces 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) Aircrews should direct the ground personnel to use the brevity code "ABORT," if any unsafe situation develops during the attack.

d. Aircrews 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 ID, weapons effects, friendly locations, and execution of the final attack/abort procedures.

13. Forward Air Controller (Airborne) Integration

a. 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 to successfully perform FAC(A) duties.

b. With an enhanced knowledge of the overall game plan, the FAC(A) will be better prepared and able to support the JTAC and/or 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 JTACs and ground commanders understand the capabilities that FAC(A)s bring 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) Perform on-scene commander 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) **Call 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 objective, 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 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. 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 clearance **must** be clearly stated. This will alleviate any confusion during the critical phase of employment. JTACs and FAC(A)s should use the following terms and brevity codes to quickly communicate duties and shall positively echo any responsibilities passed:

(1) **Brief.** The FAC(A) will automatically pass information (e.g., operational area updates, available CAS briefs, BDA) 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, allowing the JTAC to focus on other duties. It is not uncommon for some aspects of the brief to be passed by the FAC(A), 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 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 IPs, 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 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, 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. 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 1 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 TAC. 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 weapons release clearance, mission approval, and passing information.

(1) Establish two or three separate frequencies for CAS coordination and execution.

(a) 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 participants, 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.

(b) The auxiliary frequency (UHF or VHF) can be used as a coordination frequency between the AO/ALO, JTAC, and FAC(A) to pass administrative details, situation updates, new targets, coordination for SEAD, coordination for marks, and CAS mission approval. In a Marine Corps operation, this is often the TACP (local) net.

(c) A third frequency could be established if numerous aircraft are anticipated within an operational area, as TAC 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 all TAC is to occur on the primary net to ensure 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 participants, 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 participants 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 participants 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 to accommodate such tasks as target ID, 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 the FAC(A) aircraft/flight 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, FW, FAC(A) 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, FW or RW, FAC(A) operations, with JTAC 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 more rapidly through the employment of own-aircraft 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 JTAC clearance.

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). See Figures V-6 and V-7. 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 TAC.

(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 JTAC/TACP**

(1) 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 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. All FAC(A) fire missions (aviation or surface-to-surface) **must still be approved by the supported ground maneuver'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.

(a) FAC(A)s may be employed supporting convoys and mounted patrols from one unit that is transiting through another unit's operational area. Often in these situations, the ground commander does 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. CAS engagements resulting in friendly fire or without appropriate approval can be avoided due to a FAC(A)'s ability to conduct coordination with C2 and adjacent ground agencies.

(b) FAC(A)s must understand who has fires approval and build each unit's SA quickly as a radio relay between agencies.

(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. While positively identifying targets may be challenging for the FAC(A), this difficult task is 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), the importance of having a FAC(A) overhead may lie with the mission-essential tasks, other than TAC that the FAC(A) provides to the supported commanders.

(a) The FAC(A) may be given TAC or, by focusing on the other mission essential tasks, may become the critical link that allows a JTAC to provide weapons release approval for a distributed maneuver unit. The role of the FAC(A) executing the coordination missions allows the FAC(A) to act as a facilitator between agencies, maintaining and expediting the engagement timeline.

(b) When JTACs operate at greater distances from the supported ground maneuver units, the requirement for the FAC(A) to seamlessly assume control and coordinate with the ground commander for fires approval and weapons release clearance is a critical requirement.

14. 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-19.)

(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 code BREAK when passing to the JTAC/FAC(A).

Observer Lineup

Observer Lineup

"__________, this is ____________with observer lineup. Over"
(JTAC/FAC[A] C/S) (JFO C/S)

Only to JTAC/FAC(A): "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/FAC(A) 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.

Legend

CAS	close air support	km	kilometer
C/S	call sign	LRF	laser range finder
FAC(A)	forward air controller (airborne)	LTD	laser target designator
GPS	Global Positioning System	m	meter
IR	infrared	PRF	pulse repetition frequency
JFO	joint fires observer	PSS-SOF	Precision Strike Suite-Special Operations Forces
JTAC	joint terminal attack controller		

Figure V-19. Observer Lineup

(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 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-20.)

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 line 8 references the closest friendly forces 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), and ordnance.

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/FAC(A) will then conduct CAS mission preparation.

(4) After the JFO target brief, the JTAC/FAC(A) 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-21.)

(a) The JTAC/FAC(A) to JFO instructions identify actions required by the JFO to support the JTAC's/FAC(A)'s intended plan of action.

(b) The intended plan of action communicates the details of the CAS attack so the JFO can brief the supported unit leader.

Joint Fires Observer Target Brief

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"	
Remarks:	
LTL/PTL	
Threat	Direction/Distance
SEAD	Int/Cont/Non-Stan
GTL/LOF	Max Ord
Restrictions:	
FAH	
ACA	
Danger Close	
TOT	Readback

Legend

ACA	airspace coordination area	LTL	laser-to-target line
Cont	continuous	Max Ord	maximum ordinate
FAH	final attack heading	MSL	mean sea level
ft	feet	Non-Stan	non-standard
GTL	gun-target line	PTL	pointer-to-target line
Int	interrupted	SEAD	suppression of enemy air defenses
LOF	line of fire	TOT	time on target

Figure V-20. Joint Fires Observer Target Brief

(5) The JTAC/FAC(A) 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/FAC(A) conducts the CAS mission using the execution template. Execution template considerations specific to JFO integration are:

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.

Legend

CAS	close air support	TGO	terminal guidance operations
JFO	joint fires observer	TOT	time on target
PRF	pulse repetition frequency		

Figure V-21. Examples of Tactical Air Control Party Information to Coordinate

(a) **Routing/Safety of Flight.** The JTAC/FAC(A) 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/FAC(A) 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/FAC(A) or from monitoring transmission to the JTAC/FAC(A) from the aircrew.

(c) **Situation Update.** The JTAC's/FAC(A)'s SITREP should include JFO information if applicable (e.g., 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 14.b., "Target Correlation."

(i) **Attack.** See paragraph 14.c., "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/FAC(A), JFOs shall ensure previous restrictions are still applicable to reattacks and recommend changes to them if necessary.

(k) **BDA.** JTACs/FAC(A)s 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, aircrews 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.

b. **Target Correlation.** Target correlation can occur either between the JFO and the JTAC/FAC(A) or the JFO and the CAS aircrew. Some correlation considerations follow:

(1) **JFO to JTAC/FAC(A) 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/FAC(A) 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) The 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) The 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 an LGW, the JFO will confirm the laser is on the correct code and use appropriate laser brevity codes.

(f) The JFO will use appropriate IR and VDL brevity codes in response to aircrew or the JTAC.

(3) When using DACAS ground kits, the JFO has the ability to aid correlation by ensuring the aircraft's APTD is designated on the correct target. The JFO would be able to confirm the target or adjust any discrepancies using voice communications over the TAD to the CAS team.

For JFO DACAS integration, see Appendix D, "Digitally Aided Close Air Support Planning and Execution Considerations."

(4) While the JFO will not issue clearance for weapons release (i.e., CLEARED HOT), informing the JFO 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/FAC(A), 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/FAC(A) should be proactive and ensure the JFO provides timely corrections.

(f) Threats to aircraft (MANPADS, small arms, ADA equipment).

(g) Inputs to BDA.

(2) JFO should monitor TAD and be prepared to provide an ABORT call to prevent friendly fire or ensure safety of flight. 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 12, "Close Air Support without a Joint Terminal Attack Controller."

d. **Laser TGO for CAS.** When the JFO is providing TGO with an LTD, the JTAC should ensure 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/FAC(A) 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/FAC(A) should cross-check the intended aim point against the coordinates provided.

f. **Night CAS**

(1) When the JFO is using an IR sparkle to mark a target, the JTAC/FAC(A) must ensure all proper IR terminology is utilized.

(2) IR TGO communication should occur on TAD between the aircraft and JFO.

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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, and command posts.

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. Circle or write in the space provided, JTAC or FAC(A).

BLOCK B. CALL SIGN. Call sign of JTAC.

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. The intent of the remarks section is to capture amplifying mission relevant information tailored by the user based off timing (e.g., immediate, preplanned) tactical situation, and theatre requirements. Certain missions may require extensive details, while other air requests may be less specific. Examples of mission relevant information: situation update, mission overview, CAS attack brief (9-Line/5-Line brief), FAC (A) information, expanded JTAC/JFO information, contact information, SEAD, category coordinates for point targets, GARS information, digital CAS address and type, GRG, and time validation.

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

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. Adobe Professional 7.0

Figure A-1. Department of Defense Form 1972, Joint Tactical Air Strike Request

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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 (ensure fires status "COLD" for CAS).

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) 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) ACEOI.

(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/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) TAC.

(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 an 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 (i.e., AHs) 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 AND EXECUTION CONSIDERATIONS

This appendix has general comments on network construction, mission number, call signs, and addressing. It then has planning considerations for each of the common DACAS family of capabilities (VMF, Link 16, and SADL).

1. Digitally Aided Close Air Support Planning Considerations

a. **Digital Systems Setup.** DACAS requires particular attention to the setup of digital systems. JTACs/FAC(A)s must be aware of aircraft capabilities and their own system's communication prerequisites, to enable the timely and effective use of digital communications. Not all aircraft or JTAC/FAC(A) systems have the same setup requirements for digital communications; 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 approved DD Form 1972, Joint Tactical Air Strike Request, Section III, the supporting CAS aircraft's digital communication network/data link and addressing.

b. **Data Link and Voice Communications**. 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 CAS participants. Where practical, CAS participants should capitalize on data link capabilities and the increased SA their use may bring to a tactical situation. In some situations, digital systems may expedite the target acquisition process. When employing DACAS, aircrews and JTACs/FAC(A)s must familiarize themselves with potential system inaccuracies. CAS participants should also use established brevity codes (see Figure D-1 for common data link terminology, including DACAS brevity codes) to reduce the incidence of voice transmissions interfering with digital communications. Brevity codes are also useful when working with a mixed force of digital and non-digital CAS aircraft. Using brevity codes clues non-digital participants on when to remain silent so as not to impede data transfer.

c. **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 the Joint Mission Planning System (JMPS) can only accommodate six characters.

Example: Aircraft call sign from the ATO is "Nickel 21," the digital network call sign is "NL21."

Disclaimer: The following terms are used by the US Air Force community: Air-to-Air (A-A), acknowledged (ACK), cannot comply (CANTCO), Gateway (GAT), and will comply (WILCO).

Common Data Link Terminology

Term	Description/Definition
APTD	APTD is a variable message format (VMF) message sent from an aircraft that indicates its current position and its designated ground target.
CROSS-CHECK	Confirmation sensor point is on correct location.
DATA (object, position)	Data link message concerning an object at a stated location.
DATA LINK ADDRESS	The means by which radios uniquely identify each other on a given channel when using VMF over combat net radio (CNR). Numbers ending in 5 are reserved for joint terminal attack controllers (JTACs), and numbers ending in 6 are reserved for the forward air controllers (airborne) (FAC[A]s). Additionally, when in use, 05-08 have been set aside for network-enabled weapons. Link addresses should not be duplicated simultaneously on the same channel.
DIGITAL READBACK	A digital readback may be conducted for BOT attacks when an aircraft matches the JTAC's/FAC(A)'s target point with an APTD, mark point, or sensor point (data-link dependent). This would satisfy readbacks for lines 4 and 6 and limit verbal readbacks to restrictions.
DONOR	A non-command and control (C2) Joint Tactical Information Distribution System unit (JU) that will accept sensor target reports from another non-C2 JU.
FOREST	The VMF over CNR network.
FOREST SOUR	Potential problems with connectivity; initiates pre-mission VMF troubleshooting.
FOREST SWEET	Confirms receipt of data link information (the opposite of FOREST SOUR).
HOOK	Data link directive call to cue sensors to a described point (e.g., point of interest, surface-to-air missile, mark point, digital reference point, or track number) or to gain amplifying information.
INDEX	Unique number assigned to a tactical data link J12.6 message to differentiate between more than one [type] point (e.g., "SCREWTOP 23, INDEX POINT 2 is disabled vehicle").
INITIATE	The act of broadcasting (enabling) a track onto the Link 16/SADL network.
MARK POINT	Data link nondesignated geographic point of interest (J12.6 SID 9 message).
ON-STATION REPORT (OSR)/AIRCRAFT ON STATION (AOS)	OSR/AOS. A VMF message set containing aircraft check in information.
[Type] **POINT**	A digital reference point, such as the J12.6 SID 10 data link message. For example, target points and threat points can be used to build situational awareness and prioritize attacks with the data link.
PUBLISH	The directive term to broadcast a track onto the Link 16/SADL network from the tactical network.
SPI	The location (horizontal coordinate and elevation) at which a system calculates its sensor is pointed.
TIMBER	The Link 16 network. The term **BLACK TIMBER** is reserved for Link 16 via JREAP-A (announced Token Passing protocol).

Figure D-1. Common Data Link Terminology

Common Data Link Terminology (Continued)

Term	Description/Definition
TIMBER SOUR	Potential problems with net entry; initiates pre-mission link troubleshooting.
TIMBER SWEET	Confirms receipt of data link information (the opposite of TIMBER SOUR).
TRACK NUMBER (#)	Data link information file number. Commonly called “track” or written as TN.
UPDATE	This is a term to direct updating a previously initiated data link track/point. The TN or index number should be referenced.
WOOD	The SADL Network.
WOOD SOUR	Potential problems with connectivity; initiates pre-mission SADL troubleshooting.
WOOD SWEET	Confirms receipt of data link information (the opposite of WOOD SOUR).
ZAP	Request for data link information.

Legend
APTD aircraft attack position target designation
BOT bomb on target
JREAP joint range extension applications protocol
SADL situation awareness data link
SID status information discrete
SPI sensor point of interest
TN track number

Figure D-1. Common Data Link Terminology (Continued)

2. Variable Message Format over Combat Net Radio Planning

a. **VMF Addressing.** In addition to the mission number and call sign described above, VMF addressing includes the following: Internet protocol address, link address, subnet mask, and URN. The following information is one method used to apply VMF DACAS network addressing.

(1) **Internet Protocol Address.** Internet protocol address is a series of four numbers that identify the user’s router/modem on a particular network. 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.XX.**

YYY is the squadron number and is limited to 0-254. If a squadron number is higher than 254, divide by two (VMFA-314 = 157). If a squadron number is higher than 509, divide by three. The JICO may need to resolve redundancy that may occur where the numbers of two squadrons yield a common number.

XX is a tactical call sign number from the ATO. 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 number and is valid for numbers 05-95. Example: Call sign NL 21 would be Link 21.

(a) Numbers ending in 0 or 5 are reserved for JTACs.

(b) Numbers ending in 6 are reserved for FAC(A)s.

(c) Numbers ending in 7 are recommended for AOs.

(d) Numbers ending in 8 are recommended for the DASC.

(e) Numbers ending in 9 are recommended for JFOs.

(3) **Subnet Mask Addressing.** Configure subnet mask to 255.255.0.0 to allow DACAS systems to use the last six digits of the Internet protocol address as a way to identify the desired recipient. With this address scheme and the subnet mask, aircraft will not ignore broadcast messages sent from other units.

(4) **URN Addressing.** URNs are used by units in a VMF interface to uniquely identify friendly military units, broadcast networks, and multicast groups. URNs facilitate the exchange of messaging and SA information, particularly in low-bandwidth tactical environments. URN information provides the foundation for address book information used in digital systems such as C2 systems, blue force tracker, and AFATDS. Use of URNs in VMF messaging enhances C2, DACAS, the common tactical picture, and the common operational picture. URNs have the least effect of the three address elements within the VMF DACAS domain but are important to friendly force tracking systems.

(a) URNs range between 0 and 16777215, with 16777215 reserved as a broadcast URN. Each Service has a block of URNs.

(b) URNs for aircraft and JTACs are assigned in the joint master unit list.

(c) JTACs/FAC(A)s and CAS aircraft with VMF should not use dynamically assigned URNs for addressing.

(5) The JMPS is the tool CAS aircrews 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:

(a) Call sign.

(b) Mission number.

(c) Internet protocol address.

(d) Link address.

(e) Subnet mask.

(f) 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 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. Aircrews and JTACs need to use their assigned URNs as provided by the joint interface control cell in the OPTASKLINK's CNR segment or as provided for local DACAS training opportunities.

(6) The following standards provide the highest probability of first-time connectivity to expedite the use of digitally aided devices to enhance CAS:

(a) Set Transport/Network Layer Protocol: IPv4

(b) Do not run N-Layer Pass-through.

(c) Default the Subnet Mask = 255.255.0.0

Note: Some JMPS unique planning components revert to previous settings following power removal from system.

b. **The VMF Mission Profile Initialization Data Load (IDL).** The hybrid IDL (see Figure D-2) has been tested and validated with a majority of DACAS-capable aircraft and should be the default standard for DACAS systems in a TAC mission. Having a universal IDL is essential for ensuring connectivity between ground systems and aircraft. The IDL timing parameters should be entered by a member of the unit mission planning cell or weapons tactics instructor into the Unique Planning Component of JMPS.

c. **VMF Stack.** VMF stack refers to the combination of version of MIL-STD-6017, *Variable Message Format (VMF);* MIL-STD-2045-47001, *Department of Defense Interface Standard: Connectionless Data Transfer Application Layer Standard;* and MIL-STD-188-220, *Digital Message Transfer Device Subsystems,* used by a particular DACAS system (aircraft or ground kit). The commonly used stacks are currently A/C/C and B/D1/D1. When VMF stacks are mismatched, systems are unable to communicate with each other. When systems cannot communicate, operators will receive a CANTPRO [cannot process] message.

(1) **Single Stack.** A common reference to the ability of a system to transmit and receive only one variation of the VMF stack, either A/C/C or B/D1/D1.

(2) **Dual Stack.** A common reference to the ability of a system to transmit and receive two different VMF stacks but not at the same time. Some systems have made this capability operator selectable.

Variable Message Format Initialization Data Load	
Mission Profile: "Hybrid"	**Cipher/Text**
188-220 Parameters	Cipher, Plain
Network Access Delay (NAD) Scheme	Random-NAD
Digital Port Data Rate	16000
Transport/Network Layer Protocol	Internet Protocol version 4
Forward Error Correction	Enabled
Time Dispersion Coding	Enabled
Data Link Layer Scrambling	Enabled
Physical Layer Scrambling	Disabled
Equipment Preamble Time (millisecond [msec])	650
Phasing Transmission Time (msec)	150
Net Busy Detect Time without Squelch Detect (msec)	1763
Net Busy Detect Time with Squelch Detect (msec)	1763
Data Terminal Equipment (DTE) Turnaround Time (msec)	50
DTE Processing Time (msec)	1021
DTE Acknowledgement Prep Time (msec)	1021
Turnaround Time (msec)	2600
Tolerance Time (msec)	127
Equipment Lag Time (msec)	563
Number of Stations	6

Figure D-2. Variable Message Format Initialization Data Load

(3) **Simultaneous Stack.** The ability of a system to transmit multiple VMF stacks at the same time and is intended to be used when the operator does not know the VMF stack of the system they are attempting to communicate with or when the network contains systems with different stack implementations.

d. **VMF Terminology**

(1) **Broadcast.** A message addressed to all stations on the same frequency without having to know all of their addressing information and without the need to select the numerous receivers from a list. Broadcasts are not acknowledged (ACK) by the receiving stations. The ease of transmitting data to large numbers of stations simultaneously can expedite message traffic.

(2) **Unicast.** A message addressed to one station. If the receiving station receives and decodes a message unicast to it, it can issue an ACK to the sending station. Unicast should be the preferred method when there is only one CAS asset. Unicast should be used if working with a flight of more than one aircraft that forwards messages to flight members. Unicast also enables the ACK function (if the sending system is configured for ACK).

(3) **Multicast.** A message addressed to more than one, but not all, stations simultaneously. When the sender has the time and the tactical situation dictates, multicast messaging can provide an expedited means of messaging multiple users. ACK messages are also enabled with multicast transmissions (if the sending system is configured for ACK).

(4) **Auto-Learning.** A capability inherent to most ground systems and aircraft that enables the system to receive broadcast messages and identify and save the sender's

addressing information. Auto-learning is typically accomplished when an aircraft checks in, broadcasting its OSR. This enables DACAS systems to immediately unicast or multicast messages back to the sender without preprogramming the sender's addressing information. A secondary way to initiate auto-learning is for the JTAC to broadcast an APTD Request (K02.59). Aircraft on the frequency will respond with an APTD (K02.57) that allows the JTAC's kit to auto-learn the aircraft's addressing information.

(5) **APTD.** APTD is a K-series message sent from an aircraft that indicates its current position and its DGT. The DGT coordinates for this message come directly from the weapon system or a specific weapon selected for employment.

3. Link 16 and Situation Awareness Data Link Planning

a. DACAS using 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 enable ELOS transfer of information between potentially large numbers of data link participants. JTACs/FAC(A)s planning for DACAS with Link 16 should coordinate with the appropriate C2 element (ASOC/DASC) for assignment of JU numbers and track blocks.

b. Link 16 and SADL messages allow transfer of information between potentially large numbers of data link participants. The range of information exchanged and the greater distances at which data exchanges may occur over a network makes J-series messaging attractive for building SA and providing C2.

c. **Link 16/SADL Addressing.** Common among all Link 16 platforms are four variables:

(1) **JU Number.** Also known as a source track number, this JU number defines the platform. C2 users will also be issued 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.

d. JTACs/FAC(A)s planning for DACAS with Link 16/SADL should coordinate with the appropriate C2 element (ASOC/DASC) for assignment of JU numbers and track blocks. JTACs/FAC(A)s should be prepared to reference published track numbers to supporting aircraft and other DACAS participants.

e. A thorough understanding of data link standards found in SPINS is also appropriate. A key item 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 FTMs able to be displayed will vary between aircraft types.

Note: Placing DRPs (e.g., friendly positions, target locations) in the objective area as a reference during a CAS talk on is a principal advantage of Link 16 and SADL. The effective use of J3.5 Land Tracks as reference points will require disciplined track management and timely removal of non-relevant tracks.

f. **Link 16-Specific Planning.** Mission planners should select the appropriate Link 16 IDL for the respective aircraft. The planner adds the parameters received from the OPTASKLINK and a small set of locally determined parameters, such as the net numbers used for voice and air control.

g. **SADL-Specific Planning.** SADL has three operational modes: Gateway (GAT), Air-to-Air (A-A), and Air-to-Ground. For DACAS, the GAT and A-A modes will be used. In GAT mode, participants gain full SA of any network being bridged through the assigned gateway. In A-A mode, SA is limited to the participants in that flight. Both configurations require the planning of A-A settings (Air Key, Shape, and Own Ship) to ensure full sharing of messages such as precise participant location and identification (PPLI), sensor point, and system status. Some messages, such as PPLI, can received without these settings, but full DACAS SA is diminished when [type] points cannot be shared.

(1) Both A-A and GAT modes require information contained in the OPTASKLINK to properly set up communications with the desired gateway. Users must know the GAT key and Guard Channel/Hop to communicate and receive timing messages from the gateway. Similarly, there is an A-A key (0-94) required for A-A mode. Because SADL radios need a time reference, JTACs will not be able to fully test communications until a SADL capable aircraft that is timed into the same GAT or A-A key is within LOS.

(2) SADL planning checklist.

(a) Addressing information.

1. Call sign.

2. JU number from OPTASKLINK.

(b) Settings.

1. GAT key.

2. A-A key.

3. Channel/Hop.

4. Own Ship/Shape.

5. Frequency map.

6. Crypto algorithm.

4. Gateway Planning Considerations

a. Gateways allow VMF-capable JTACs/FAC(A)s to communicate digitally with Link 16/SADL-capable aircraft by transmitting messages through a gateway. At the gateway, the JTAC's/FAC(A)'s targeting and SA information is broadcast to all aircraft in the Link 16/SADL networks. Gateways provide JTACs/FAC(A)s with the capability to publish DRPs and other information onto the data link network for Link 16 and SADL-capable aircraft. Gateways are capable of sending information from the Link 16/SADL networks back to VMF-equipped JTACs/FAC(A)s. Including a gateway in the DACAS communications plan is extremely beneficial for SA of the maximum number of platforms in the AO. Figure D-3 for common K- to J-series message translation.

b. A tactical gateway can be used to translate data from VMF over CNR to Link 16/SADL and vice versa. Gateways can enable a JTAC/FAC(A) to provide SA for supporting aircrews who are either not capable of the same data link as the JTAC/FAC(A) or are available for ELOS/BLOS updates. In these cases, the JTAC/FAC(A) can leverage a gateway to distribute their RSOF, situation update, game plan, 9-line, and remarks/restrictions. When JTACs/FAC(A)s send messages to aircraft through a gateway, they must address the message to the aircraft's URN so the gateway sends the message to the intended recipient.

K- to J-Series Message Translation

K01.1 - Free Text Message	To	J28.2 - Free Text Message
K01.1 - Free Text Message	From	J28.2 - Free Text Message
K05.1 - Position Report	To	J2.0 - PPLI
K05.1 – Position Report	From	J2.X – Any PPLI Message
K04.1 – Observation Report	To	J3.5 – Land Track
K04.1 – Observation Report	From	J3.5 – Land Track

Legend

PPLI precise participant and location identification

Figure D-3. K- to J-Series Message Translation

Aircrew: "Hardrock 43, this is Hawg 21, 15 miles to the North, flight level 150-160, FOREST SWEET."

JTAC: "Hawg 21, proceed to IP Lakehouse – Villa, block 14 to 16, no other air on station. Call when established, send OSR."

Aircrew: "Hawg 21, proceeding Lakehouse – Villa, block 14 to 16, standby OSR."

Aircrew: Hawg 21 transmits OSR message.

JTAC: "HG21//IP LAKEHOUSE TO VILLA//14 B 16//CALL EST//SEND OSR"

Aircrew: "WILCO" – This notifies the JTAC that message was received and will be followed. If the aircrew is unable to comply, the aircrew and JTAC will use voice to update airspace holding instructions.

5. Digitally Aided Close Air Support Using Variable Message Format over Combat Net Radio

a. When establishing initial digital contact with an aircraft, JTACs/FAC(A)s need to know their own VMF digital address information (i.e., Internet protocol address, link address, and URN) and be prepared to pass their information to strike aircraft if required. This is required if the aircrew is unable to auto-learn the VMF network address information form the JTAC's/FAC(A)'s transmission.

Note: When using VMF over CNR, voice transmissions can interrupt a data transmission if the radio is keyed without enough delay following a data push. Because of this, instances where voice and data are utilized together should be initiated with voice and followed by data. Also, a newly arriving aircraft should "observe" the net for several seconds prior to keying the microphone.

b. **VMF over CNR DACAS Execution.** Because digital messages are short data bursts, they can sometimes be successfully transmitted/received on the edge of LOS communication ranges before voice transmissions are clear. The flight lead should collect wingmen's data prior to checking in with the JTAC/FAC(A) to expedite the OSR/AOS. Once the JTAC/FAC(A) system has detected the aircraft's OSR/AOS and auto-learned their addressing, the JTAC/FAC(A) will conduct RSOF via voice or digitally.

(1) **RSOF**

(a) Once aircraft arrive on station, aircrew advises the JTAC/FAC(A) of VMF capability by advising either FOREST SWEET or FOREST SOUR. The JTAC/FAC(A) issues voice RSOF instructions followed by a request for digital check in. Following as an example of an aircraft checking in with VMF capability and RSOF with an OSR/AOS request:

(b) RSOF may be sent via preplanned FTM (K01.1) if pre-coordination was conducted and the JTAC/FAC(A) already has the CAS aircraft's VMF address information. **Do not delay voice transmission of the RSOF if the aircraft is on station and a digital message is not immediately available.**

(2) **Aircraft Check-In**

(a) Once RSOF instructions are received, the aircrew can send OSR/AOS if not previously completed. A momentary delay in time, perhaps three to five seconds, should be expected by both parties as the normal time needed to accomplish the OSR/AOS request and reply.

(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 (e.g., VDL code, laser code).

(3) **Situation Update.** Following receipt of the OSR/AOS, the JTAC sends a position report (K05.1) and observation reports (K04.1) for threats, targets, and friendly forces. The remaining elements of the situation update can be sent via voice or with an FTM (K01.1). Following is an example of an FTM situation update:

Example: SUC B//SA-8 MA1234 9876//LT ARMOR WITH INF//FRND IVO OP FEETS//81MM SW OF OP//MARK AND CONTROL BS16//IN WITH HEADING ALL ATTACKS//WINDS FROM NORTH 10KTS

Note: JTACs/FAC(A)s may need to verbally pass target and threat locations if the aircraft is unable to receive observation reports (K04.1).

(4) **Game Plan.** Some parts of the game plan are transmitted with the CAS aircrew brief (K02.33) message (type of control and method of attack). Any remaining items may be transmitted over voice or passed digitally with an FTM (K01.1).

(5) **CAS Brief.** The CAS aircrew brief (K02.33) includes elements of the game plan (type of control and method of attack), the 9-line, and remarks/restrictions in one message. CAS aircrew briefs are sent via unicast or multicast (dependent upon the number of DACAS participants involved in the mission) to allow automated message acknowledgement.

Note: Some aircraft will ignore a broadcast CAS aircrew brief (K02.33) message, so the JTAC/FAC(A) should only use unicast or multicast for sending the VMF 9-line.

(a) The JTAC/FAC(A) will initiate sending the CAS aircrew brief following the game plan (if required) by transmitting over voice "Standby CAS Brief" followed by the digital transmission.

(b) Once the aircrew has received the CAS aircrew brief, they will select a will comply (WILCO) or cannot comply (CANTCO) response, ensuring all aircraft system CAS pages are reviewed before committing to a WILCO.

Note: Receipt of WILCO message does not constitute readbacks. CANTCO message initiates digital or voice negation between the JTAC/FAC(A) and aircrew.

(6) **Remarks/Restrictions.** The CAS aircrew briefing (K02.33) contains a free text comment section for remarks and restrictions not available in dropdown menus. Limit comments to 200 characters or less. Entries in the comments section should be limited to SA enhancing remarks and pertinent restrictions, as aircrew may be required to read several pages of text on their aircraft displays.

(7) **Readbacks.** The JTAC/FAC(A) can request either digital or verbal readbacks. **The JTAC/FAC(A) always retains the right to request verbal readbacks of required and directed CAS brief elements.**

Note: There is currently no joint standard for translation in aircraft and ground systems between latitude/longitude and MGRS. Regardless of the coordinate format the JTAC kit is displaying, the VMF message sent from the ground kit is in latitude/longitude. When the aircraft receives the K02.33 message and the target location is designated by the aircrew, the coordinate is sent directly to the targeting and weapons systems in latitude/longitude format. The risk in using MGRS for display and/or readback is that the aircraft system must translate the latitude/longitude coordinate into MGRS for display to the aircrew, potentially introducing translation or rounding errors. To avoid display or readback errors, the JTAC/FAC(A) and aircrew should keep the coordinates in latitude/longitude format during the entire DACAS process. The JTAC/FAC(A) should request verbal readbacks in latitude/longitude format to avoid translation and rounding errors.

(a) **Digital Readback.** After receiving the CAS aircrew brief (K02.33), the aircrew designates the target coordinates and sends an APTD (K02.57). The APTD satisfies digital readback of lines 4 and 6 and is the most accurate representation of elevation and target location. The JTAC/FAC(A) verbally acknowledges receipt of the APTD and requests a readback of restrictions via voice. If the JTAC/FAC(A) does not receive the APTD from the CAS aircrew, the JTAC/FAC(A) sends a single APTD request (K02.59) message. The JTAC/FAC(A) confirms the designation point **and** coordinates from the aircraft's APTD match the intended target, and then requests restrictions via voice.

Devil 41 designates Berserk 22's target from the K02.33 message and sends an APTD (K02.57) to Berserk 22.

BK22: "Devil 41, from Berserk 22, good APTD, readback restrictions."

DL41: "Berserk 22, Devil 41, FAH 195- 225."

BK22: "Good readbacks. Call ready for correlation."

(b) **Verbal Readback.** If the JTAC/FAC(A) requests verbal readbacks, or is unable to receive an APTD, the JTAC/FAC(A) will request for the aircrew to transmit lines 4, 6, and restrictions. DACAS systems send and receive location information using the latitude/longitude format regardless of the format selected by the user for display. When MGRS is selected for display, DACAS system users may note that an MGRS coordinate received may have the last digit in the Easting or Northing differ by one from the coordinate that was sent. This is due to rounding that may occur when systems translate coordinate formats. This is not considered an incorrect readback when using digital systems.

Caution

The aircraft attack position target designation will indicate the aircraft's attack position and target designation location which may or may not be on the target. At this point during the CAS execution, the designation should be on the target. If the designation is not on the target, then the JTAC/FAC(A) should confirm the intended point of designation with the aircrew.

(8) **Correlation**

(a) In a BOC scenario, correlation is complete after the digital or verbal readback requirement has been met.

(b) In a BOT scenario, correlation should be conducted via voice.

1. Correlation can be initiated by referencing the location in which the APTD is displayed on the JTAC/FAC(A)'s kit.

2. If the target location has moved, or is significantly different than the briefed target location, the aircrew should send an updated APTD once TALLY/CAPTURE/CONTACT to provide the JTAC/FAC(A) updated target location and coordinates.

Caution: JTACs/FAC(A)s should not digitally initiate an APTD during correlation to avoid pulling an inaccurate designation point.

(c) The tactical image (K04.17) provides an additional option for target correlation when using VMF.

1. The initial image transfer from the aircraft can typically take approximately 40 seconds to transfer, with several "squelch breaks" on the radio. Aircrews should preface the image transfer with "Standby image" to clear the network of traffic.

2. Once received, the JTAC/FAC(A) can add markings to the image and retransmit it back to the aircraft. Sending a marked-up image back to the aircraft is faster than the initial image transfer.

(9) **Conducting the Attack**

(a) **IP Inbound Call.** The aircraft can send a departing initial point (DPIP) (K02.35) message to the JTAC/FAC(A) in lieu of a voice "IP inbound" call.

(b) 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 with aircraft ingress profile and/or target designation location is confirmed, depending on type of attack and method of engagement. This will avoid impact on necessary voice communications.

(c) Laser brevity communication should only be conducted with voice.

(d) Corrections from visual mark should be conducted with voice communication.

(e) **"IN" Call.** A voice "IN" call remains the primary method of transmission.

(f) CLEARED HOT/CLEARED TO ENGAGE and ABORT shall be sent via voice communication.

(10) **Assess Effectiveness and Reattacks.** Assess and repeat the attack as required. Reattack instructions can be sent via FTM or voice, depending on timing requirements.

(11) **BDA.** A CAS BDA (K02.28) message should be used when attacks on the target are complete.

(a) The CAS BDA message will provide aircrew SA on the target status and may be required for some aircraft to activate the next CAS briefing in their DACAS systems.

(b) When the CAS aircraft time on station is complete, the JTAC/FAC(A) can send a mission summary BDA that supplements any individual target CAS BDA (K02.28) messages sent. A mission summary BDA may be sent via voice or an FTM (K01.1).

Note. The CAS BDA (K02.28) message is specific to a transmitted CAS aircrew brief (K02.33) and should not be used for mission summary BDA unless only one DACAS attack was executed.

(12) **RSOF.** Sent via free text or voice.

c. **JFO DACAS Integration Using VMF**

(1) **System Configuration.** For the digital exchange of messages, it is recommended for the JFO to configure the ground kit to transmit unicast to the JTAC. The JTAC ground kit is best configured in multicast mode to communicate with the CAS aircraft and the JFO simultaneously to receive acknowledgments and provide SA. If aircrew selectable, CAS aircrew will transmit digital messages in broadcast mode for ground parties to receive all message traffic. Once the aircraft checks in and broadcasts the OSR/AOS the JFO and JTAC ground kits will auto-learn the aircraft's information.

(2) **JFO Action During DACAS Integration.** Once initial voice contact is made on the assigned net, the JFO will send a position report (K05.1) and observer lineup and situation update FTM (K01.1) to initiate digital connection with the JTAC. Once the JTAC receives the FTM from the JFO, the JTAC's ground kit will auto-learn the JFO's addressing. The JFO will then utilize an observation report (K04.1) to provide the JTAC with friendly positions and targeting data (lines 4 through 6 of the CAS brief) as nominated by the ground force commander. The observation report provides part of the JFO target brief and is a technique to provide the JTAC SA of the battle field. To complete the JFO target brief, the JFO will then transmit lines 7, 8, and remarks and restrictions over voice. Any additional information required (e.g., marks, specialized equipment, and TOTs) will be sent using voice or an FTM.

(3) **JFO Target Brief.** When the decision has been made to attack the target using CAS, the JFO shall send the JTAC/FAC(A) the CAS brief (K02.33). This message format should be used if the JTAC/FAC(A) digital system allows them to receive and modify CAS briefs from other participants. If not included in the CAS brief (K02.33), any required additional information (i.e., marks, specialized equipment, and TOTs) may be sent using FTM (K01.1) or by voice. If the JTAC/FAC(A) system does not allow them to alter the CAS brief (K02.33), then the JFO will transmit a "joint fires observer target brief" using an observation report (K04.1), which includes lines 4 through 6 of the 9-line. To complete the JFO target brief, the JFO will transmit lines 7, 8, remarks and restrictions, and any required additional information (e.g., marks, specialized equipment, and TOTs) will be sent using FTM (K01.1) or voice. An example of a JFO target brief is shown in Chapter V, "Execution," (see Figure V-20).

(4) As the JFO monitors the assigned net, the JFO should expect to receive communications from the JTAC and CAS aircraft as the mission progresses, such as mission updates, mandatory readbacks, APTD (K02.57), and DPIP (K02.35) calls/messages. The JTAC and the JFO will ensure the APTD reflects the correct designation point for the CAS mission. The JFO will verify the target information is correct and in conjunction with the commander's intent.

(5) **Target Correlation.** For target correlation, the JFO will send updates over voice or via a new observation report (K04.1).

(6) The JFO should be prepared to provide an ABORT over voice to prevent friendly fire incidents, ensure safety of flight, or to satisfy commander's intent.

(7) **BDA**

(a) The JFO will assess weapon(s) effects if able and provide corrections and updates using voice or an FTM (K01.1). After verifying with the commander and JTAC, the JFO shall ensure previous restrictions are still applicable to the reattacks and recommend changes to them if necessary.

(b) The JFO may pass BDA to the JTAC and/or the CAS aircraft via CAS BDA (K02.28) or voice after each attack. When transmitting a digital BDA, the JFO will broadcast the message so all parties will receive the message. If situation dictates, the JFO may utilize an FTM (K01.1) to pass overall mission assessment. Example FTM: "4TANKS/10PAX/NEUT//MSN SUCCESSFUL."

6. Digitally Aided Close Air Support Using Link 16 and Situation Awareness Data Link

a. When possible, JTACs should have their C2 agency publish the J3.5 land track/point or J3.0 digital TRP in advance of aircraft check-in. Timely publishing of tracks allows aircrews to gain SA of the area or point of interest before establishing contact with the JTAC.

Note: Do not place tracks in close proximity to each other (<500 meters); consider instead employing a "stake" (center of target array), vice multiple closely placed tracks.

b. Situation permitting, JTACs should send the ASOC/DASC the situation update FTM (J28.2) with relevant track numbers or index numbers referenced. This pre-built situation update should be marked with a SUC, giving the JTAC and aircrew a concise way to confirm and/or modify the situation update during check-in. **JTACs may also confirm digital addresses with C2 agencies during this initial contact call.**

c. **JTACs must ensure they are actively publishing a PPLI (J2.5) to allow other datalink participants to see their JU number and add them to the donor list.**

d. **Link 16-Specific**. Aircrews should ensure their JMPS load enables selection of a land PPLI (J2.5). If aircrews are unable to select land PPLIs, JTACs must configure their ground systems to publish friendly location as an air PPLI (J2.2), instead of a land PPLI to be donorized. Donorization allows the aircraft to receive the JTAC's targets and/or mark points.

e. **SADL-Specific.** Coordination of SADL shape and position within the shape are crucial to enabling communication between the JTAC and aircrew for A-A mode operations. JTACs must also ensure they know what GAT and A-A keys, as well as guard channel/hops, are being utilized.

f. **Donorizing the CAS Participants.** Prior to aircraft arrival on station, the aircrew must add the CAS participants (e.g., JTAC, JFO, engagement authority) to the donor list using the JU number listed in the OPTASKLINK. If the CAS participant still requires donorization upon aircraft check-in, a request to be donorized will be transmitted in conjunction with the JTAC's RSOF. Once the aircraft donorizes the CAS participants, digital messages can be sent.

Note: Non-C2 platforms do not have the capability to donorize gateway/C2 nodes.

(1) **RSOF**

(a) With donorization completed, the JTAC transmits RSOF or sends FTM (J28.2) and own ship PPLI (J2.X).

(b) If the CAS participants need to be donorized upon aircraft arrival on station, the JTAC will publish PPLI (J2.X) and inform the aircraft that they are WOOD (SADL) or TIMBER (Link 16) capable. The JTAC issues voice RSOF with a request to be donorized.

Example RSOF:

JTAC: "Hawg 21 from Spartan 11, WOOD capable, proceed to Lakehouse – Villa, block 14 to 16, no other air on station. Call when established, donorize JU38400."

(c) The JTAC publishes [type] points for threats using a TSM (J12.6) to help build the battlespace picture.

(2) **Aircraft Check-in.** After the JTAC is donorized, the aircrew will transmit check-in with ABORT code. If the JTAC can view the aircraft's system status (J13.2) message, which contains the aircraft identification, weapons load, and fuel status, then an abbreviated check-in is recommended.

(3) **Situation Update.** After aircraft check-in is completed, the JTAC will send enemy and threats as mark point TSM (J12.6) and transmit the situation update via FTM (J28.2) or voice. Voice confirmation of point types (e.g., target, threat, unknown) may be required for multiple TSMs (J12.6). When available, index numbers should be included when referencing points.

Warning

Not all aircraft are capable of differentiating between digital reference points (indexes, [type] points, or mark points). The TSM (J12.6) should be reserved and used only for designated targets and not for friendly positions.

Example of a Situation Update using an FTM (J28.2): This FTM codes the current situation update as situation update code B, and informs the aircrew of a known SA-8 location, passes enemy composition, friendly location, friendly fire support, controlling call sign of Bullet 16.

JTAC: "SUC B//SA-8 MA12349876//LIGHT ARMOR WITH INFANTRY//FRIENDLIES IVO OP FEETS//81MM SW OF OP//MARK AND CONTROL BT16//WINDS FROM NORTH 10KTS."

(4) **Game Plan.** Game plan is sent over voice prior to the 9-line. Game plan may also be passed digitally, utilizing an FTM (J28.2), if time allows.

(5) **CAS Aircrew Brief**

(a) The JTAC can assign a mark point (J12.6) to an aircraft for CAS engagement through the mission assignment (J12.0) message. The mission assignment

(J12.0) contains several portions of the CAS brief to include: target mark point (J12.6), elevation, type and quantity, location, friendly location, egress heading, and weapon type. The mission assignment (J12.0) is not a complete 9-line and the JTAC must still pass a full 9-line and remarks and restriction over voice. Using the mission assignment will increase SA to the aircraft and can shorten time for correlation.

(b) If the JTAC opts to pass a verbal 9-line rather than using a digital mission assignment (J12.0), the JTAC may reference a track number (if the target J3.5 was published previously by their C2 agency) or index number (if JTAC used a J12.6 mark point) of the target track for lines 4 and 6. For JTACs using Link 16, it is recommended that JTACs reference target point, index number, target description as lines 4 through 6 within a verbal 9-line. Following as an example of a 9-line using target point, index number, and description:

"Banger 21 from Hustler 35, IP Owl, 175, 8.5;"

"Lines 4-6, Target Point, Index 8, 6 x T-72s;"

"No mark, SW 2600, Egress right pull back to IP Owl."

(c) An FTM (J28.2) can be used to pass the CAS brief. However, if the JTAC's kit is not designed to automatically populate an FTM (J28.2) when they send a target as a 9-line, this process can be time consuming and is not recommended as a primary method. Additionally, depending on the aircraft, the FTM (J28.2) may be difficult to read as some of the 9-line may get curtailed from one line to the next.

"Slayer 11 from Advance 35, IP Nome, 180, 10.5;"

"Lines 4-6, Target Point, Index 6, 7 x Technicals;"

"Gator 84 - Index 6, SW 1500m, Egress North to IP Nome."

Note: When a TSM (J12.6) is sent by a unit, it does not get a track number from the track pool, rather it is assigned an index number in relation to the sender's JU number (e.g., JU 502 indexes would be 502-01, 502-02). The index number is two digits and allows for 64 index numbers (00-63). The index number is how the track is to be referenced on the link. It is important to understand for each participating unit that the index number may not display in the track number field. Aircrews are advised to know where the index number is located in their platform systems. The aircrew may have to hover over the track or select the track and view a read out window.

(6) **Remarks/restrictions** are transmitted via voice or sent as a part of an FTM (J28.2).

(7) **Readbacks.** The aircrew should hook and match the JTAC's target point by publishing their own mark point (J12.6) on the target. This is followed up by a verbal readback of restrictions.

(a) For BOT, the matched point satisfies digital readbacks of lines 4 and 6 and is the most accurate representation of elevation and target location. The JTAC retains the right to request verbal readbacks of elevation and target location derived from point/index number. The latitude/longitude (DM.MMMM) format should be used for verbal readbacks of digital points. Do not readback the index number by itself.

(b) BOC requires standard CAS verbal readback procedures.

(8) **Correlation.** JTACs should initiate correlation by referencing their target point/mark point index number or the aircrew's sensor point/mark point (J12.6). This helps speed up the correlation process along with VDL and voice communication. Once the aircrew designates the target, the JTAC should see on the ground kit the lock line from the aircraft's location to the intended target location, increasing confidence that the aircrew intends to employ weapons on the correct target.

(9) **Attack.** Once correlation is complete and the aircrew is TALLY/CAPTURE/CONTACT the aircrew should transmit "IN" and any requested calls over voice.

(10) **BDA.** Following the attack, the JTAC should transmit BDA over voice or send FTM (J28.2). The aircraft should also send BDA to the JTAC; this will close out the JTAC's mission assignment (J12.0) to complete the mission.

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APPENDIX E
EXAMPLES OF RADIO COMMUNICATIONS DURING 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, conduct combat assessment, 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 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.

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 phosphorus, 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. Threat, 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. Advise when ready for enhanced target description."

Attack Aircraft: "Ready."

JTAC: "When you roll in you will see an East West running road in a large valley. There is a small urban buildup on the North side of the road. Your target is located just East of that buildup. Expect your mark there."

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: "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."

JTAC: "Winder 62, direct hit egress, (cardinal direction if required) to Mazda block 13-14, standby BDA."

JTAC: "Winder 61 flight, mission successful, we are no longer receiving effective fire. Proceed to Chevy, elevate block 15 to 16, contact Blacklist on Brown 20."

Attack Aircraft: "Winder 61, copy, proceeding Chevy block 15 to 16, switching."

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'slead 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 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."

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 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: "Type 2, bomb on coordinate, 1 by GBU-32 each, airburst, 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: "Rumble 41, ready."

JTAC: "Lines 1-3, 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, standby TOT."

Attack aircraft validate target location by cross-checking that the position is coincident with the expected target area using all appropriate means (e.g., map plot, digital map set, and radar through the weather). Additionally, attack aircraft complete entry of lines 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: "Type 2, bomb on target, advise when ready for 9-line."

Attack Aircraft: "Ragin' 11, ready."

JTAC: "Moon, 030, 9.2." "Elevation, 450 feet, 2 BTR 90s, 8 digit grid 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: "Razor 11, ready."

JTAC: "Lines 1-3, from the overhead" or "Lines 1-3 NA." "Elevation, 450 feet, Mechanized company in the open, NB 922 556. Lonewolf laser hand off, 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 hand off, 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 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. Threat, ZU-23, South 1500, nonstandard 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 until 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 are 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.

APPENDIX F
TERRAIN EXAMPLES

Figures F-1, F-2, F-3, and F-4 provide terrain examples.

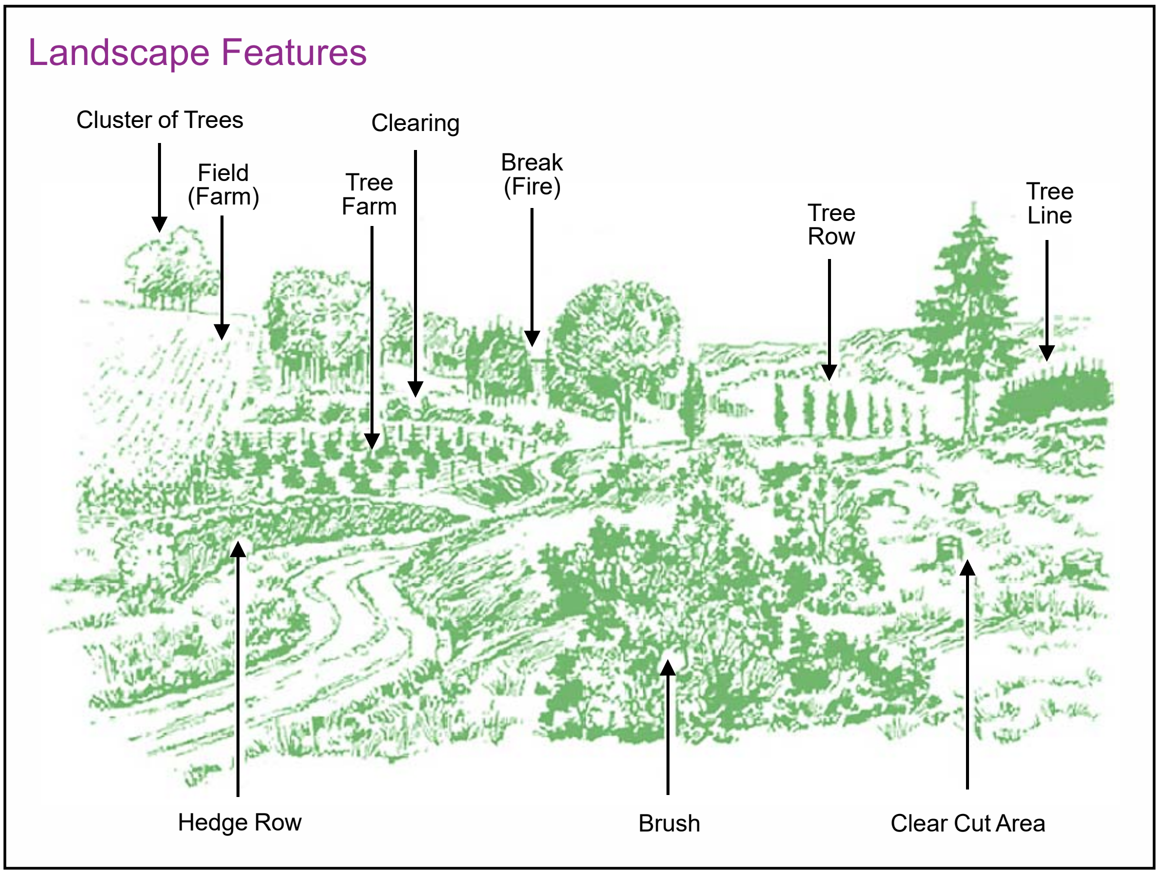

Figure F-1. Landscape Features

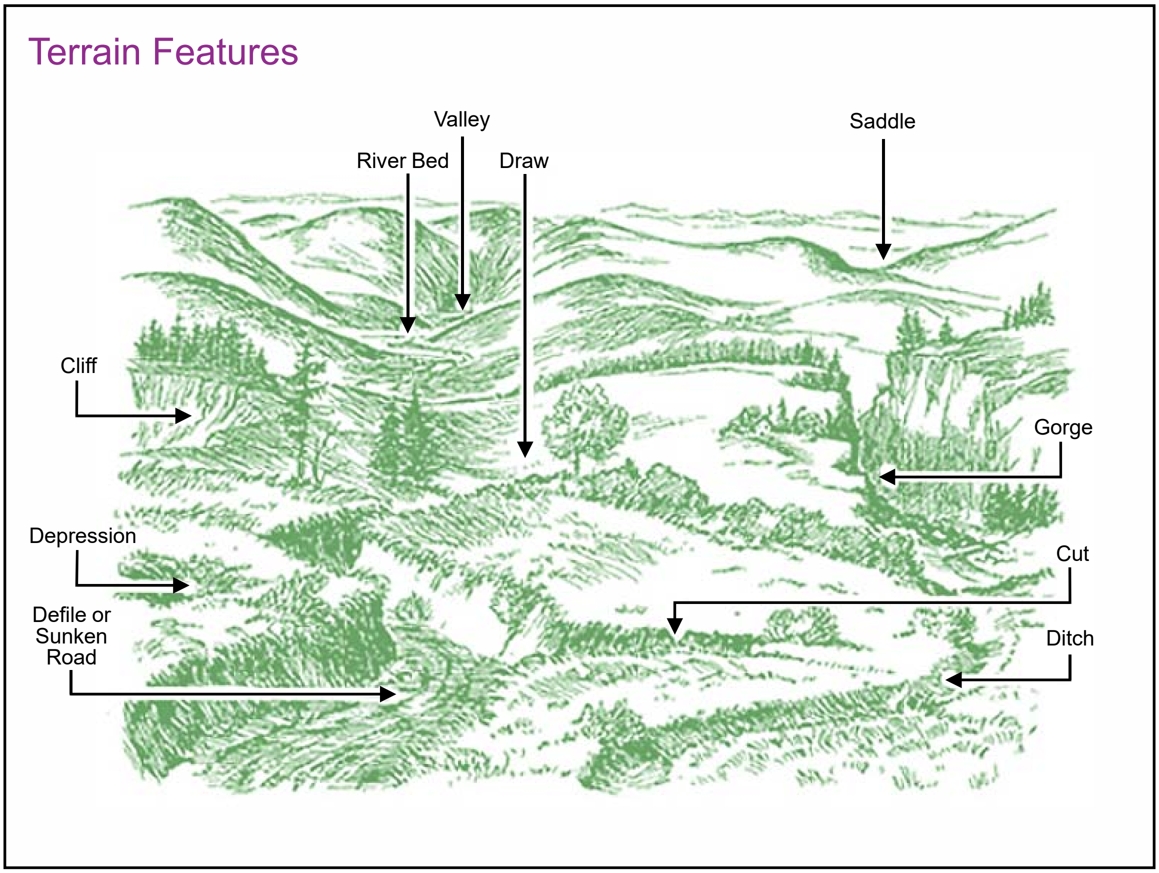

Figure F-2. Terrain Features

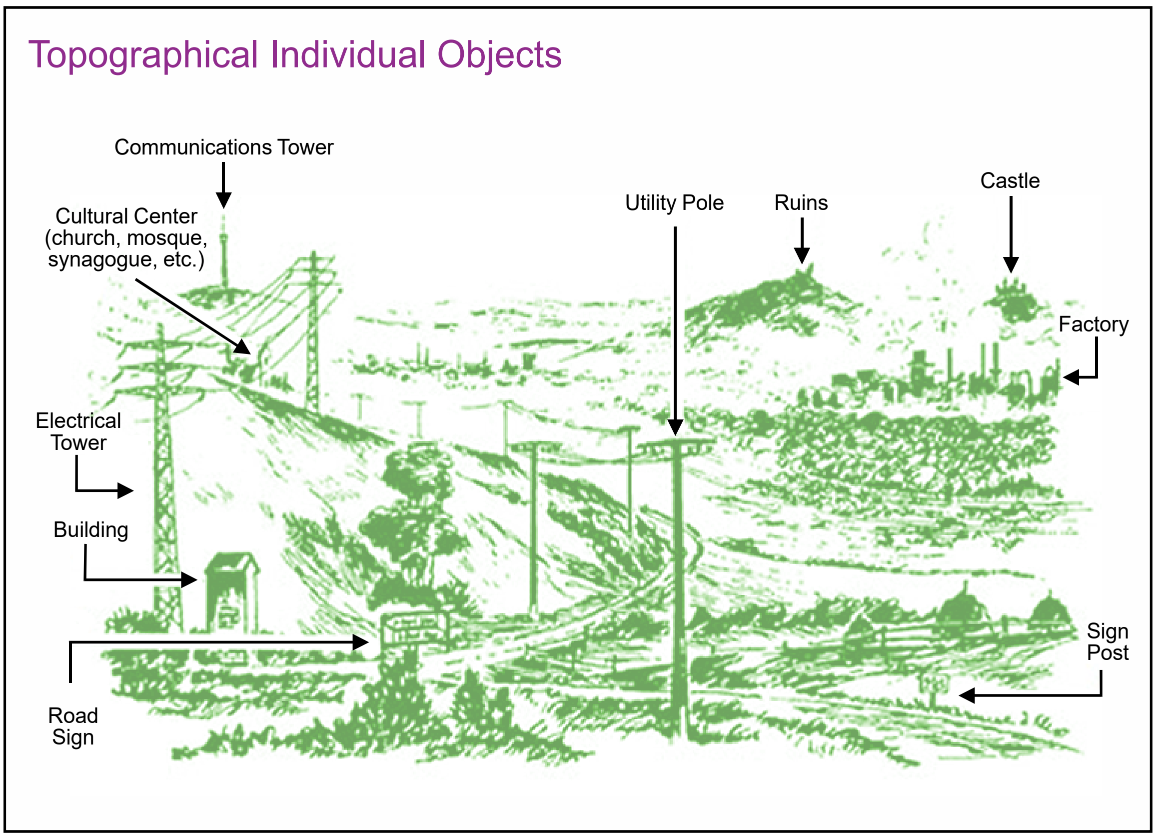

Figure F-3. Topographical Individual Objects

Water Features

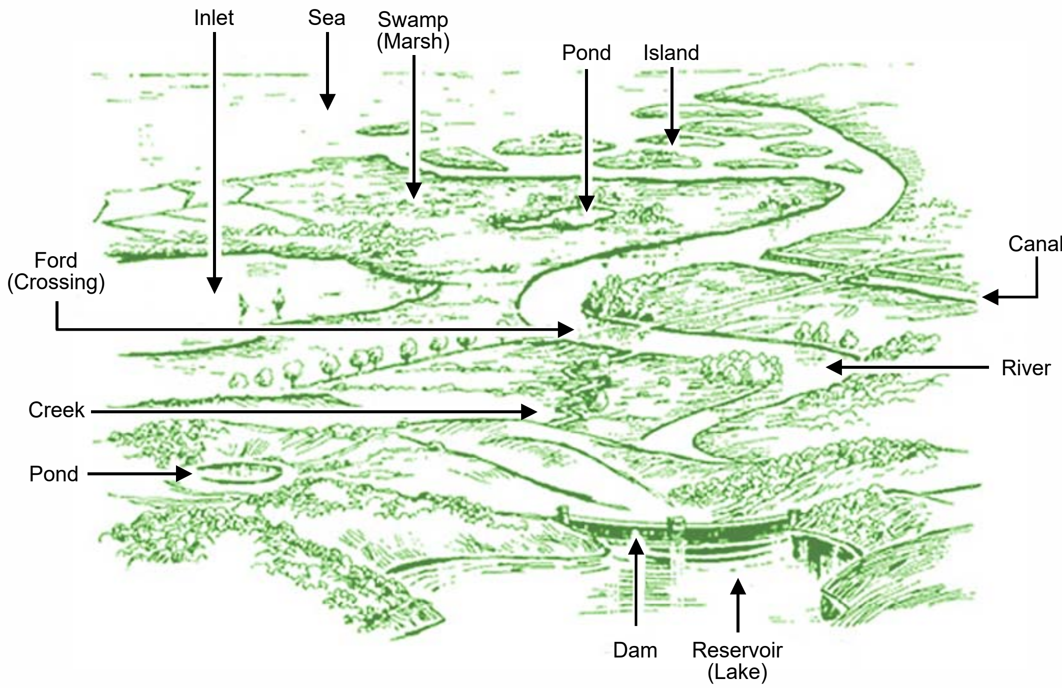

Figure F-4. Water Features

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APPENDIX G
POINTS OF CONTACT

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HQMC AVM TACP
Pentagon, RM 5D514
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Joint Staff Doctrine Sponsor/Joint Staff, J-6
Deputy, Joint Close Air Support
DDC5I Joint Fires Division
Phone Number: 757-836-0520

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APPENDIX H
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 3122.06E, *(U) Sensitive Target Approval and Review (STAR) Process*.

b. CJCSI 3160.01C, *No-Strike and the Collateral Damage Estimation Methodology*.

c. CJCSI 3505.01D, *Target Coordinate Mensuration Certification and Program Accreditation*.

d. CJCSI 3900.01D, *Position (Point and Area) Reference Procedures.*

e. CJCSI 3901.01E, *Requirements for Geospatial Information and Services.*

f. JP 1, *Doctrine for the Armed Forces of the United States*.

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, *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 Planning.*

2. Multi-Service Publications

a. ATP 1-02.1/MCRP 3-30B.1/NTTP 6-02.1/AFTTP 3-2.5, *Multi-Service Tactics, Techniques, and Procedures for Multi-Service Brevity Codes*.

b. ATP 3-09.32/MCRP 3-31.6/NTTP 3-09.2/AFTTP 3-2.6, *Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower*.

c. ATP 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*.

d. ATP 3-52.1/MCWP 3-25.13/NTTP 3-56.4/AFTTP 3-2.78 *Multi-Service Tactics, Techniques, and Procedures for Airspace Control.*

e. ATP 3-52.2/MCRP 3-25F/NTTP 3-56.2/AFTTP 3-2.17, *Multi-Service Tactics, Techniques, and Procedures for the Theater Air Ground System*.

f. ATP 3-91.1/AFTTP 3-2.86, *The Joint Air Ground Integration Center.*

3. Service Publications

a. AFTTP 3-1, *Threat Guide.*

b. AFTTP 3-3.JTAC, *Combat Aircraft Fundamentals – Joint Terminal Attack Controller.*

c. NTTP 3-02.1.3, *Amphibious/Expeditionary Operations Air Control.*

APPENDIX J
ADMINISTRATIVE INSTRUCTIONS

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2. Authorship

a. The lead agent for this publication is the US Marine Corps. The Joint Staff doctrine sponsor for this publication is the Joint Staff J-6.

b. The following staff, in conjunction with the joint doctrine development community, made a valuable contribution to the revision of this joint publication: lead agent, LtCol Thomas Lee, US Marine Corps; Joint Staff doctrine sponsor, Mr. Joseph Sullivan, Joint Staff J-6; LCDR Adam Yates, Joint Staff J-7, Joint Doctrine Division; and CDR Jason Berwanger, Joint Staff J-7, Joint Doctrine Analysis Division.

3. Supersession

This publication supersedes JP 3-09.3, *Close Air Support,* 25 November 2014.

4. Change Recommendations

a. To provide recommendations for urgent and/or routine changes to this publication, please complete the Joint Doctrine Feedback Form located at: https://jdeis.js.mil/jdeis/jel/jp_feedback_form.pdf and e-mail it to: js.pentagon.j7.mbx.jedd-support@mail.mil.

b. When a Joint Staff directorate submits a proposal to the CJCS that would change source document information reflected in this publication, that directorate will include a proposed change to this publication as an enclosure to its proposal. The Services and other organizations are requested to notify the Joint Staff J-7 when changes to source documents reflected in this publication are initiated.

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6. Distribution of Publications

Local reproduction is authorized, and access to unclassified publications is unrestricted. However, access to and reproduction authorization for classified JPs must be IAW DOD Manual 5200.01, Volume 1, *DOD Information Security Program: Overview, Classification, and Declassification,* and DOD Manual 5200.01, Volume 3, *DOD Information Security Program: Protection of Classified Information.*

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GLOSSARY

PART I—ABBREVIATIONS, ACRONYMS, AND INITIALISMS

A-A	Air-to-Air
AAGS	Army air-ground system
ACA	airspace coordination area
ACE	aviation combat element (USMC)
ACEOI	automated communications-electronics operating instructions
ACK	acknowledged
ACM	airspace coordinating measure
ACO	airspace control order
ADA	air defense artillery
ADAM	air defense airspace management
AFATDS	Advanced Field Artillery Tactical Data System
AFLE	Air Force liaison element
AFTTP	Air Force tactics, techniques, and procedures
AGL	above ground level
AH	attack helicopter
AI	air interdiction
ALO	air liaison officer
AM	amplitude modulation
ANGLICO	air-naval gunfire liaison company
ANW2	Adaptive Networking Wideband Waveform
AO	air officer
AOA	amphibious objective area
AOC	air operations center
AOF	azimuth of fire
AOS	aircraft on station
APTD	aircraft attack 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	Army techniques publication
AWACS	Airborne Warning and Control System
BAE	brigade aviation element
BCD	battlefield coordination detachment (USA)
BCL	battlefield coordination line
BCT	brigade combat team
BDA	battle damage assessment
BI	battlefield illumination
BLOS	beyond line-of-sight
BN	battalion

BOC	bomb on coordinate
BOT	bomb on target
BP	battle position
C2	command and control
CA	coordinating altitude
CANTCO	cannot comply
CAS	close air support
CAT	category
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
CL	coordination level
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
D3A	decide, detect, deliver, and assess
DACAS	digitally aided close air support
DASC	direct air support center
DCGS	distributed common ground/surface system
DD	Department of Defense (form)
DGT	designated ground target
DOD	Department of Defense
DPIP	departing initial point
DPPDB	digital point positioning database
DRP	digital reference point
ELINT	electronic intelligence
ELOS	extended line-of-sight
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 (USA)
FCT	firepower control team
FDC	fire direction center
FEBA	forward edge of the battle area
FECC	fires and effects coordination center (USMC)
FFA	free-fire area
FIST	fire support team (USA)
FLIR	forward-looking infrared
FLOT	forward line of own troops
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 (USA)
FSEM	fire support execution matrix
FSO	fire support officer
FST	fire support task
ft	feet
FTM	free text message
FW	fixed-wing
G-3	Army or Marine Corps component operations staff officer (Army division or higher staff, Marine Corps brigade or higher staff)
GAT	Gateway
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
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
IDL	initialization data load
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)
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
JMO	joint meteorological and oceanographic officer
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
JTF	joint task force
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 tactical air command center
MARLE	Marine liaison element
MCRP	Marine Corps reference publication
MCWP	Marine Corps warfighting publication
METOC	meteorological and oceanographic
METT-T	mission, enemy, terrain and weather, troops and support available-time available
MGRS	military grid reference system
MIL-STD	military standard
MIR	multisensor imagery reconnaissance
MISREP	mission report
MRR	minimum-risk route
MSL	mean sea level
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
OPTASKLINK	operations task link
OSR	on-station report
PGM	precision-guided munition
P_i	probability of incapacitation
PID	positive identification
PLA	post-launch abort
POF	priority of fires
PPLI	precise participant location and identification
PRF	pulse repetition frequency
PSS-SOF	Precision Strike Suite-Special Operations Forces
PTL	pointer-to-target line
RF	radio frequency
RFA	restrictive fire area
RFL	restrictive fire line
ROC	rehearsal of concept
ROE	rules of engagement
ROZ	restricted operations zone
RP	red phosphorus
RPG	rocket-propelled grenade
RSOF	routing and safety of flight
RW	rotary-wing
S-3	battalion or brigade operations staff officer (USA); operations and training officer (USMC)
SA	situational awareness
SAAFR	standard use Army aircraft flight route
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
SPINS	special instructions
STANAG	standardization agreement (NATO)
SUC	situation update code

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
TBMCS	theater battle management core system
TDL	tactical data link
TGO	terminal guidance operations
TLE	target location error
TMO	target mensuration only
TOC	tactical operations center
TOT	time on target
TRP	target reference point
TSM	target sorting message
TTP	tactics, techniques, and procedures
TTT	time to target
UA	unmanned aircraft
UAS	unmanned aircraft system
UH	utility helicopter
UHF	ultrahigh frequency
URN	unit reference number
USA	United States Army
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
WILCO	will comply
WOC	wing operations center (USAF)
WP	white phosphorus

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.** (DOD Dictionary. Source: JP 3-09.3)

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.** (DOD Dictionary. Source: JP 3-09.3)

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.** (DOD Dictionary. Source: JP 3-09.3)

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.** (DOD Dictionary. Source: JP 3-09.3)

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. (DOD Dictionary. Source: JP 3-09.3)

attack position. The last position occupied by the assault echelon before crossing the line of departure. (DOD Dictionary. Source: JP 3-09.3)

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.** (DOD Dictionary. Source: JP 3-09.3)

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. (DOD Dictionary. Source: JP 3-09.3)

close air support. Air action by aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces. Also called **CAS.** (Approved for incorporation into the DOD Dictionary.)

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. (DOD Dictionary. Source: JP 3-09.3)

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.** (DOD Dictionary. Source: JP 3-50)

control point. 1. A position along a route of march at which personnel 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. Also called **CP.** (Approved for incorporation into the DOD Dictionary.)

danger close. None. (Approved for removal from the DOD Dictionary.)

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.** (DOD Dictionary. Source: JP 3-09.3)

direct air support center (airborne). None. (Approved for removal from the DOD Dictionary.)

direct fire. Fire delivered on a target using the target itself as a point of aim for either the weapon or the director. (DOD Dictionary. Source: JP 3-09.3)

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.** (DOD Dictionary. Source: JP 3-09.3)

engage. 1. In air and missile defense, a fire control order used to direct or authorize units and/or weapon systems to attack a designated target. (JP 3-01) 2. To bring the enemy under fire. (DOD Dictionary. 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 the DOD Dictionary.)

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.** (DOD Dictionary. Source: JP 3-09.3)

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.** (DOD Dictionary. 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.** (DOD Dictionary. 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).** (DOD Dictionary. Source: JP 3-09.3)

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 the DOD Dictionary.)

forward edge of the battle area. The foremost limits of a series of areas in which ground combat units are deployed to coordinate fire support, the positioning of forces, or the maneuver of units, excluding areas in which covering or screening forces are operating. Also called **FEBA.** Approved for incorporation into the DOD Dictionary.)

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.** (Approved for incorporation into the DOD Dictionary.)

forward operating base. An airfield used to support tactical operations without establishing full support facilities. Also called **FOB.** (DOD Dictionary. Source: JP 3-09.3)

general support. 1. Support given to the supported force as a whole and not to any particular subdivision thereof. 2. A tactical artillery mission. Also called **GS.** (Approved for incorporation into the DOD Dictionary.)

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.** (DOD Dictionary. Source: JP 3-09.3)

gun-target line. An imaginary straight line from gun to target. Also called **GTL.** (DOD Dictionary. Source: JP 3-09.3)

head-up display. A display of flight, navigation, attack, or other information superimposed upon the pilot's forward field of view. (DOD Dictionary. Source: JP 3-09.3)

high-altitude bombing. Horizontal bombing with the height of release over 15,000 feet. (Approved for replacement of "high altitude bombing" in the DOD Dictionary.)

immediate air support. Air support to meet specific requests that arise during the course of a battle and cannot be planned in advance. (Approved for incorporation into the DOD Dictionary.)

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.** (Approved for incorporation into the DOD Dictionary.)

joint air attack team. None. (Approved for removal from the DOD Dictionary.)

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.** (DOD Dictionary. Source: JP 3-09.3)

joint fires observer. A certified and qualified Service member who requests, controls, and adjusts surface-to-surface fires; provides targeting information in support of close air support; and performs terminal guidance operations. Also called **JFO.** (Approved for incorporation into the DOD Dictionary.)

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.** (DOD Dictionary. Source: JP 3-09.3)

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 the DOD Dictionary.)

lead aircraft. The airborne aircraft designated to exercise command of other aircraft within the flight. (Approved for incorporation into the DOD Dictionary.)

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.** (DOD Dictionary. Source: JP 3-09.3)

Marine tactical air command center. The principal United States Marine Corps air command and control agency from which air operations and air defense warning functions are directed. Also called **Marine TACC.** (Approved for replacement of "tactical air command center" and its definition in the DOD Dictionary.)

marking. To maintain contact on a target from such a position that the marking unit has an immediate offensive capability. (DOD Dictionary. 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.** (DOD Dictionary. Source: JP 3-09.3)

naval surface fire support. Fire provided by Navy surface gun and missile systems in support of a unit or units. Also called **NSFS.** (DOD Dictionary. Source: JP 3-09.3)

Navy 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.** (Approved for replacement of "tactical air control center" in the DOD Dictionary.)

night-vision device. Any electro-optical device used to detect visible and infrared energy and provide a visible image. Also called **NVD.** (Approved for replacement of "night vision device" and its definition in the DOD Dictionary.)

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" and its definition in the DOD Dictionary.)

no-fire area. An area designated by the appropriate commander into which fires or their effects are prohibited. Also called **NFA.** (DOD Dictionary. 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.** (DOD Dictionary. Source: JP 3-09.3)

preplanned air support. Air support in accordance with a program, planned in advance of operations. (DOD Dictionary. Source: JP 3-09.3)

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.** (DOD Dictionary. Source: JP 3-09.3)

release altitude. Altitude of an aircraft above the ground at the time of ordnance release. (DOD Dictionary. Source: JP 3-09.3)

safing. As applied to weapons and ammunition, the changing from a state of readiness for initiation to a safe condition. Also called **de-arming.** (DOD Dictionary. Source: JP 3-09.3)

spot net. Radio communication net used by a spotter in calling fire. (DOD Dictionary. Source: JP 3-09.3)

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.) (DOD Dictionary. Source: JP 3-09.3)

supporting arms coordination center. A single location on board an amphibious warfare 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 the DOD Dictionary.)

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.** (DOD Dictionary. Source: JP 3-09.3)

tactical air coordinator (airborne). An aircrew member who coordinates, from an aircraft, the actions of other aircraft engaged in air support of ground or sea forces. Also called **TAC(A).** (Approved for incorporation into the DOD Dictionary.)

tactical air direction center. An air operations installation, under the overall control of the Navy tactical air control center or the Marine 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.** (Approved for incorporation into the DOD Dictionary.)

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.** (DOD Dictionary. Source: JP 3-09.3)

target location error. The difference between the coordinates generated for a target and the actual location of the target. Also called **TLE.** (DOD Dictionary. Source: JP 3-09.3)

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.** (DOD Dictionary. Source: JP 3-09.3)

terminal attack control. The authority to control the maneuver of and grant weapons release clearance to attacking aircraft. Also called **TAC.** (Approved for incorporation into the DOD Dictionary.)

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. (DOD Dictionary. Source: JP 3-09.3)

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 to avoid enemy detection and fire. Also called **contour flight**; **low-level flight**; **nap-of-the-Earth flight.** (Approved for incorporation into the DOD Dictionary.)

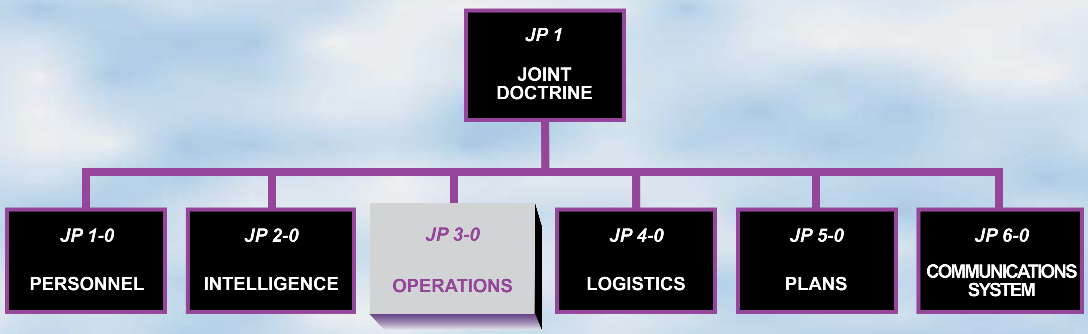
thermal crossover. The natural phenomenon that normally occurs twice daily when temperature conditions are such that there is a loss of contrast between two adjacent objects on infrared imagery. (DOD Dictionary. Source: JP 3-09.3)

time on target. The actual time at which munitions impact the target. Also called **TOT.** (DOD Dictionary. 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.** (DOD Dictionary. Source: JP 3-09.3)

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. (DOD Dictionary. Source: JP 3-09.3)

JOINT DOCTRINE PUBLICATIONS HIERARCHY



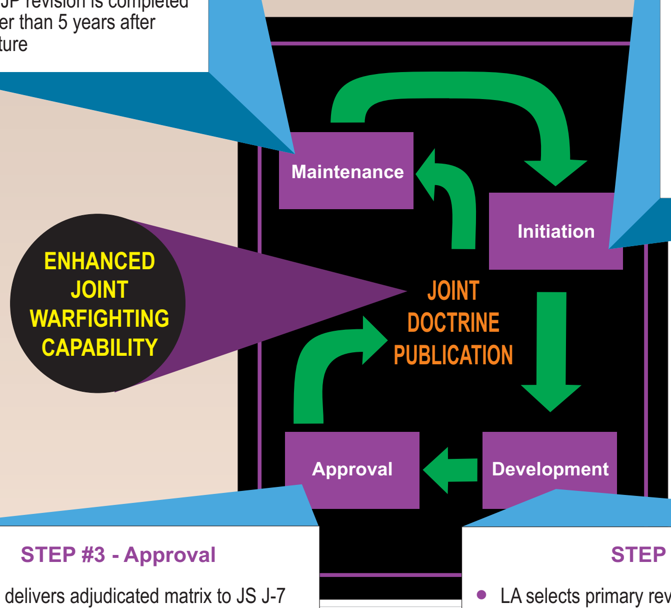
All joint publications are organized into a comprehensive hierarchy as shown in the chart above. **Joint Publication (JP) 3-09.3** is in the **Operations** series of joint doctrine publications. The diagram below illustrates an overview of the development process:

STEP #4 - Maintenance

- JP published and continuously assessed by users
- Formal assessment begins 24-27 months following publication
- Revision begins 3.5 years after publication
- Each JP revision is completed no later than 5 years after signature

STEP #1 - Initiation

- Joint doctrine development community (JDDC) submission to fill extant operational void
- Joint Staff (JS) J-7 conducts front-end analysis
- Joint Doctrine Planning Conference validation
- Program directive (PD) development and staffing/joint working group
- PD includes scope, references, outline, milestones, and draft authorship
- JS J-7 approves and releases PD to lead agent (LA) (Service, combatant command, JS directorate)



STEP #3 - Approval

- JSDS delivers adjudicated matrix to JS J-7
- JS J-7 prepares publication for signature
- JSDS prepares JS staffing package
- JSDS staffs the publication via JSAP for signature

STEP #2 - Development

- LA selects primary review authority (PRA) to develop the first draft (FD)
- PRA develops FD for staffing with JDDC
- FD comment matrix adjudication
- JS J-7 produces the final coordination (FC) draft, staffs to JDDC and JS via Joint Staff Action Processing (JSAP) system
- Joint Staff doctrine sponsor (JSDS) adjudicates FC comment matrix
- FC joint working group

JOINT
CHIEFS OF STAFF