Joint Publication 3-09.3

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

3 September 2003
Incorporating Change 1
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PREFACE

1. Scope

This publication provides joint tactics, techniques, and procedures (JTTP) for joint fire support and aviation planning, execution and control agencies, and aircrews in fixed- and rotary-wing aircraft to attack targets in close proximity to friendly forces. It presents options the joint force commander (JFC) can employ when planning and executing close air support in joint operations.

2. Purpose

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

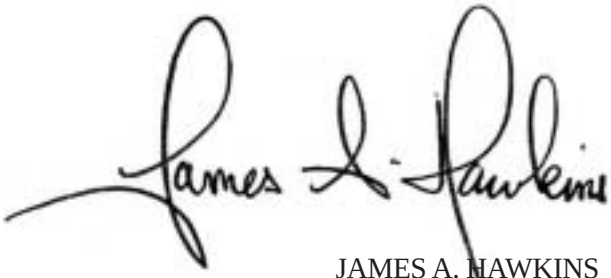
3. Application

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

b. The guidance in this publication is authoritative; as such, this doctrine (or JTTP) will be followed except when, in the judgment of the commander, exceptional circumstances dictate otherwise. If conflicts arise between the contents of this publication and the contents of Service publications, this publication will take precedence for the activities of joint forces unless the Chairman of the Joint Chiefs of Staff, normally in coordination with the other members of the Joint Chiefs of Staff, has provided more current and specific guidance. Commanders of forces operating as part of a multinational (alliance or coalition) military command should follow multinational doctrine and procedures ratified by the United States.

For doctrine and procedures not ratified by the United States, commanders should evaluate and follow the multinational command's doctrine and procedures, where applicable and consistent with US law, regulations, and doctrine.

For the Chairman of the Joint Chiefs of Staff:



JAMES A. HAWKINS
Major General, USAF
Vice Director, Joint Staff

SUMMARY OF CHANGES
REVISION OF JOINT PUBLICATION 3-09.3, DATED 1 DECEMBER 1995

- **Defines and discusses the position of joint terminal attack controller (JTAC).**
- **Provides expanded guidance on the uses of close air support (CAS), to include targeting.**
- **Adds guidance on the joint air attack team.**
- **Updates conditions required for effective CAS.**
- **Renames the "air operations center" as the "Air Force air and space operations center."**
- **Adds a discussion of Navy/Marine Corps command and control in amphibious operations.**
- **Discusses special operations forces terminal guidance operations.**
- **Provides a discussion of CAS intelligence, surveillance, and reconnaissance requirements.**
- **Consolidates coverage of planning and requesting CAS into one chapter.**
- **Adds the five steps of CAS decision-making process.**
- **Adds a new chapter on CAS preparation to include rehearsals and pre-combat preparations.**
- **Provides detailed discussion of joint terminal attack controller to combat operations center/tactical operations center coordination.**

- **Provides detailed discussion on the 3 types of CAS terminal attack control.**
- **Mandates verbal or digital read-back of Line 4 (elevation), Line 6 (target location), and any restrictions provided by the JTAC from the 9-line CAS briefing.**
- **Discusses urban CAS.**
- **Provides guidance on CAS execution with laser and inertial navigation system/global positioning system guided weapons.**
- **Eliminates Appendices on communications equipment and aircraft and helicopter capabilities.**
- **Adds the term "terminal attack control" and modifies the definitions of the terms "terminal control" and "terminal guidance" in Joint Publication 1-02.**
- **Change 1 clarifies the types of CAS terminal attack control and updates risk estimate distance data for aircraft-delivered ordnance.**

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EXECUTIVE SUMMARY
COMMANDER'S OVERVIEW

- **Discusses Organization for and Fundamentals of Close Air Support**
- **Describes Close Air Support Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR)**
- **Describes Planning and Requesting Close Air Support**
- **Discusses Preparation for Close Air Support**
- **Outlines Execution of Close Air Support**

Fundamentals of Close Air Support

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

Close air support (CAS) can be conducted at any place and time friendly forces are in close proximity to enemy forces. The word "close" does not imply a specific distance; rather, it is situational. **The requirement for detailed integration** because of proximity, fires, or movement **is the determining factor**. At times CAS may be the best means to exploit tactical opportunities in the offense or defense. CAS provides firepower in offensive and defensive operations to destroy, disrupt, suppress, fix, harass, neutralize, or delay enemy forces.

CAS may be used to mass the effects of combat power, in order to exploit opportunities in the offense and defense. **Each Service organizes, trains, and equips to employ CAS** within its roles as part of the joint force. As a result, a **variety of aircraft are capable of performing CAS**. The joint force commander (JFC) and his staff must be capable of integrating all CAS capabilities into the operation plan.

A joint terminal attack controller (JTAC) is a qualified (certified) service member who, from a forward position, directs the action of combat aircraft engaged in CAS and other air operations. A qualified and current JTAC will be recognized across Department of Defense as capable and authorized to perform terminal attack control.

For joint air operations providing CAS, integration starts at the operational level during the air apportionment process.

Whether conducting offensive or defensive operations, **commanders plan for CAS at key points** throughout the battlefield. **The JFC prioritizes CAS to support the concept of operations (CONOPS).** Commensurate with other mission requirements, the joint force air component commander (JFACC) postures aviation assets to optimize support to requesting units. The operation order, air tasking order (ATO), airspace control order, and special instructions provide the framework for integrating joint air operations CAS into the commander's CONOPS.

There are several conditions for effective CAS.

The conditions for effective CAS are: thoroughly trained personnel with well developed skills; effective planning and integration; effective command, control, communications, and computer systems; air superiority (especially suppression of enemy air defenses); target marking and/or acquisition; streamlined and flexible procedures; and appropriate ordnance. Although not a requirement for CAS employment, favorable weather improves CAS effectiveness.

Close Air Support C4ISR

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 staff located in the joint air operations center (JAOC), using host component organic command and control (C2) architecture. **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 air capabilities/forces made available for joint tasking through the JAOC and appropriate Service component C2 systems.**

The Commander, Air Force Forces exercises C2 over assigned and attached forces through the theater air control system (TACS). Closely related to, and interconnected with the TACS is the Army air-ground system.

The theater air control system (TACS) provides the commander, Air Force forces (COMAFFOR) the capability to plan and conduct joint air operations. The COMAFFOR's focal point for tasking and exercising operational control over Air Force forces is the Air Force air and space operations center, which is the senior element of the TACS.

The Army air-ground system (AAGS) begins at the field army level, and extends down through all echelons to the maneuver battalion. **AAGS coordinates and integrates both Army component aviation support and air support with Army ground maneuver.**

Terminal attack control of CAS assets is the final step in the TACS for CAS execution. There are both ground and air elements of the TACS to accomplish this mission.

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

The Navy tactical air control system is comprised of the United States Navy tactical air control center (TACC), tactical air direction center and helicopter direction center. The Navy TACC is the primary air control agency within the area of operations from which all air operations supporting the amphibious task force are controlled.

The Marine air C2 system consists of various air C2 agencies.

The Marine air command and control system (MACCS) consists of various air C2 agencies designed to provide the Marine air-ground task force aviation combat element commander with the ability to monitor, supervise, and influence the application of Marine air. Marine aviation's philosophy is one of centralized command and decentralized control. The Commander, Marine Force's focal point for tasking and exercising operational control over Marine Corps air forces is the tactical air command center.

Principal organizations and personnel that support coordination of CAS in the special operations forces command system are the special operations liaison element, the special operations C2 element, and joint terminal attack controller qualified special operations personnel.

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 commander (JSOACC), if designated by the JFSOCC. If a JSOACC 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, the special operations command and control element, and joint terminal attack controller (JTAC) qualified SOF personnel.

CAS missions require a high degree of control exercised through effective communications.

Communication must be flexible and responsive to ensure that links between aircraft and ground units are maintained. Flexibility and responsiveness of joint force CAS communications are made possible using a variety of techniques. When CAS is executed in joint operations, everyone must have the appropriate signed operating instructions and/or joint communications-electronics operating instructions in order to communicate effectively and successfully. Communications redundancy is achieved through the various communication nets used by air control agencies and tactical aircraft.

Intelligence preparation for CAS at all levels is largely dependent on mission and planning time available.

Optimum intelligence, surveillance, and reconnaissance (ISR) support to CAS begins early in the deliberate planning process. While it is impossible to account for every conceivable possibility, this early integration can assist in better target selection, ISR collection requirements, force allocation, and follow-on assessment as well as assist in preparing for immediate retaskings.

Planning and Requesting Close Air Support

CAS has a five step decision-making process.

Step 1: Receipt of Mission.

Step 2: Mission Analysis.

Step 3: Course of Action (COA) Development.

Step 4: COA Analysis/Wargame.

Step 5: Orders Production.

Commanders should plan for the employment of CAS throughout the depth of their assigned battlespace.

CAS has several planning considerations. They include:

CAS can support offensive, defensive, and other military operations.

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

CAS planners must consider C2, intelligence, surveillance, and reconnaissance, and CAS aircraft assets available.

Terrain can affect communications and visual line of sight for identifying the target and/or aircraft. Weather ceiling and visibility may affect the decision to employ low, medium, or high altitude tactics.

Time considerations include the time available for planning and the ATO planning cycle.

Collateral damage risk to civilians, civilian structures and properties associated with CAS attacks.

There are two types of CAS requests, preplanned and immediate.

Preplanned requests may be filled with either scheduled or on-call air missions while most **immediate requests** are filled with on-call missions. Those CAS requirements foreseen early enough to be included in the joint ATO are submitted as preplanned requests. As soon as the requirements for CAS are identified during the planning process, CAS planners submit a preplanned request

for CAS prior to the request cut-off time, as specified by higher headquarters. Immediate requests arise from situations that develop outside the ATO planning cycle. Because these requirements cannot be identified early on, tailored ordnance loads may not be available for specified targets.

Close Air Support Preparation

Preparation consists of activities by the unit before execution to improve its ability to conduct operations including, but not limited to: rehearsals, pre-combat/ communication checks, and movement.

The **rehearsal** is one of the most overlooked aspects of maneuver and fire support preparation. 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.

During the preparation phase, and often in consonance with the pre-combat inspections, **communication links are checked and verified**. This ensures that primary and backup voice and digital systems are checked, cryptology is current, time synchronized, and code words, brevity codes, passwords, and call signs are available and current.

The air officer/air liaison officer ensures **tactical air control party (TACP) movement** is in accordance with the maneuver unit's observation plan. Most TACP operations require movement to forward assembly areas, observation posts, or battle positions during the preparation phase of an operation.

Close Air Support Execution

It is critical for joint terminal attack controllers and combat operations center/ corps tactical operations center elements to coordinate their efforts prior to each CAS engagement.

CAS execution begins with a target nomination from the supported commander and involves two processes that are continuous and overlapping in nature (1) JTAC to operations center coordination, and (2) CAS target engagement.

Key issues such as battle tracking, target nomination, airspace deconfliction and coordination, synchronization, weapons release authority, tactical risk assessment, types of terminal attack control, and which JTAC provides terminal attack control must be clearly understood. **Only through effective coordination can the CAS "team" successfully achieve the supported commander's objectives for CAS.**

Standard procedures and tactics are vital to passing key information between CAS participants.

To ensure effective execution of CAS regardless of theater or specific command, standardized procedures should be followed. Such

procedures attend to CAS aircraft check-in, situation updates, and tactics, techniques, and procedures during final attack control.

Types of terminal attack control.

There are three types of terminal attack control (Type 1-3).

Type 1

Type 1 control is used when the JTAC must visually acquire the attacking aircraft and the target for each attack.

Type 2

Type 2 control will be used when the JTAC requires control of individual attacks but assesses that either visual acquisition of the attacking aircraft or target at weapons release is not possible or when attacking aircraft are not in a position to acquire the mark/target prior to weapons release/launch.

Type 3

Type 3 control is used when the JTAC requires the ability to provide clearance for multiple attacks within a single engagement subject to specific attack restrictions. Type 3 control does not require the JTAC to visually acquire the aircraft or the target; however, all targeting data must be coordinated through the supported commander's battle staff.

Since both fixed- and rotary-wing CAS aircraft are ever changing, standardized tactics provide a baseline for further refinement and improvement. Aircrews will ultimately decide aircraft tactics but must ensure that tactics used fall within any constraints issued by the JTAC.

CAS operations in limited visibility or adverse weather conditions demand a high level of proficiency. Such proficiency can only come about through dedicated, realistic CAS training. The three general categories of limited visibility employment are visual, system aided, and night vision device.

Technology can assist in effective CAS. Laser and inertial navigation systems and/or global positioning system based systems can aid in target acquisition and weapon guidance.

CONCLUSION

This publication provides joint tactics, techniques, and procedures for joint fire support and aviation planning, execution and control agencies, and aircrews in fixed- and rotary-wing aircraft to attack targets in close proximity to friendly forces. It presents options the JFC can employ when planning and executing CAS in joint operations.

CHAPTER I
INTRODUCTION, ORGANIZATION, AND FUNDAMENTALS

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

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

1. Introduction

a. **This publication focuses on the joint tactics, techniques, and procedures (JTTP) for close air support (CAS) in a joint environment. Although simple in concept, CAS requires detailed planning, coordination, and training for effective and safe execution.**

b. CAS is an element of joint fire support. Synchronizing CAS in time, space, and purpose with supported maneuver forces increases the effectiveness of the joint force. CAS assists land, maritime, amphibious, and special operations forces (SOF) to move, maneuver, and control territory, populations, and key waters. The supported commander establishes the priority, timing, and effects of CAS fires within the boundaries of the land, maritime, SOF, or amphibious force's area of operations. SOF may also need CAS and other joint fire support at locations well beyond land, maritime, and amphibious operations force commanders' areas of operations.

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

2. Close Air Support Defined

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

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

Commanders integrate CAS with their fire and maneuver to achieve objectives.

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

d. **CAS may be used to mass** the effects of combat power, in order to exploit opportunities in the offense and defense. The impact of effectively executed CAS in modern warfare draws credence from one of Napoleon's maxims, "XCII. In battle as in a siege, skill consists in converging a mass of fire upon a single point; when the fight is on he that has the skill to bring a sudden, unexpected concentration of artillery to bear upon a point is sure to win." **Each Service organizes, trains, and equips to employ CAS** within its roles as part of the joint force. As a result, a **variety of aircraft are capable of performing CAS**. The joint force commander (JFC) and his staff must be capable of integrating all CAS capabilities into the operation plan (OPLAN).

e. A joint terminal attack controller (JTAC) is a qualified (certified) Service member who, from a forward position, directs the action of combat aircraft engaged in CAS and other air operations. A qualified and current JTAC will be recognized across Department of Defense as capable and authorized to perform terminal attack control.

Units and organizations that have a reasonable expectation to conduct terminal attack control in order to accomplish their assigned missions need to have individuals available trained to the appropriate standards to perform this activity (e.g., JTACs). However, experience has shown that there has, and will likely continue to be instances where terminal attack control will be requested by personnel/units that do not have JTACs present. In rare circumstances, the ground commander might require CAS when no JTAC is available. One reason for this would be as a result of some unforeseen consequence of combat operations. In these instances, JTACs, FAC(A)s, and/or CAS aircrews should attempt to assist these personnel/units to greatest extent possible to bring fires to bear in support of their combat operations.

3. Use of Close Air Support

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

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

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

(1) Mission and concept of operations (CONOPS).

(2) Enemy disposition and composition.

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

(4) Requirements necessary to integrate CAS with the fire and maneuver schemes.

(5) Capabilities and limitations of available or allocated CAS assets and available ordnance.

(6) Compliance with the Law of Armed Conflict (LOAC).

c. **Targeting.** At the tactical level, targeting is the process of selecting and prioritizing individual targets and matching the appropriate response to them, taking account of operational requirements and capabilities. While conducting CAS, this may equate to the JTAC selecting a particular target in a target array. When targeting, JTACs must consider items like target type, mission, enemy, air defenses, terrain and weather, available armament, and response time. Other considerations include controller-to-target aspect, aircraft-to-target aspect, weapon-to-target aspect, designation or mark type, proximity of friendly forces, proximity of noncombatants, and other joint fires. Additionally, controllers and aircrew must expeditiously obtain and pass battle damage assessment (BDA) information. Commanders, controllers, and aircrew can use BDA to determine if objectives have been met, or whether reattack is necessary.

4. Close Air Support Integration

For joint air operations providing CAS, integration starts at the operational level during the air apportionment process. Whether conducting offensive or defensive operations, **commanders plan for CAS at key points** throughout the depth of the battlefield. **The JFC prioritizes joint air operations for CAS to support his CONOPS.** Commensurate with other mission requirements, the joint force air component commander (JFACC) postures aviation assets to optimize support to requesting units. The operation order (OPORD), air tasking order (ATO), airspace control order (ACO), and special instructions (SPINS) provide the framework for integrating joint air operation's CAS into commander's CONOPS.

5. Fratricide

a. **General.** Fratricide or casualties to friendly forces caused by friendly fire, is an unwanted consequence of warfare. **This publication's JTTP are key to reducing the risk and potential of fratricide, in turn increasing the safety and effectiveness of CAS.**

b. **Causes.** Although occasionally the result of malfunctioning weapons, **fratricide has usually 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 situational awareness by JTACs, CAS aircrews, requestors, battle staff, or commanders. Items such as detailed mission planning, standardized procedures for friendly force tracking and supporting immediate air requests, realistic training/mission rehearsal, use of friendly tagging or tracking devices, and effective staff, forward air controller (FAC)/air officer (AO) and air liaison officer (ALO) coordination, and sound clearance of fires procedures can significantly reduce the likelihood of fratricide.

c. **Responsibility. All participants in the CAS employment process are responsible for the effective and safe planning and execution of CAS.** Each participant must make every effort possible to correctly identify friendly units and enemy forces prior to targeting, clearing fires, and weapons release. Combat identification (CID) is the process of attaining an accurate characterization of detected objects to the extent that high confidence and timely application of military options and weapon resources can occur. Depending on the situation and the operational decisions that must be made, this characterization may be limited to, "friend," "enemy," or "neutral." In other situations, other characterizations may be required including, but not limited to, class, type, nationality, and mission configuration. CID characterizations, when applied with rules of engagement (ROE), enable engagement decisions and the subsequent use, or prohibition of use, of lethal and nonlethal weaponry to accomplish military objectives. CID is used for force posturing, command and control (C2), situational awareness as well as shoot, no-shoot employment decisions.

d. **Training. JFCs, components, and units must conduct joint training and rehearsals, on a regular basis, that routinely exercise these JTTP** scenarios that simulate situations that will be found in the battlespace in order to develop the skill-sets and familiarity required for success.

6. Fixed- and Rotary-Wing Close Air Support Employment

The organizational structure, primary missions, and the 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- and rotary-wing aircraft can both conduct CAS, employment considerations differ.** Traditional planning and employment methods for fixed-wing CAS may differ from rotary-wing aircraft and may vary among the Services.

a. Attack helicopters and fixed-wing aircraft have capabilities that are complementary, **especially when employed in combined attacks**. Fixed-wing aircraft have **a wide variety of CAS munitions and excellent capability to conduct CAS in diverse terrain.** Helicopters offer the advantage of an increased loiter time on station. **Both helicopters and fixed-wing aircraft offer improved response times but may have decreased flexibility when operating from forward locations.**

b. Commanders and planners typically measure **fixed-wing aircraft employment in sorties.** A sortie is an operational flight by one aircraft. **Normally, CAS fighter/attack aircraft fly in groups of two to four aircraft.** Bombers normally fly as single ships or small groups. The Air Force calls these flights, while the Navy and Marine Corps call them either sections (two aircraft) or divisions (three to four aircraft). Special operations AC-130 gunships typically operate single-ship sorties during hours of darkness and under low-threat conditions. Survivability for aircraft is usually higher at night.

c. **Army aviation units** are organic to corps, divisions, and regiments and **perform missions as part of a combined arms team**. Army helicopter units normally receive mission-type orders and execute as an integral unit/maneuver element. **Special situations may arise where attack helicopters are employed in smaller units. The Army does not consider its attack helicopters a CAS system,** although they can conduct attacks employing CAS JTTP when operating in support of other forces. **The preferred employment method is as an integral unit**, operating under the control of a maneuver commander executing mission-type orders.

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

e. The **joint force special operations component commander (JFSOCC)** may maintain a small fleet of special operations aircraft, both fixed- and rotary-wing. These aircraft are normally used to support and conduct special operations, and some can perform CAS.

f. **Joint air attack team (JAAT)** is a combination of attack and/or scout rotary-wing aircraft and fixed-wing CAS aircraft operating together to locate and attack high-priority targets and other targets of opportunity. JAAT normally operates as a coordinated effort supported by fire support, air defense artillery, naval surface fire support (NSFS), intelligence, surveillance, and reconnaissance (ISR) systems, electronic warfare (EW) systems, and ground maneuver forces against enemy forces. JTACs may perform duties as directed by the air mission

commander in support of the ground commander's scheme of maneuver. JAAT planning considerations and employment methods are discussed in the multi-Service JAAT manual, Field Manual (FM) 90-21, Marine Corps Reference Publication (MCRP) 3-3.23A, Naval Warfare Publication (NWP) 3-01.3, Air Force Tactics, Techniques, and Procedures (AFTTP)(I) 3-2.10.

7. Conditions for Effective Close Air Support

The conditions for effective CAS are: thoroughly trained personnel with well developed skills, effective planning and integration, effective command, control, communications, and computers systems, air superiority (especially suppression of enemy air defenses [SEAD]), target marking and/or acquisition, streamlined and flexible procedures and appropriate ordnance. Although not a requirement for CAS employment, favorable weather improves CAS effectiveness (see Figure I-1).

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

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 pre-planned and pre-briefed. Rehearsals provide participants an opportunity to walk through the operation, to achieve familiarity with terrain, airspace restrictions and procedures, and to identify shortfalls.

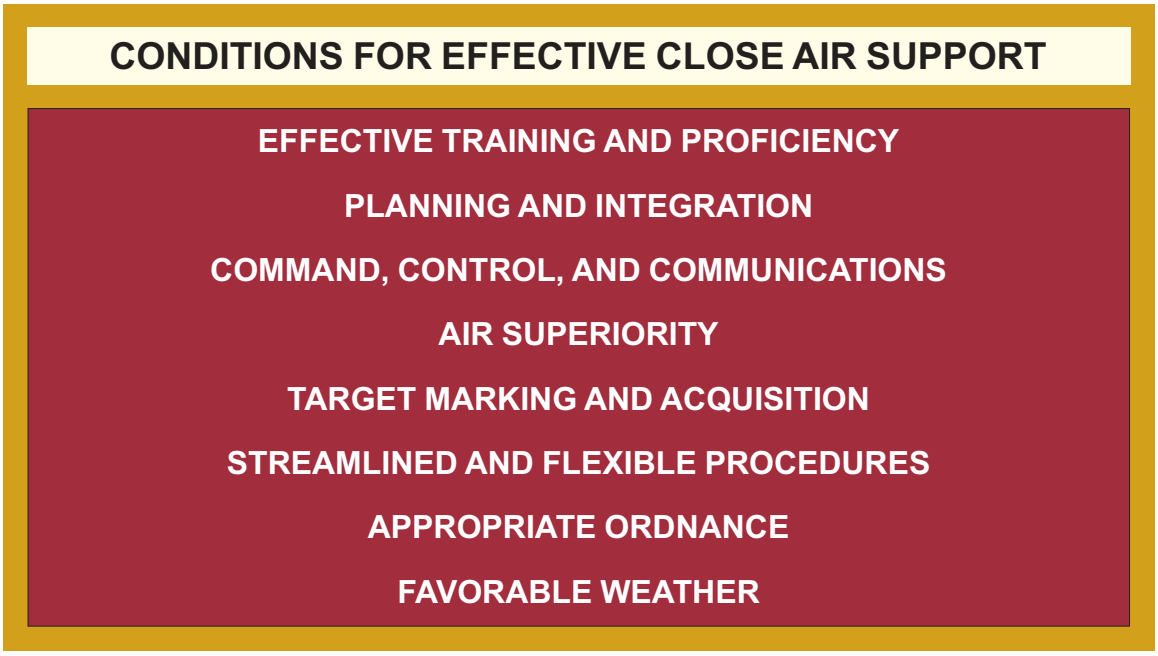

Figure I-1. Conditions for Effective Close Air Support

c. **Command, Control, and Communications (C3).** CAS requires an integrated, flexible C3 structure to identify requirements, request support, prioritize competing requirements, task units, move CAS forces to the target area, provide threat warning updates, enhance CID procedures, etc. Accordingly, C2 requires dependable and interoperable communications between aircrews, air control agencies, JTACs, ground forces, requesting commanders, and fire support agencies. Any airspace control measures and fire support coordinating measures should allow for timely employment of CAS without adversely effecting other fire support assets. See Joint Publication (JP) 3-52, *Doctrine for Joint Airspace Control in the Combat Zone*, for more information.

d. **Air Superiority.** Air superiority permits CAS to function without prohibitive interference by the adversary. **Air superiority may range from local or temporary air superiority to control of the air over the entire operational area.** SEAD is an integral part of achieving air superiority and may be required during CAS attacks.

e. **Target Marking and Acquisition.** The commander employing CAS can improve its effectiveness by providing timely and accurate target marks. Target marking builds situational awareness, identifies specific targets in an array, reduces the possibility of fratricide, and facilitates terminal attack control. 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 V, "Execution" for further details.

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

(1) Using forward operating bases (FOBs) or forward operating locations near the area of operations.

(2) Placing aircrews in a designated ground or airborne alert status.

(3) Delegating launch and divert authority to subordinate units.

(4) Placing JTACs and AOs/ALOs to facilitate continuous coordination with ground units, communication with aircraft, and observation of enemy locations.

g. **Appropriate Ordnance.** To achieve the commander's intent for CAS, planners, JTACs, and aircrews must tailor the weapons and fuse settings. 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, and are not advisable for targets where friendly troops may be affected by the immediate strike or by unexploded ordnance. Cluster munitions that dud may affect the mobility of certain units. In all cases, the supported commander needs to know the type of ordnance expended, and its possible impact on the unit's current or subsequent mission.

Responsive CAS allows a commander to exploit fleeting battlefield opportunities.

h. **Favorable Weather.** Favorable weather improves aircrew effectiveness regardless of aircraft or weapon capability. Tactical decision aids, such as target acquisition weather software, night vision device (NVD) planning software, infrared (IR) target/scene simulation software, and integrated weather effects decision 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 precise enough information to ensure positive target identification and assure avoidance of fratricide.

8. Responsibilities

a. **The Joint Force Commander. The JFC establishes the guidance and priorities for CAS** in the CONOPS, operation or campaign plans, air apportionment decision, and by making capabilities and forces available to the components.

b. **Joint Force Air Component Commander. The JFACC is given the authority necessary** to accomplish missions and tasks assigned by the establishing commander. For CAS, **these responsibilities include recommending an air apportionment decision**, allocating forces/capabilities made available from the JFC and components, creating and executing 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. Service component commanders are responsible for ensuring that their assets are capable of executing CAS missions within Service roles or as directed by the JFC.**

CLOSE AIR SUPPORT IN WORLD WAR I

Despite the losses inflicted on attacking aircraft, aerial attack of front-line troops appeared, on the whole, to be quite effective. On November 23, 1917, for example, RFC D.H. 5 fighters (a type used almost exclusively for ground-attack duties) cooperated with advancing British tanks, attacking artillery positions at Bourlon Woods as the tanks advanced. Subsequent analysis concluded that "the aeroplane pilots often made advance possible when the attacking troops would otherwise have been pinned to the ground." The critical problem affecting the quality of air support in the First World War was, interestingly, one that has appeared continuously since that time as well: communication between the air forces and the land forces. During these early operations, communication was virtually one-way. Infantry would fire flares or smoke signals indicating their position, or lay out panel messages to liaison aircraft requesting artillery support or reporting advances or delays. For their part, pilots and observers would scribble messages and send them overboard (on larger aircraft, crews carried messenger pigeons for the same purpose). Though by 1918 radio communication was beginning to make an appearance in front-line air operations — as evidenced by its employment on German ground-attack aircraft such as the Junker J1 and on Col. William Mitchell's Spad XVI command airplane — it was still of such an uncertain nature that, by and large, once an airplane had taken off it was out of communication with the ground until it had landed. Thus attack flights — both Allied and German — tended to operate on what would now be termed a "prebriefed" basis: striking targets along the front 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

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CHAPTER II
COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE

"Command and control encompasses all military functions and operations, giving them meaning and harmonizing them into a meaningful whole."

Marine Corps Doctrinal Publication 6

1. General

a. **CAS requires an integrated, flexible, and responsive C2 structure** to process CAS requirements **and a dependable, interoperable, and secure communications architecture** to exercise control. This chapter outlines the joint and component airspace control agencies involved and joint force connectivity required for integrated CAS.

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

2. Close Air Support for Joint Force Operations

a. **If a support relationship is established between components, the supporting component uses the CAS C2 system of the supported component.** For example, if an Army brigade is under operational control (OPCON) to a Marine MAGTF, the Army brigade submits CAS requests through the brigade fire support element (FSE) to the Marine Corps 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 components, each component forwards CAS requests utilizing its respective CAS process to the JAOC for consideration/ fill.** For example, if a MAGTF and an Army division are operating as adjacent units under the JFC, each component would direct CAS requests through its respective CAS process to the JAOC.

c. **Figure II-3 (Air Force/Army TACS/AAGS nets) depicts** Air Force and Army air C2 agencies and communications nets. **This information is provided for supporting components to determine control agencies and frequency band connectivity for CAS.**

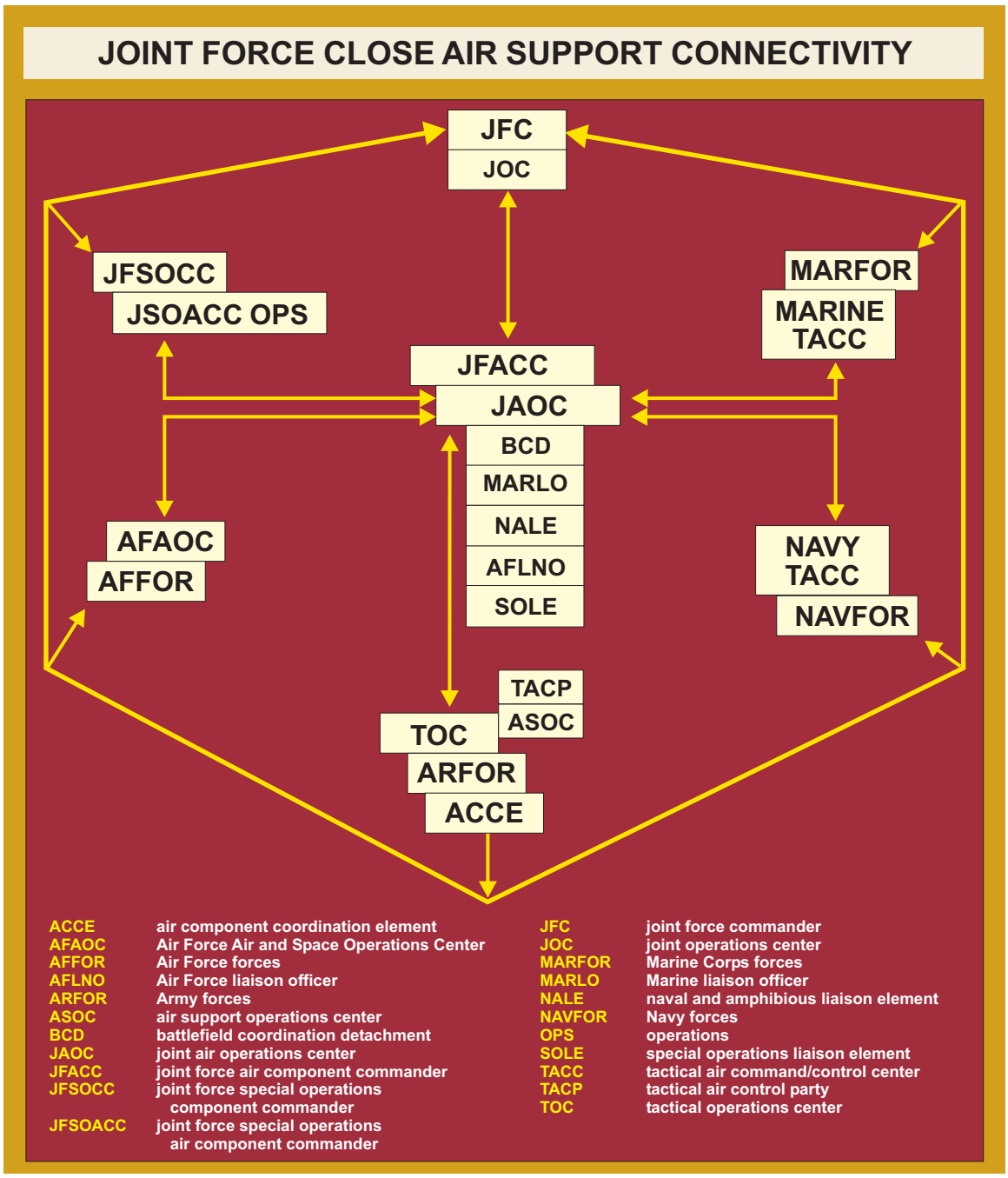

Figure II-1. Joint Force Close Air Support Connectivity

COMPONENT AIR COMMAND AND CONTROL AGENCIES FOR CLOSE AIR SUPPORT

United States Air Force	United States Army	United States Navy	United States Marine Corps	Special Operations Forces
Theater Air Control System	Army Air-Ground System	Navy Tactical Air Control System	Marine Air Command and Control Stysem	Air Command and Control
Air Force Air and Space Operations Center		Tactical Air Control Center/ Tactical Air Direction Center	Tactical Air Command Center/Tactical Air Direction Center	Joint Special Operations Air Component
	Battlefield Coordination Detachment	Naval and Amphibious Liaison Element	Marine Liaison Officer	Special Operations Liaison Element
Control and Reporting Center		Fleet Air Warfare Coordinator	Tactical Air Operations Center	
Air Support Operations Center		Air Support Coordination Section	Direct Air Support Center	Special Operations Command and Control Element
	Fire Support Element/Army Airspace Command and Control	Supporting Arms Coordination Center	Fire Support Coordination Center	Special Operations Command and Control Element
Tactical Air Control Party			Tactical Air Control Party	
Forward Air Controller (Airborne)		Forward Air Controller (Airborne)	Forward Air Controller (Airborne)	
Tactical Air Controller (Airborne)		Tactical Air Controller (Airborne)	Tactical Air Controller (Airborne)	
Terminal Attack Controller			Forward Air Controller	Joint Terminal Attack Controller qualified special operations personnel

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

3. Air Force/Army Command and Control

The commander, Air Force forces (COMAFFOR) exercises C2 over assigned and attached forces through the TACS.

a. **Theater Air Control System. The TACS provides the COMAFFOR the capability to plan and conduct joint air operations.** Army and Air Force connectivity is outlined in Figure II-4. The COMAFFOR's focal point for tasking and exercising OPCON over Air Force forces (AFFOR) is the **Air Force air and space operations center (AFAOC)**, which is the **senior element of the TACS**. Subordinate TACS agencies performing the tasks of planning, coordinating, monitoring, surveillance, controlling, reporting, and execution of CAS are shown in Figure II-5.

UNITED STATES AIR FORCE/UNITED STATES ARMY COMMUNICATIONS NETS

NET	FREQUENCY	AFAOC	ASOC	CRC	WOC	FAC	TACP	CAS A/C	AWACS	JSTARS
Command and Control Net	High Frequency (HF) Satellite Communication (SATCOM)	X	X	X	X				X	X
Air Force Air Request Net	HF SATCOM		X	X			X			# X
Air Control Net	Ultra High Frequency (UHF) Very High Frequency/ Amplitude Modulation (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/Frequency Modulation (FM)		X				X			#
Voice Product Net		X	X	X					X	X
High Value Asset Net	UHF		X	X						X

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

Figure II-3. United States Air Force/United States Army Communications Nets

UNITED STATES AIR FORCE/UNITED STATES ARMY COMMUNICATIONS NETS

LEGEND

A/C	Aircraft
AFAOC	Air Force Air and Space Operations Center
ASOC	Air Support Operations Center
AWACS	Airborne Warning and Control System
CAS	Close Air Support
CRC	Control and Reporting Center
FAC	Forward Air Controller
JSTARS	Joint Surveillance Target Attack Radar Systems
TACP	Tactical Air Control Party
WOC	Wing Operations Center

Figure II-3. United States Air Force/United States Army Communications Nets (cont'd)

(1) **Air Force Air and Space Operations Center. The AFAOC is the COMAFFOR's means of turning the JFC's guidance into a component air operations plan.** It allocates resources and tasks forces through ATOs. When the COMAFFOR is also the JFACC, he will augment the AFAOC with elements from other components to create a JAOC.

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

(2) **Air Component Coordination Element (ACCE).** The Air Force component commander establishes an ACCE to interface and provide liaison with the joint force land component commander (JFLCC) or commander, Army forces. The ACCE is collocated with the JFLCC staff. The ACCE is the senior Air Force element assisting the JFLCC staff in planning air component supporting and supported requirements. The ACCE interface includes exchanging current intelligence and operational data, support requirements, coordinating the integration of AFFOR/JFACC requirements for airspace control measures (ACMs), joint fire support coordinating measures (FSCMs), and CAS. The ACCE is organized with expertise in the following areas: plans, operations, intelligence, airspace management, and airlift. The ACCE is not an air support operations center (ASOC) or tactical air control party (TACP), but acts as the AFFOR/JFACC senior liaison element and can also perform many air support planning functions.

(3) **Wing Operations Center (WOC).** The WOC is a unit's operational 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.

(4) **Airborne C2 Elements.** Airborne C2 platforms supporting CAS include the E-3 Sentry Airborne Warning and Control System (AWACS), and the E-8C, Joint Surveillance Target Attack Radar System (JSTARS).

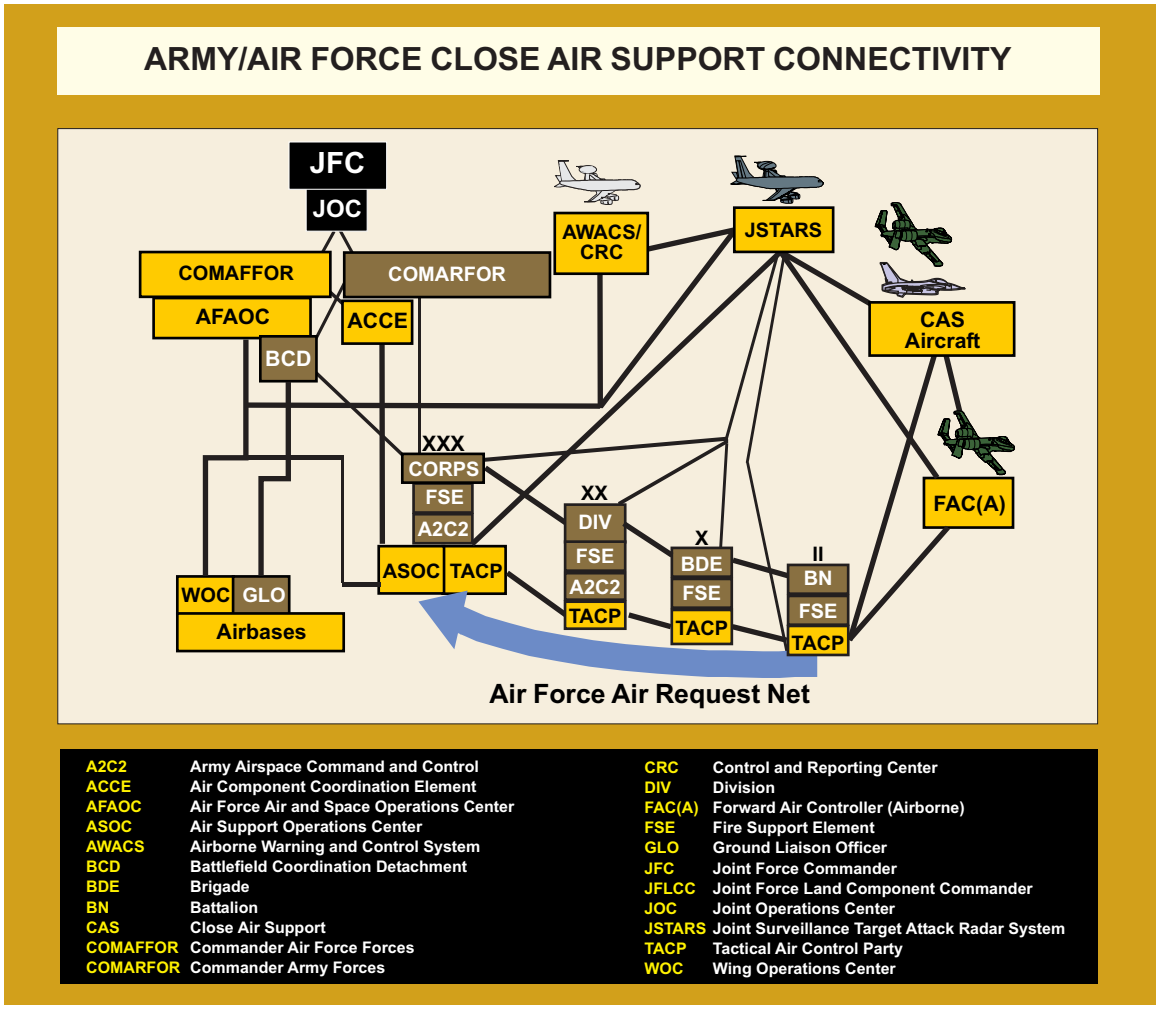

Figure II-4. Air Force/Army Close Air Support Connectivity

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

(b) **JSTARS.** JSTARS provides ground and air commanders with situation development, targeting, attack planning and limited post-attack assessment information. JSTARS supports CAS by providing targeting information to the ASOC, FSCC/FSE, tactical operations centers, or direct air support center (DASC). If necessary, JSTARS can provide ground surveillance situational awareness and targeting information directly to CAS aircraft, the forward air controller (airborne) (FAC(A)), or the TACP. As part of its airborne battlespace C2 mission, JSTARS can provided limited ASOC back-up functions.

(5) **Control and Reporting Center (CRC).** CRCs are **ground-based airspace control/air defense, battlespace management centers that provide the COMAFFOR with a decentralized**

SUBORDINATE THEATER AIR CONTROL SYSTEM AGENCIES

- Airborne Warning and Control System
- Control and Reporting Center
- Deployed Radar
- Air Support Operations Center
- Tactical Air Control Party
- Terminal Attack Controllers
- Joint Surveillance Target Attack Radar System

Figure II-5. Subordinate Theater Air Control System Agencies

C2 execution capability. Critical core competencies of the CRC include air battle execution, surveillance, combat identification, data link management, and theater air defense. The CRC provides a robust systems/communications hub capability that connects lateral and subordinate joint and TACS C2 nodes to the JAOC. CRCs provide safe passage and radar control and surveillance for CAS aircraft transiting to and from target areas.

(6) **Air Support Operations Center**

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

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

CLOSE AIR SUPPORT IN WORLD WAR II

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

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

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

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

b. **Army Air-Ground System.** The AAGS (see Figure II-4) begins at the field army level, and extends down through all echelons to the maneuver battalion (BN). **AAGS coordinates and integrates both Army component aviation support and air support with Army ground maneuver.**

(1) **Battlefield Coordination Detachment (BCD).** The Army maintains BCDs at the numbered Army level to **interface and provide liaison with the JFACC or COMAFFOR** during combat operations. It is the senior Army airspace command and control (A2C2) element. The BCD is located in the JAOC or AFAOC. Preplanned CAS requests proceed through Army command channels to the BCD. The BCD interface includes exchanging current intelligence and operational data, support requirements, coordinating the integration of Army forces (ARFOR) requirements for ACMs, joint FSCMs, and CAS. The BCD is not an FSE, but acts as the ARFOR senior liaison element and can also perform many fire support functions.

(2) **Tactical Operations Center (TOC).** At each level in the Army **the TOC is focal point of staff planning and synchronization of all operations for the commander**, including planning and requesting CAS for unit missions. The staff uses the TOC to **coordinate** the requirements for **CAS employment** within the unit's area of operations.

(3) **Tactical Command Post.** The tactical command post primarily concentrates on the **conduct of the current operations**. The tactical command post is usually the **approving authority for immediate CAS requests or diversions of preplanned missions** for the unit. It is normally where the commander or battle staff will issue clearance of fires.

(4) **FSE and ASOC/TACP Interface. The FSE is the link for the CAS mission area between the Army unit and the ASOC/TACP.** The FSE 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 unit. As part of this responsibility, the FSE **coordinates the airspace usage** with the unit's A2C2 element collocated with the FSE. The FSE and ASOC/TACP **synchronize and integrate CAS** for the unit. CAS coordination occurs through the ASOC and the unit's ALO or TACP in conjunction with the fire support coordinator and operations officer (G-3/S-3). If Navy or Marine Corps CAS is available, the air and naval gunfire liaison company provides the division, brigade, and BN FSEs with supporting arms liaison.

c. **TACS/AAGS Terminal Attack Control Agencies and Personnel. When appropriate, AAGS may be clearly related to and interconnected with the USAF TACS. Together, these systems are known as "TACS/AAGS." Terminal attack control of CAS assets** is the final step in the TACS for CAS execution. There are both ground and air elements of the TACS to accomplish this mission.

(1) **Tactical Air Control Party.** The TACP is the principal Air Force liaison element aligned with Army maneuver units from BN through corps. The primary mission of corps-through brigade-level TACPs is to advise their respective ground commanders on the capabilities and limitations of air power and assist the ground commander in planning, requesting, and coordinating CAS. The TACP provides the primary terminal attack control of CAS in support of ground forces.

(a) **Air Liaison Officer.** 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. Above

BN level, an ALO is an aeronautically rated officer and is an expert in the capabilities and limitations of air power. The ALO plans and executes CAS in accordance with the ground commander's guidance and intent. At BN level, an ALO (commonly called a "BALO") is an Air Force officer or specially-qualified enlisted TACP member who provides the BN commander direct CAS support.

(b) **Terminal Attack Controllers (TAC).** The TAC is the forward Army ground commander's CAS expert. TACs provide the ground commander recommendations on the use of CAS and its integration with ground maneuver. They are members of TACPs and perform terminal attack control of individual CAS missions. The TAC must:

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

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

3. Validate targets of opportunity.

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

5. Submit immediate requests for CAS.

6. Control CAS with supported commander's approval.

7. Perform BDA.

(2) **Forward Air Controller (Airborne).** 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.

(3) **Tactical Air Coordinator (Airborne) (TAC[A]).** Normally performed by JSTARS, or a FAC(A) in the absence of JSTARS, **the TAC(A) provides communications relay** between the TACP and attack aircraft as well as other agencies of the TACS. It also expedites CAS aircraft-to-FAC hand-off during "heavy traffic" CAS operations. Air Force two-ship FAC(A) flights, especially in higher threat environments, may divide responsibilities so one aircraft fills the normal FAC(A) role while the second becomes a TAC(A).

(4) **Fire Support Team (FIST). The FIST is the ground commander's fire support element at the company level.** The company fire support officer (FSO) supervises the FIST and is the company fire support coordinator (FSC). Field artillery and mortars provide the primary fire support to the company. The FIST coordinates these assets, and when available, coordinates CAS and naval resources through appropriate agencies. The FIST also provides forward observer capabilities to the company. In the absence of a TACP, the FIST can assist the commander in the execution of CAS. **Non-JTAC qualified personnel** providing terminal attack control of a CAS mission may increase the risk of fratricide. **The decision to use non-JTAC qualified personnel for terminal attack control of CAS must be balanced against potential loss of friendly forces to enemy action.** Regardless, FIST personnel provide expert targeting information that other CAS personnel can use.

(5) **Army Aviation Unit Commander. Army attack aviation commanders establish liaison with supported headquarters (HQ)** when operating under mission-type orders. The liaison element **integrates aviation maneuver and fires into the ground tactical plan**. During execution, the liaison element **monitors the mission** while the unit commander executes in accordance with orders generated by the supported commander. **The aviation unit commander controls aviation maneuver and fires and provides reports to the command group.** FAC(A) qualified helicopter aircrew or heliborne JTAC may direct the terminal attack control of CAS.

4. Navy Command and Control

The NTACS is the principal air control system afloat (see Figure II-6). It is comprised of the United States Navy (USN) tactical air control center (TACC), tactical air direction center (TADC) and helicopter direction center (HDC). The commander, Navy force's (COMNAVFOR's) focal point for tasking and exercising OPCON over Navy air forces is the Navy TACC.

a. **Tactical Air Control Center.** The Navy TACC is the primary air control agency within the area of operations from which all air operations supporting the amphibious task force are controlled. When the COMNAVFOR is also the JFACC, he will augment the Navy TACC with elements from other components to create a JAOC. One of the seven functions of the Navy TACC is to provide CAS and other air support as requested by the landing force (LF). Ideally the Navy TACC is collocated with the supporting arms coordination center (SACC). Two sections within the Navy TACC specifically support the CAS function:

(1) **The Air Traffic Control Section (ATCS)** provides initial safe passage, radar control, and surveillance for aircraft in the amphibious operation area. The ATCS can also provide early detection, identification and warning of enemy aircraft.

(2) **The Air Support Coordination Section (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; provides aircrews with current and complete intelligence, and target briefings; passes CAS control to the JTAC; executes the CAS portion of the ATO; and acts as the agency for immediate CAS requests.

b. **Tactical Air Direction Center.** The TADC is a control agency subordinate to the Navy TACC or Marine tactical air command center, smaller in area of control, seen during advance force or sector operations (see paragraph 6).

c. **Helicopter Direction Center.** The HDC is an air operations installation under the overall control of the Navy TACC, TADC or DASC (ashore), as appropriate, from which control and direction of helicopter operations are exercised.

d. **Supporting Arms Coordination Center.** Although not part of the NTACS, the SACC is integral to supporting arms C2. The SACC is a single location on board an amphibious 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

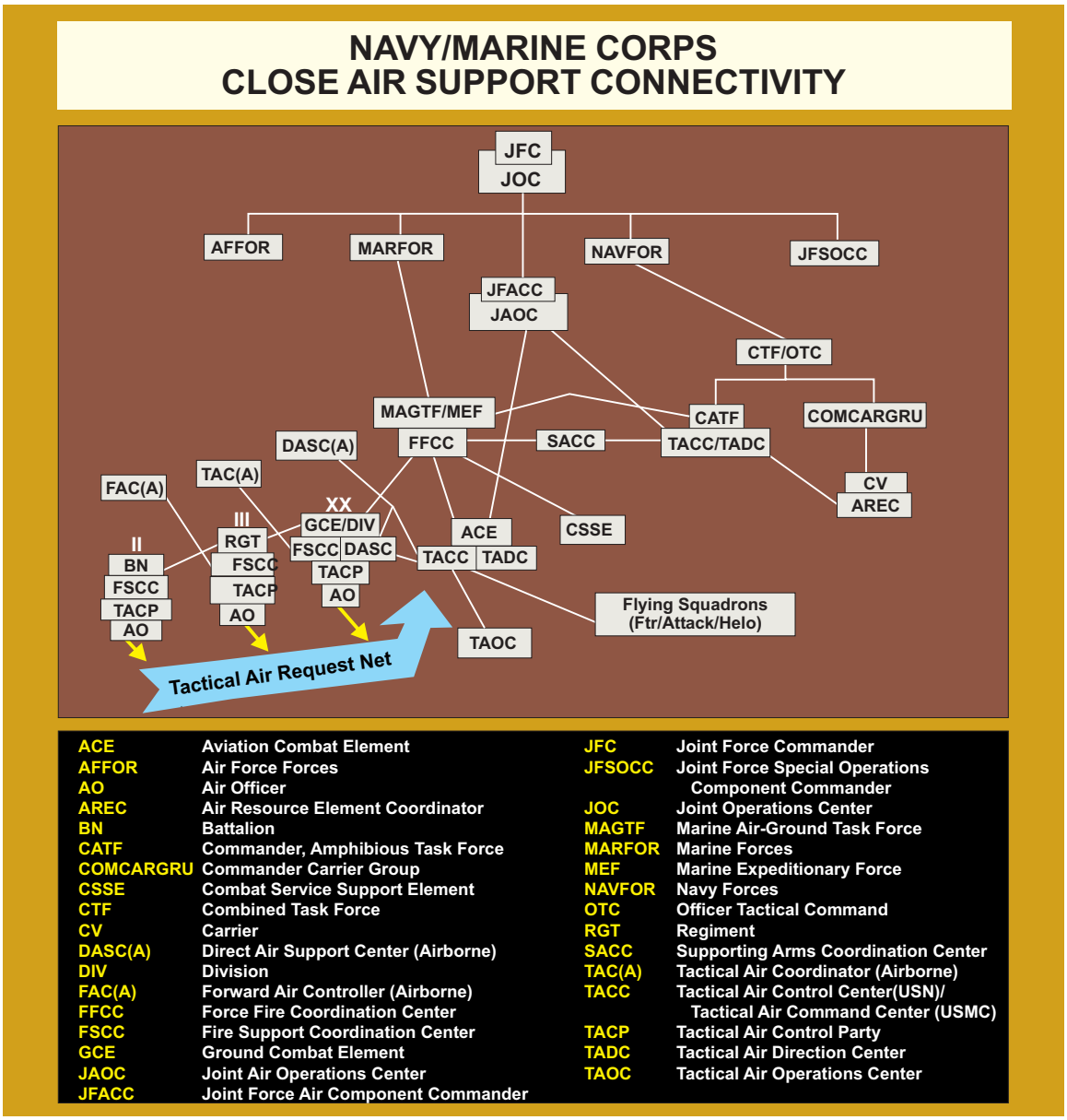

Figure II-6. Navy/Marine Corps Close Air Support Connectivity

SACC maintains radio contact on tactical air request (TAR) nets with TACP to coordinate CAS requests.

e. The naval and amphibious liaison element and Marine Corps liaison officer are available to the JFACC JAOC for CAS coordination and integration.

5. Marine Corps Command and Control

a. The MACCS consists of various air C2 agencies designed to provide the MAGTF aviation combat element (ACE) commander with the ability to monitor, supervise, and influence the application of Marine aviation's six functions (see Figure II-6). The Marine air control group (MACG) is responsible for providing, operating, and maintaining principal MACCS agencies. Marine aviation's philosophy is one of centralized command and decentralized execution. The commander, Marine force's (COMMARFOR's) focal point for tasking and exercising OPCON over Marine Corps air forces is the tactical air command center.

b. The principal agencies within the MACCS critical to the employment of CAS are:

(1) **Tactical Air Command Center.** The Marine Corps tactical air command center 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 COMMARFOR is also the JFACC, he will augment the Marine Corps tactical air command center with elements from other components to create a JAOC. Other Services' comparable agencies include the AFAOC and the Navy's TACC.

(2) **Tactical Air Direction Center.** 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 (see paragraph 6).

(3) **Tactical Air Operations Center (TAOC)**. The TAOC is subordinate to the Marine tactical air command center. The TAOC provides **safe passage, radar control**, and **surveillance** for all aircraft within the operational area.

(4) **Direct Air Support Center.** The DASC is the principal air control agency responsible for the direction of air operations that directly support ground forces and is only capable of providing procedural air control. It functions in a decentralized mode of operation, but is directly supervised by the Marine tactical air command center. The DASC processes immediate CAS requests, coordinates the execution of preplanned and immediate CAS, directs assigned and itinerant aircraft, and controls unmanned aerial vehicles (UAVs) 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 force fires coordination center (FFCC). Synchronization between the DASC and the FFCC/FSCC is vital to the effective coordination of direct air support missions and the employment of other supporting arms. An airborne DASC can also be operated from KC-130 aircraft providing the functions of the DASC on a limited scale.

(a) **Tactical Air Control Party.** The TACP, although an agency of the MACCS, is not administratively part of the MACG. Instead, it is located within the GCE. 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 are located at the regimental, BN, and company levels.

(b) **Forward Air Controller. The FAC controls aircraft** in support of ground troops from a forward ground position. This control aids target identification and greatly reduces the potential for fratricide. Primary duties of the FAC are to:

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

2. Know the supported units' plans, position, and needs.

3. Locate targets of opportunity.

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

5. Request CAS.

6. Control CAS.

7. Perform BDA.

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

(a) **Forward Air Controller (Airborne)**. 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.

(b) **Tactical Air Coordinator (Airborne).** The TAC(A) is a naval aviator who coordinates the action of combat aircraft engaged in close support of ground or sea forces. He serves as an on site airborne extension of the DASC. The DASC or Marine tactical air command center determines the TAC(A)'s authority over aircraft operating within his assigned area.

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

6. Navy/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 (see Figure II-7).

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

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

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

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

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

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

7. Special Operations Command and Control

Theater special operations are normally under the control of the JFSOCC. Control of SOF air is normally exercised by a joint special operations air component commander (JSOACC), if designated by the JFSOCC. If a JSOACC 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 qualified SOF personnel (see Figure II-8).

a. **Special Operations Liaison Element.** A SOLE is a special operations liaison team provided by the JFSOCC 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.

AMPHIBIOUS TACTICAL AIR CONTROL SYSTEM COMMUNICATIONS NETWORK

NET	FREQUENCY	TACC USN	TACC USMC	TADC	TAOC	DASC	MAG	TACP	A/C
Tactical Air Request/ Helicopter Request Net	High Frequency (HF) Very High Frequency (VHF)	X				X		X	X
Group Common	Ultra High Frequency (UHF)						X		#
Guard	UHF VHF	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.
"#" Indicates participation when directed, or as required.
"N" Indicates participation by Naval Tactical Air Control System agencies.

Figure II-7. Amphibious Tactical Air Control System Communications Network

AMPHIBIOUS TACTICAL AIR CONTROL SYSTEM COMMUNICATIONS NETWORK

LEGEND

A/C	Aircraft
DASC	Direct Air Support Center
MAG	Marine Air Group
TACC	Tactical Air Control Center (USN)
	Tactical Air Command Center (USMC)
TACP	Tactical Air Control Party
TADC	Tactical Air Direction Center
TAOC	Tactical Air Operations Center
USMC	United States Marine Corps
USN	United States Navy

Figure II-7. Amphibious Tactical Air Control System Communications Network (cont'd)

b. **Special Operations Command and Control Element (SOCCE).** A SOCCE 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.

c. **JTAC Qualified Special Operations Forces.** SOF from all three Service components (USAF special tactics personnel, USN sea-air-land teams, and US Army special forces) may have individuals that are JTAC qualified to perform terminal attack control. SOF terminal attack control training emphasizes night IR, laser, and beacon equipment.

d. **Terminal Guidance Operations (TGO).** Terminal guidance is different than terminal attack control. TGO are actions that provide terminal guidance to weapons or aircraft to facilitate target engagement. TGO are many times conducted by SOF and make joint air attacks and SOF ground operations complementary. Enemy targets, such as mobile high-payoff targets, that are difficult to locate from the air are often more visible to ground SOF. Small ground SOF elements can sometimes search for, identify, and precisely report the location of these targets and with systems like global positioning system (GPS), laser designators, etc. or combinations of the above can provide target locations. Ground SOF may also be able to provide precise BDA of attacks on targets that otherwise may be obscured or hidden. **TGO do not include authority to clear aircraft to release ordnance and should not be confused with terminal attack control.**

8. Communication Systems

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

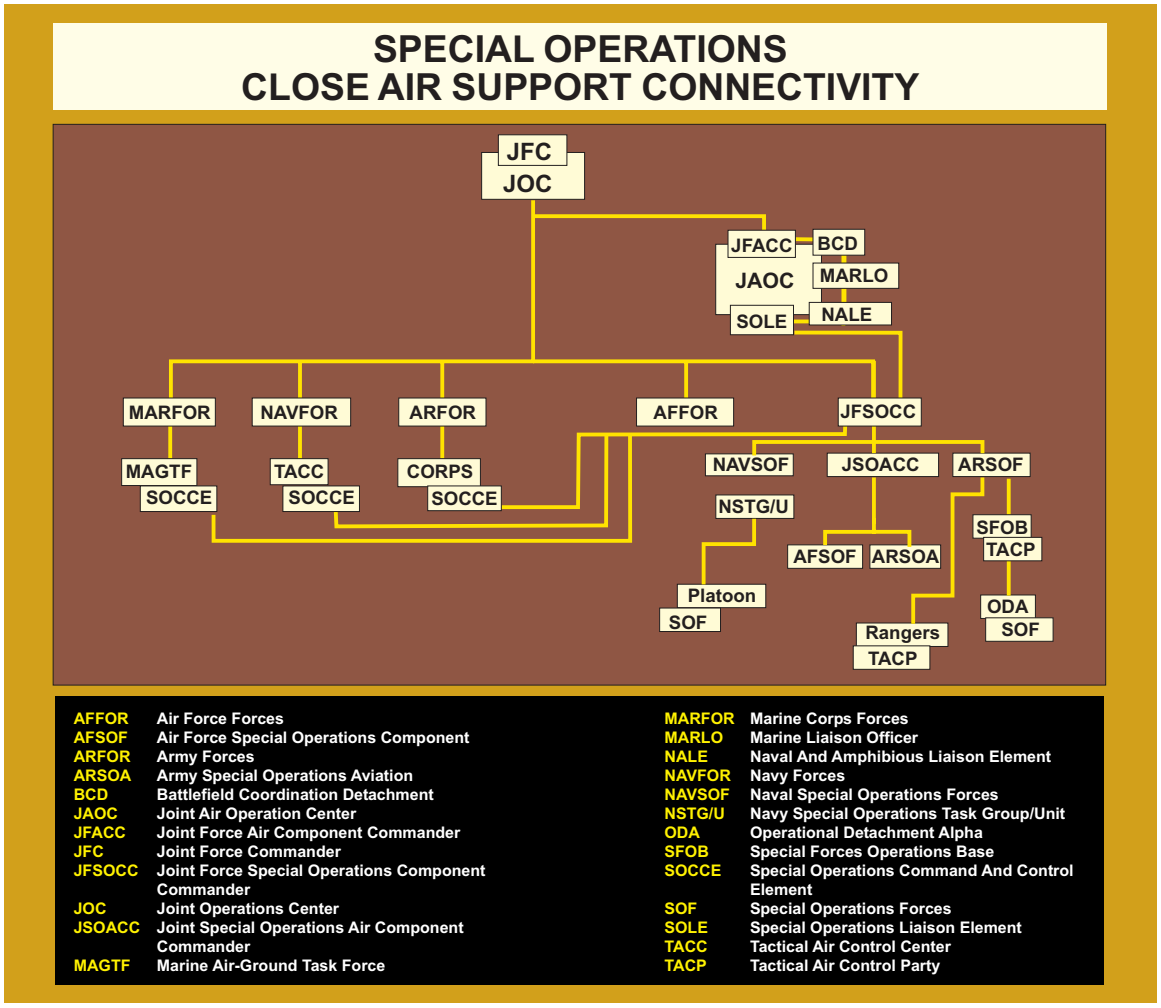

Figure II-8. Special Operations Close Air Support Connectivity

countermeasures and emission control (EMCON), and through the interoperable communications nets of the components.

b. **Secure Voice/Frequency-Agile Communications.** The preferred means of communication during CAS missions is either using secure voice or frequency-agile radio systems (e.g., Have Quick, Single-Channel Ground and Airborne Radio System [SINCGARS]). Data link should also be used to transmit information whenever possible. However, **do not allow the non-availability of these methods to hinder the application of CAS**, especially in emergency situations or in the case of fleeting targets.

c. **Countermeasures. Enemy communications jamming, monitoring, and imitative deception interfere with the air 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. **Emission Control.** 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 and the aircrew.** The DASC/ASOC/TACC or TAC(A) transmits the CAS brief to the aircrew as early as possible and prior to initial contact with the JTAC. The aircrew contacts the JTAC, transmits the abort code, 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, **everyone involved must have the appropriate signal operating instructions (SOI)/joint communications-electronics operating instructions (JCEOI) data** to communicate effectively and successfully. The JFACC (or the JFC staff if a JFACC is not established) identifies the communications requirements associated with CAS. The command, control, communications, and computers systems directorate of a joint staff (J-6) satisfies these requirements (e.g., providing frequencies, call signs, cryptographic key information) and produces the SOI/JCEOI. It is the responsibility of the JFACC to ensure that required communications data for CAS is published in the joint ATO/SPINS.

(3) Specifically, **CAS-capable units and aircrews will need radio frequencies and call signs for airspace control agencies, ground forces, and JTACs** they will need to contact during the course of their missions. They will also need identification, friend or foe codes and authentication materials. The component communications manager should establish direct liaison with the joint force J-6 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-3 and II-7 for a listing of the communications nets associated with CAS.

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

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

(b) **Army Command/Operations Net (voice).** This net is used for C2 of all maneuver elements within the maneuver force. TACPs may access this net to obtain commander's final

release authority or to coordinate with key staff agencies for information such as the disposition and location of forward friendly units or elements.

(c) **Fire Support Net (voice).** The primary purpose of this net is to request calls for fire and facilitate coordination between maneuver, FSEs, field artillery, mortars, and non-field artillery observers. 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).** Scouts, reconnaissance elements, and other intelligence gathering entities use this net to pass routine operational and intelligence information. The O&I net connects battlespace observers with their corresponding C2 nodes. Additionally, this net may be used to determine if specific triggers for CAS have been met in order to synchronize CAS with ground fire and maneuver. TACPs may access this net to obtain forward battlespace information or facilitate terminal attack control.

(e) **Command and Control Net.** Interfaces with other TACS units (AFAOC, CRC, AWACS, JSTARS, and WOC) are accomplished via high-frequency (HF)/single sideband (SSB), tropo-microwave links, and satellite communications (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) **Air Force Air Request Net.** The AFARN is the link between the ASOC and subordinate TACPs for request and coordination of immediate air support. The ASOC is the net control station (NCS). An AFARN will normally be provided for each division. The ASOC will activate and operate as many nets as necessary, contingent with needs, equipment available, and frequencies allocated. Although the primary mode for the AFARN was HF/SSB in the past, the Air Force has recently procured and fielded PRC-117F radios with SATCOM capability. This capability will likely lead to the use of SATCOM as the preferred mode for AFARN communications. Digital is the preferred method for transmitting/receiving air support requests as it expedites integration of request into automated systems.

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

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

(i) **Inflight Report Net.** This UHF-AM net is for the airborne transmission of inflight reports to the elements of the TACS. Reports are normally passed to the CRC, AWACS, or

JSTARS and relayed to the AFAOC and/or ASOC. The ASOC and AFAOC monitor this net when in range.

(j) **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.

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

(l) **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.

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

(a) **United States Marine Corps (USMC) Command Net.** This net is used for C2 of all maneuver elements within the maneuver force. AOs and FACs 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 Net.** This net provides a means to directly request and adjust artillery fire.

(d) **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.** Provides a means of communication between in-flight group aircraft and/or with the aircraft group HQ. Each aircraft group has its own common net.

(f) **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.** Provides positive control of helicopters in the amphibious objective area (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 rotary-wing CAS.

(h) **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.** Provides the primary means for the Navy TACC/TADC to pass operational and/or administrative traffic to various agencies providing tactical air support. During a large operation, an additional tactical air command net may be reserved for purely operational purposes.

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

(k) **Tactical Air Direction Net.** Provides a means for the control of aircraft conducting CAS and for the TACC/Marine tactical air command center, 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 UHF, with a secondary very high frequency (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 terminal attack control only.

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

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

(n) **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.** Provides a means for aircraft to directly request and adjust naval surface fires.

(p) **Shore Fire Control Party, Local Net.** Provides a means for coordination between the naval gunfire liaison officer and the shore fire control party.

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

(a) **SOF Air.** Communications between the aircraft and the JSOACC will be used to coordinate preplanned/immediate CAS requests. For preplanned CAS missions in support of another component, SOF air will access the established network of the requesting

component. For immediate CAS (after JFSOCC approval), SOF air will access the requesting Service communications net to provide the requested CAS support.

(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 joint special operations air component [JSOAC]) will forward the request to the JFACC via established communication links (through the SOLE). Once the asset has been assigned, that information is passed to the requester via the JFSOCC (again, by means of the JSOAC). The requesting unit will communicate with the CAS aircraft via the established providing component net (including UHF/VHF Guard).

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

h. **Communications Equipment.** See FM 90-2, MCRP 3-16.8B, NWP 3-09.2, AFTTP 3-2.6, *Multi-Service Procedures for the Joint Application of Firepower (J-FIRE)* publication for a listing of radios found on CAS-capable aircraft and ground units. The figures in that publication describe communication frequency ranges and capabilities.

i. **Digital Call-for Fire.** Systems that enable the TACP or forward observers to communicate with the FSC and to aid in the speed and accuracy of information flow may be used. All agencies involved with the conduct of fires should have the capability to receive and disseminate digital requests for fires if digital means are to be used.

9. Intelligence, Surveillance, and Reconnaissance

a. **Joint intelligence preparation of the battlespace (JIPB)** is the analytical process used to produce intelligence assessments and other intelligence products in support of the JFC's decision-making process. It is a continuous process that includes four major steps:

(1) Defining the total battlespace environment.

(2) Describing the battlespace effects.

(3) Evaluating the enemy.

(4) Determining and describing potential enemy courses of action (COAs), particularly the most likely and dangerous to friendly forces and mission accomplishment.

b. **Intelligence preparation for CAS at all levels in the CAS process is largely dependent on mission and planning time available.** Optimum ISR support to CAS begins early in the deliberate planning process to include JIPB and the targeting process. While it is impossible to account for every conceivable possibility, this early integration can assist in better target selection, ISR collection requirements, force allocation, and follow-on assessment. In turn, this will assist in preparing for immediate retaskings. While preplanned CAS benefits most from advanced planning, immediate CAS can still realize the same benefits. At a minimum,

tactical level forces should analyze the battlespace and environment in terms of military objectives; air, land, and sea avenues of approach; and the effects of weather and geography on personnel, CAS operations and weapons systems. The tactical level evaluation for CAS should concentrate on standard order of battle factors such as composition, strength, morale, tactics, and training status of specific tactical units that can interfere with mission accomplishment.

For more detailed discussion of JIPB see JP 2-01.3, Joint Tactics, Techniques, and Procedures for Joint Intelligence Preparation of the Battlespace.

c. **Human Intelligence (HUMINT).** There are many sources of HUMINT on the battlefield. Teams deployed on the battlefield such as the TACP, combat observation and lasing teams (COLTs), 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. CAS aircrew should provide the TACP and controlling agencies as much reconnaissance information as possible throughout the course of their mission.

d. **CAS Related ISR Systems**

(1) **Unmanned Aerial Vehicle.** UAVs can provide multiple types of information. Most can be equipped to collect one or more types of information on a single mission. Types of information available from UAVs include real time video and synthetic aperture radar (SAR) data. When utilized, UAV platforms must be integrated and deconflicted with CAS aircraft and surface fires within the battlespace to support CAS.

(2) **Joint Surveillance, Target, Attack, Reconnaissance Radar System.** JSTARS provides two primary radar modes; moving target indicator and SAR. Two types of ground stations can receive JSTARS radar information: the common ground station, normally found with Army ground units, and the joint Services workstation, normally found in the AFAOC/ASOC or TACC.

(3) **USAF RC-135 RIVET JOINT and U-2, USN EP-3/ARIES, and US Army RC-12/GUARDRAIL provide classified communications intelligence and electronic intelligence (ELINT) information** which may be used independently or cross-checked with other ISR platforms to augment or complete the overall intelligence picture.

(4) **Tactical Reconnaissance Systems.** Some aircraft are equipped with sensors that enable tactical airborne reconnaissance.

For more information, see FM 90-2, MCRP 3-16.8B, NWP 3-09.2, AFTTP 3-2.6 Multi-Service Procedures for the Joint Application of Firepower (J-FIRE).

(5) **Ground Surveillance Systems.** Ground surveillance radar provides a mobile, near all-weather ability to detect objects and provide target locations. The radar is capable of performing a variety of tasks, including searching avenues of approach, possible enemy attack positions, assembly areas, or other sectors or areas on a time schedule, at random, or

continuously to report location, size composition, and nature of enemy activity. Counterfire radars can also provide targeting information on enemy artillery, mortar, and rocket systems locations.

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

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CHAPTER III
PLANNING AND REQUESTING

"Planning is everything — Plans are nothing."

Field Marshal Helmuth Graf von Moltke (1800-1891)

1. Introduction

This chapter outlines a CAS-related decision-making process that can be applied to deliberate and crisis action planning, identifies specific CAS-related staff responsibilities, outlines basic CAS planning considerations, and identifies procedures for requesting CAS and CAS-related air support. Focus will be at the brigade level and below with the concept of a joint fires team consisting of TACP personnel and the FSE/FSCC. The FSE is the US Army representation to the team and the FSCC is the USMC's representation. The joint fires team is the primary tactical staff agency responsible for CAS planning. The planning phase begins when the unit receives the order from higher HQ (HHQ). Finally, while the chapter focuses on the tasks that planners must perform during major ground operations, the same tasks may apply to CAS performed in support of tactical recovery of aircraft and personnel (TRAP), combat search and rescue forces, rear area security forces, etc., that may not have the formal staff agencies discussed in the chapter.

2. Deliberate Planning

Commanders and planners must effectively incorporate their knowledge of CAS capabilities and limitations. Apportionment and allocation decisions, campaign phase development, force deployment flow, etc. can all impact tactical level CAS planning. CAS planning covered in this chapter provides planners at all levels with the necessary CAS considerations for sound concept and orders development. Deliberate planning supports crisis action planning (CAP) by anticipating and developing OPLANs that facilitate the rapid development and selection of a COA and execution planning during a crisis.

For more information on the deliberate planning process see JP 5-0, Doctrine for Planning Joint Operations.

3. Crisis Action Planning

CAP is the time critical development of OPORDs and campaign plans in response to an imminent crisis. CAP is the planning process more closely related to the employment of the tactical level procedures of CAS. The CAS decision-making process and considerations in this chapter can be applied to the phases of CAP identified in JP 5-0, *Doctrine for Planning Joint Operations*.

4. Close Air Support in the Decision-making Process

The CAS decision-making process, as indicated in Figure III-1, is a continuous 3-phase cycle that has been tailored for joint fire support and focused specifically on CAS. This chapter focuses on planning (see Figure III-2), and Chapter IV, "Preparation," and Chapter V,

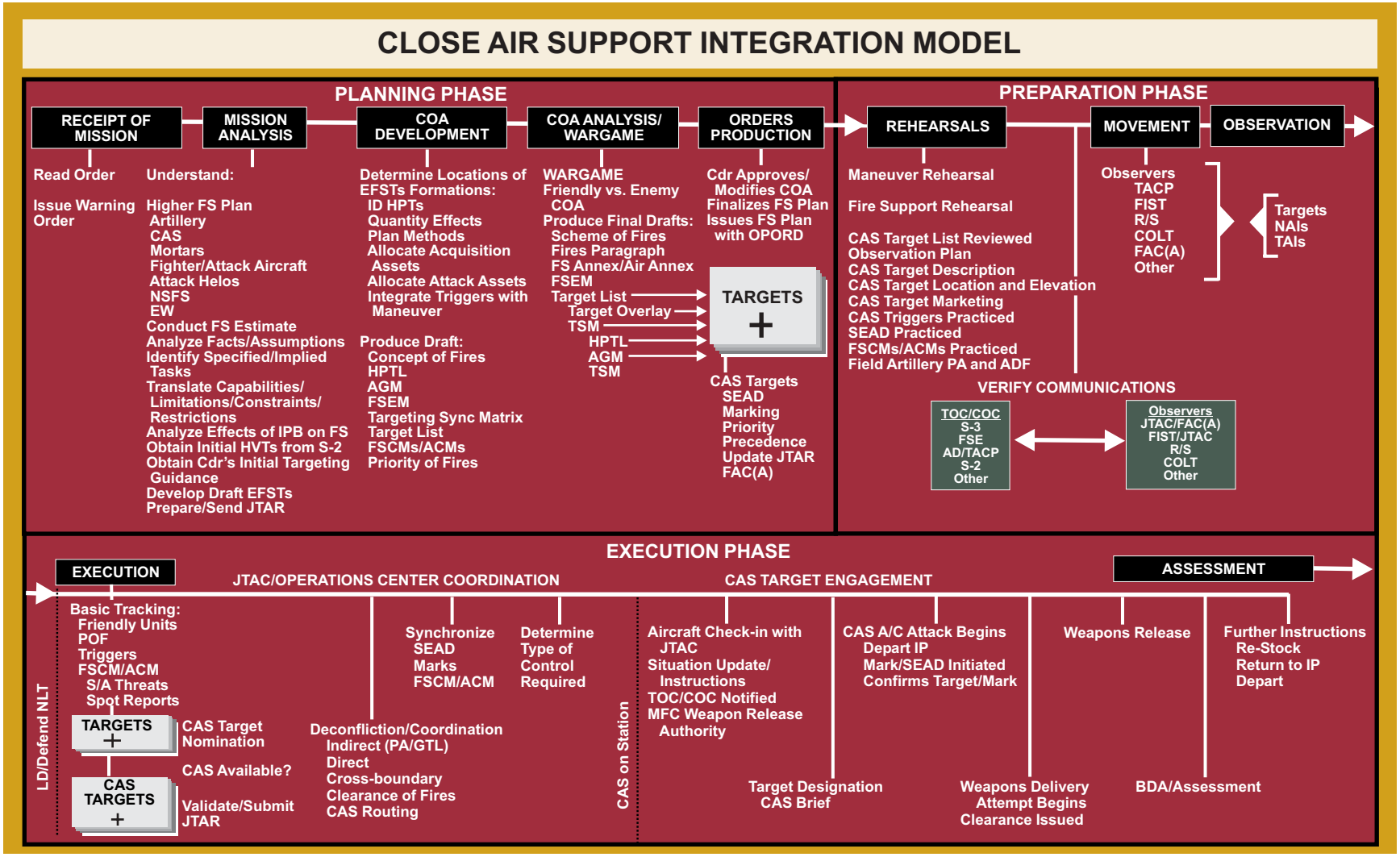

Figure III-1. Close Air Support Integration Model

CLOSE AIR SUPPORT INTEGRATION MODEL

LEGEND

A/C	Aircraft
ACM	Airspace Control Measures
AD	Advanced Deployability
ADF	Automatic Direction Finding
AGM	Air to Ground Missile
BDA	Battle Damage Assessment
Cdr	Commander
CAS	Close Air Support
COA	Course of Action
COLT	Combat Observation and Lasing Team
EFST	Essential Fire Support Task
EW	Electronic Warfare
FAC(A)	Forward Air Controller (Airborne)
FIST	Fire Support Team
FS	Fire Support
FSCM	Fire Support Coordinating Measure
FSE	Fire Support Element
FSEM	Fire Support Execution Matrix
GTL	Gun-target Line
HPT	High-Payoff Target
HPTL	High-Payoff Target List
HVT	High-Value Target
ID	Identify
IP	Initial Position
IPB	Intelligence Preparation of the Battlespace
JTAC	Joint Terminal Attack Controller
JTAR	Joint Tactical Air Strike Request
LD	Line of Departure
MFC	Multinational Force Commander
NAI	Named Area of Interest
NLT	No Later Than
NSFS	Naval Surface Fire Support
OPORD	Operation Order
PA	Position Area
POF	Priority of Fires
R/S	Reconnaissance/Surveillance
S-2	Battalion or Brigade Intelligence Staff Officer
S-3	Battalion or Brigade Operations Staff Officer
SA	Surface to Air
SEAD	Suppression of Enemy Air Defenses
TACP	Tactical Air Control Party
TAI	Target Area of Interest
TOC/COC	Tactical Operations Center/ Combat Operations Center
TSM	Trunk Signaling Message

Figure III-1. Close Air Support Integration Model (cont'd)

"Execution," cover the subsequent phases in detail. For the purpose of this publication, the fire support staff officers, AOs/ALOs, and the BN or brigade operations staff officer (S-3/G-3) air are **CAS planners**. CAS planners actively participate with the ground commander to provide CAS-related inputs to the plan or OPORD. The planning phase ends in a published order to subordinate units.

a. **Orders (Basics and Annexes).** Orders are the means by which the commander expresses to his subordinates his battlefield visualization, intent, and decisions, focusing on the results the commander expects to achieve — his vision of the end state of an operation. They also help the staff integrate and synchronize the commander's decisions and concepts. FSCC/FSE 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.

b. **CAS Decision-making Process — 5-steps**

(1) **Step 1: Receipt of Mission.** The CAS decision-making process is a tool that assists the commander and staff in developing a fire support plan. The FSC/FSO plays a crucial role in the process both as the staff fire support expert and as a member of the targeting team. AOs and ALOs are also integral members of the targeting team and should be prepared to provide:

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

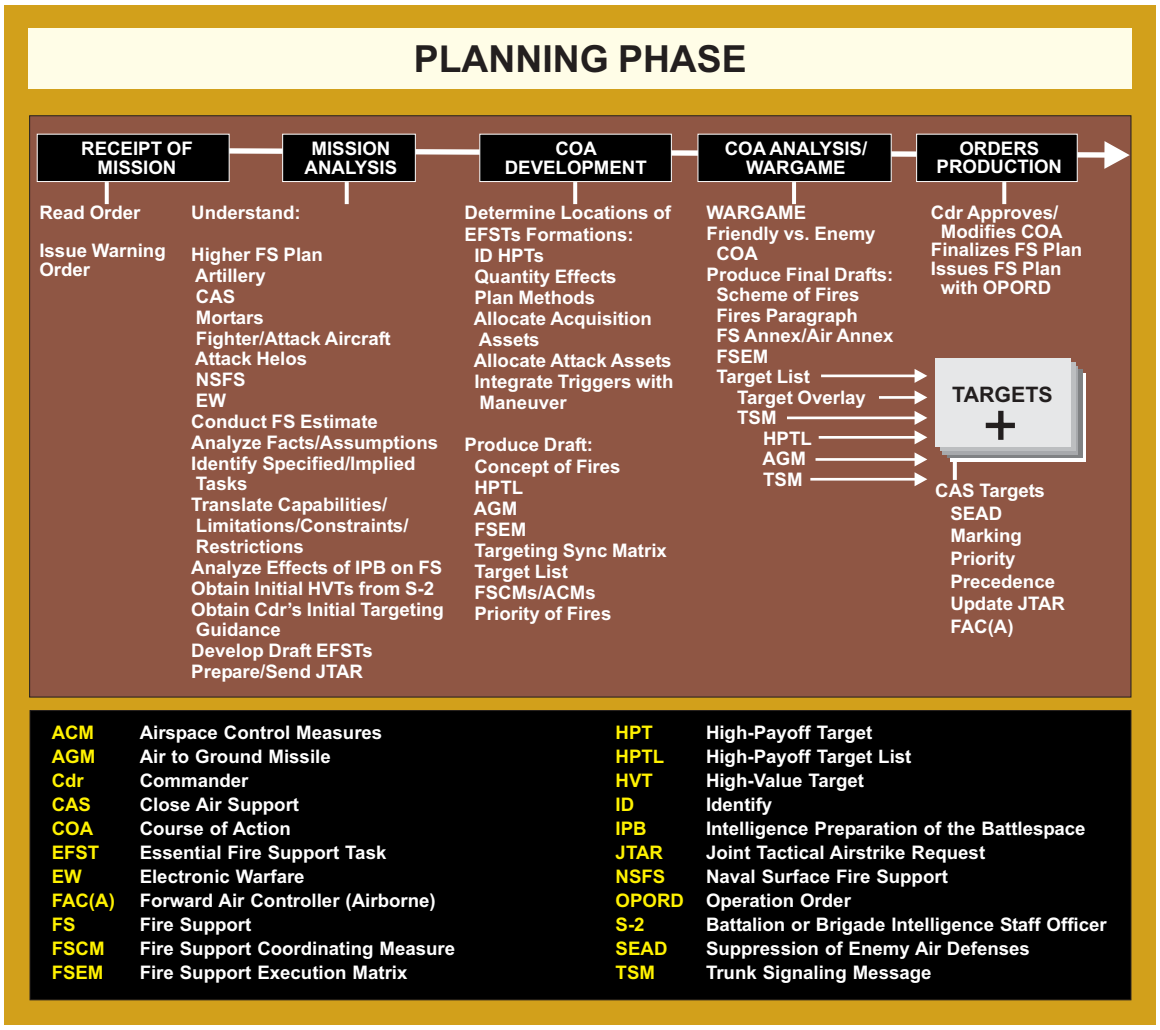

Figure III-2. Planning Phase

(b) Input to the ground commander's initial guidance.

(c) Estimated air combat capability to support the operations.

(d) Capabilities and limitations of assigned personnel and equipment.

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

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

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

(c) Assist in developing the mission statement.

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

1. HHQ priorities of fires.

2. Facts and assumptions.

3. Weight of effort decisions.

(e) Provide the following products:

1. Available CAS assets.

2. CAS constraints.

3. CAS risk assessment (type of terminal attack control required).

4. Use of available time.

5. Warning order(s) to subordinate units.

6. Verification that subordinate TACP elements understand the plan and the ability of air power to support the mission.

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

1. CONOPS/Scheme of Maneuver. What is the commander's intent? Is this an offensive or defensive operation? What type of offensive or defensive operation (Deliberate Attack, Hasty Defense, etc.)?

2. Concept for fires/essential fire support tasks (EFSTs). What are the commander's desired task and purpose for fires? How can CAS contribute? What other battlefield operating systems (BOSs) are affected? Have all CAS assets been properly integrated with joint air attack team operations?

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

4. Reconnaissance and surveillance (R&S) Plan. What R&S assets are available? Where are R&S assets positioned? How can CAS operators communicate directly/indirectly with R&S assets? What are the commander's critical information requirements (CCIRs)? Can CAS assets satisfy CCIRs?

5. Observation Plan. How can CAS take advantage of available "eyes" on the battlefield? Are terminal attack control methods considered? Where will JTACs 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?

(g) **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. Further refinements to these initial requests can be forwarded as details become available. It is critical to adhere to time constraints relative to the ATO cycle.

(3) **Step 3: COA Development.** After receiving guidance, the staff develops COAs for analysis and comparison. Guidance and intent focuses staff creativity toward producing a comprehensive, flexible plan within available time constraints. During this step, CAS planners:

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

(b) Generate options used to develop possible COAs. Options should be suitable, feasible, acceptable, distinguishable, and complete.

(c) Array initial forces to determine CAS requirements.

(d) Develop the CAS "scheme of maneuver" by examining opportunities for the best use of air power including the placement of TACP assets.

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

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

(g) **Key Considerations.** During COA development, CAS planners must consider:

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

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

3. Develop COAs. Where is the enemy and how does he fight (enemy order of battle)? Where is he going? Where can I kill him? When will he be there? What can he do to kill me? How am I going to kill him?

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. How will CAS aircraft enter/exit the battlespace? 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 BOS elements? Where will JTACs be positioned on the battlefield? What ACMs and FSCM are needed to support the COA?

5. Priority of Fires. CAS planners must be aware of which unit has priority for CAS. This consideration must be reflected in the COA development. It is also important to make the commander and his staff aware of their unit's relative priority for CAS within the operational area. Does the element with priority of 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?

(h) TACP: The TACP provides the following inputs during COA development:

1. Specific TACP portions of the following plans:

a. Observation plan.

b. Employment plan.

c. Communications plan.

2. Evaluation of overall TACP capabilities/limitations:

a. Personnel.

b. Equipment.

3. Risk assessment. Type of terminal attack control procedures (See Chapter V, "Execution," for types of terminal attack control).

4. Initial JTARs with all information currently available.

5. Current geospatial products and overlays.

(4) **Step 4: COA Analysis/Wargame.** The staff follows eight steps during the wargaming process. **Specific CAS-related considerations are provided below:**

(a) Gather the tools.

1. ATO/SPINS information.

2. Decision-making matrices/devices.

3. Briefing cards/CAS Briefs (9-lines/North Atlantic Treaty Organization [NATO] theater standard brief).

4. Standard conventional load (SCL) listings.

5. Aircraft and weapons capabilities information.

(b) List all friendly forces.

1. CAS aircraft.

2. FAC(A).

3. Airborne C2.

4. Ground forces, including fire support assets.

5. JTACs.

6. Other observers/ISR assets.

7. Other aviation and support assets.

(c) List assumptions.

1. Aircraft operating altitudes.

2. Enemy surface to air threat posture.

3. CAS tactics.

4. JTAC procedures in effect.

5. Terrain/weather effects on CAS.

(d) List known critical events and decision points.

1. Line of Departure or Defend No Later Than Times.

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

3. ACM/FSCM requirements.

4. SEAD/marking round requirements.

(e) Determine evaluation criteria.

1. Timeliness.

2. Accuracy.

3. Flexibility.

4. Mass.

5. Desired effects.

(f) Select the wargame method.

1. Rock drill.

2. Terrain model/sand table.

3. Map.

4. Radio.

5. Other.

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

1. Event logs.

2. Timetables.

3. Reaction times, etc.

(h) Wargame 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?

(i) **Fires Paragraph.** CAS and other fire support planners begin to refine the fires paragraph to the OPORD by further developing specific tasks, purpose, methods, and desired effects for fires. The resulting list of tasks becomes the CAS EFSTs. EFSTs have four distinct components: task, purpose, method, and effects (TPME).

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

a. Disrupt movement of 3rd Guards Tank Regiment.

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

c. Limit advance of 32nd Motorized Rifle Regiment.

d. Destroy lead elements of the Forward Security Element.

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

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

b. "To seize and hold Objective Panther."

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

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

a. CAS engages armored targets vicinity of Brown 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. 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.

(j) **Fire Support Annex.** Fire support and CAS planners may also elect to produce a Fire Support Annex. This annex may be necessary to expand upon the fire support information in paragraph 3 of the OPORD. If the fire support plan information in paragraph 3 is adequate, then a Fire Support Annex is not published. A fire support execution matrix (FSEM) may also be developed as part of or used in place of a standard Fire Support Annex. Regardless of format, further expansion of fire support information includes:

1. Purpose. Addresses exactly what is to be accomplished by fire support during each phase of the battle. It should be specific in addressing attack guidance and engagement criteria. **This is the most important part of the fires paragraph.** The Fire Support Annex must articulate how fire support as a BOS will be synchronized with the other BOSs/Service assets.

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

3. Allocations 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; 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 (CBUs).

(k) **Airspace Control Annex.** This addresses ACMs required to support the CAS and fire support plans.

(5) **Step 5: Orders Production.** The staff prepares the order or plan to implement the selected COA by turning it into a clear, concise CONOPS, a scheme of maneuver, and concept of fires. Orders and plans provide all necessary information that subordinates require for execution, but without unnecessary constraints that would inhibit subordinate initiative.

5. Command and Staff Responsibilities

This section identifies commander and key staff member responsibilities relating to CAS planning. While these members may be from different Services with differing specialties, the detailed integration requirement inherent in CAS mandates that they work as a team. Key staff members should make every effort to establish a close relationship with each other and provide cross talk and professional development opportunities. Only through thorough understanding and appreciation for each other's perspective can CAS planners function as an effective combat team.

a. **Supported Commander.** The commander's intent and end state must be clearly understood, particularly, the desired results for CAS in relation to the overall mission objective. Commanders must ensure CAS planners understand the objective, scheme of maneuver, C2 requirements, and criteria for specific ROE. Commanders also provide the risk assessment determination identifying specific guidance for types of terminal attack control.

b. **Intelligence Officer.** The intelligence officer is the principal staff officer for all matters concerning military intelligence, counterintelligence, and security operations. In this capacity, the intelligence officer provides current and timely CAS targeting information as well as projected enemy actions. He 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 and other JIPB information.

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

d. **Fires Support Coordinator/Fire Support Officer.** The FSC/FSO is the staff officer in charge of the FSCC/FSE. Regardless of Service or echelon, the FSC/FSO works in conjunction with the AO/ALO and other fire support representatives to ensure CAS is fully integrated into the fires portion of the OPORD. He also coordinates the preparation of the fire support

subparagraph (or annex) that constitutes the Fire Support Plan. If the fire support subparagraph needs amplification, the FSC/FSO prepares a Fire Support Annex.

e. **Naval Gunfire Liaison Officer (NGLO).** NGLOs are Navy officers provided by the USMC supporting artillery units to GCE FSCC/FSEs. The NGLO assists the FSC/FSEs in planning naval surface fire support.

f. **Air Officer/Air Liaison Officer.** 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 his respective ground element. AO/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.

6. Close Air Support Planning Considerations

This section addresses basic planning considerations associated with the METT-T format. CAS planners should also refer to their Service TTP. Extensive use of checklists and decision-making tools is recommended to ensure these considerations are reviewed as part of the CAS planning process. CAS is coordinated with other maneuver, combat support, and joint forces to form a combined arms team. CAS provides firepower in offensive and defensive operations to destroy, neutralize, disrupt, suppress, fix, or delay enemy forces as an element of joint fire support. Commanders use CAS to gain and employ required capabilities not organic to the force or to augment organic surface fires. Commanders should plan for the employment of CAS throughout the depth of their assigned battlespace.

a. CAS can support deep, close, and rear area operations.

(1) **Deep Operations.** Commanders may employ CAS to support operations deep within their area of operations, which may include SOF or conventional forces with a deep operation mission. **This type of CAS will normally be limited in scope and duration to supporting maneuver forces or special operations activities.** Deep operations involving CAS may require additional coordination to deconflict with other missions deep in the area of operations such as air interdiction (refer to the joint ATO).

(2) **Close Operations.** A commander generally assigns most of his available CAS to the unit he has designated as his main effort or attack. **CAS aircraft and fire support assets mass with surface forces to enable the commander to achieve his objectives.** The speed, range and firepower of CAS also make it a valuable asset for exploiting success and attacking a retreating enemy.

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

b. **Mission.** 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: movement to contact, attack, exploitation, or pursuit.

(a) **Movement to Contact.** CAS can be employed to support maneuver forces providing forward and flank security. Once contact is made, employing CAS aircraft at the initial point of contact can overwhelm and force the enemy to prematurely deploy his forces. The ground commander rapidly augments his organic combat power with CAS to secure time and space to maneuver forces, gain positional advantage, and seize the initiative. CAS assets might be the first friendly force to make contact with the enemy. **When planning for CAS integration in a movement to contact, consider possible CAS engagement areas along the entire axis of advance and friendly force vulnerable flanks.**

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

(c) **Exploitation.** Exploitation is an offensive operation that usually follows a successful attack and is designed to disorganize the enemy and erode his 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 annihilate the fleeing enemy force as the enemy becomes demoralized and cohesion and control disintegrate. Because the objective of the pursuit is destruction of the enemy, **CAS can keep direct pressure on the enemy to prevent them from reorganizing or reconstituting.**

(2) **CAS in Support of Friendly Defensive Operations.** In defensive operations, commanders employ CAS to cause the enemy to deploy prematurely, or slow or stop the enemy's attack. CAS can be distributed to support specific forces in the security, main battle, or rear areas depending on the type of defense (mobile or area). Commanders may use CAS to:

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

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

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

(3) **CAS in Other Military Operations.** CAS aircraft, particularly the FAC(A)/TAC(A) may prove beneficial in various military operations by providing a flexible and timely forward aerial observation platform. CAS can provide the commander with certain CCIRs that can facilitate the mission.

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

(1) Other enemy considerations include:

(a) What are his offensive/defensive capabilities?

(b) Surface-to-air threats, decoys, camouflage, etc. Valuable enemy targets are usually defended by surface-to-air missiles (SAMs), antiaircraft artillery (AAA), or automatic weapons. Use of "standoff weapons" and varying initial point location will enhance aircraft survivability by reducing exposure and altering attack direction.

(c) What is his capability to conduct C2 warfare? (Communications, navigational aids, and targeting, etc.)

(2) 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 critical. The potential for the threat situation to change during the course of the mission makes communications and close coordination between the aircrews, control agencies, and the supported ground force crucial. In-flight updates on enemy activity and disposition along the flight route and in the target area may require aircrews to alter their original plan and tactics. If the enemy is successful at disrupting communications, alternatives are planned to ensure mission accomplishment. Secure voice equipment and frequency-agile radios can overcome some effects of enemy interference.

d. **Troops (CAS Assets) Available.** CAS planners must consider C2, ISR, and CAS aircraft assets available.

(1) **C2 Assets.** A detailed, flexible, and redundant C2 plan is essential. Airborne C2 support systems may alleviate some of the challenges in C2. Each of these platforms has inherent capabilities and limitations. Consider each of the available C2 assets and what role they can play to support the mission. This may generate specific requirements that, in turn, end up as formal requests for air support. As a minimum, consider the following C2 assets:

(a) **Direct Air Support Center/Air Support Operations Center.** The USMC DASC or USAF ASOC functions as the primary control agency of the MACCS or theater air ground system (TAGS) for the execution of CAS in direct support of ground operations. Normally

aligned with the senior tactical ground command HQ at corps level and below, the DASC/ASOC coordinates and directs CAS for land forces. The DASC/ASOC facilitates CAS, air interdiction, SEAD, mobility, and ISR missions within its assigned area of control. The DASC/ASOC is the NCS for immediate air support request nets, and monitors aircraft check-in/check-out within its area of control. Ensure that the DASC/ASOC has all the following pertinent information concerning the mission for transmittal to supporting aircrews:

1. Target updates.

2. Enemy/friendly situation.

3. Surface fire support activities.

4. Surface-to-air threats.

5. Airspace coordination measures.

6. JTAC contact instructions.

(b) **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? As a minimum, review the following:

1. JSTARS and direct air support center (airborne) (DASC[A]). JSTARS and the USMC DASC(A) provide C2 of strike resources in support of a ground conflict. They can serve as an alternate ASOC/DASC for battle management of immediate CAS operations.

2. TAC(A). Normally performed by USMC F/A-8D aircraft, DASC(A), or JSTARS. The TAC(A) coordinates the action of aircraft engaged in support of ground or sea forces. During periods of heavy traffic CAS operations, the TAC(A) can expedite aircraft to FAC(A) handoff. Does the mission require a TAC(A)?

3. Army Aviation Unit Commander. The aviation unit commander controls aviation maneuver and fires and provides reports to the command group. Qualified attack helicopter commanders may also provide CAS terminal attack control. Is there an Army Aviation Unit Commander involved in the mission? How will he integrate with the JTAC?

(c) **TACP.** While corps through brigade TACPs function primarily as liaisons, BN TACPs and company JTACs have the primary responsibility of terminal attack control. It is important to consider TACP capabilities and limitations as well as 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?

(d) **Combat Lasing Team (CLT)/COLT.** CLT/COLTs may aid the JTAC by acquiring or lasing targets. If the JTAC plans to use a CLT/COLT, then he must be able to communicate and coordinate with the team during target marking or terminal guidance illumination.

(2) **Intelligence, Surveillance, and Reconnaissance Assets.** Use all sources of ISR. Assets that may be used include UAV and JSTARS feeds, JSTARS voice link, ELINT sources, scout reconnaissance troop reports, FAC(A) and JTAC observations, O&I reports, and feeds from elements of the TAGS are all viable sources of information. There are many human sources of CAS targeting information available on the battlefield. These elements are specifically tailored for ISR roles and normally report through established intelligence channels.

(3) **CAS Aircraft Weapons and Capabilities.** Fixed- and rotary-wing aircraft, their weapons and capabilities can be found in the FM 90-2, MCRP 3-16.8B, NWP 3-09.2, AFTTP 3-2.6 *Multi-Service Procedures for the Joint Application of Firepower (J-FIRE)* publication. CAS planners should select those combinations of munitions and aircraft offering the required accuracy, firepower, and flexibility. To achieve the desired level of destruction, neutralization, or suppression of enemy CAS targets, the weapons load, arming and fuze settings must be tailored for the desired results. Cluster and general-purpose munitions are very effective against troops and stationary vehicles. However, hardened, mobile, or pinpoint targets may require specialized weapons, such as laser-guided, electro-optical (EO), or IR munitions, or aircraft with special equipment or capabilities. While the AFAOC determines the actual ordnance CAS aircraft will carry, the requesting commander should provide sufficient information outlining his desired effects, any external or self-initiated tactical restrictions or limitations, etc. 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.

e. **Terrain and Weather Effects on CAS.** Terrain can affect communications and visual line of sight (LOS) for identifying the target and/or aircraft. Situational awareness enhancing systems (e.g., SAR and data link type systems) and GPS-guided weapons improve the ability to execute CAS in certain tactical situations despite weather limitations. Regardless, favorable visibility normally improves CAS effectiveness. Weather ceiling and visibility may affect the decision to employ low, medium, or high altitude tactics. These conditions will also affect the JTAC's ability to see the target. Weather conditions may also determine the attack profile of the aircraft. If enemy vehicles are moving, exhaust smoke, dust trails, and movement can indicate their location. Visibility is more critical for long-range deliveries (e.g., free-fall bombs/rockets) than it is for short-range deliveries (e.g., retarded bombs and guns). Thick haze or smoke has a greater effect on low-level attacks than on steep-dive attacks because horizontal visibility is usually lower than oblique visibility. Reduced visibility and cloud layers restrict laser and electro-optically guided ordnance. Target acquisition is usually easier when the sun is behind the aircraft.

(1) **Target Masking.** A target screened by valleys or other 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. 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 his forces along roads, valleys, reverse slopes, and deep defiles, where CAS is very effective. However, the terrain also restricts the attack direction of the CAS strikes. CAS planners must assume the enemy will concentrate air defenses along the most likely routes CAS aircraft will fly. CAS planners must thoroughly identify the air defense systems and target them to enhance the survivability of CAS assets.

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

(a) **Target Acquisition.** In general if good contrast exists between the target and the background, target detection will be possible at extended ranges. Deserts that have vegetation will reduce target detection capabilities from standoff ranges. Camouflage and decoys have proven to be effective countermeasures in the desert environment and will also delay target acquisition.

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

(6) **Jungle/Forested Environment.** In jungle terrain, most contact with the enemy is at extremely close range. If the friendly force has a substantial advantage in fire support, the enemy will most likely try to close with the friendly force and maintain that close contact. Thus, the friendly force commander might not be able to use his 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.** Due to limited LOS ranges, both vertical and horizontal, target acquisition will be difficult for both the attacking aircraft and the JTAC. Target marking techniques and attack profiles may have to be altered to engage targets. Smoke has limited effectiveness; however, even in forested terrain, white phosphorous (WP) is normally effective as a marking round.

(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 fratricide.

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

(d) **Communications.** Communications may be severely degraded due to LOS. Use FAC(A)/TAC(A), or airborne C2 platforms as relay stations.

(7) **Urban CAS Environment.** CAS planners must be aware of the special considerations regarding urban terrain. These considerations include, but are not limited to:

(a) **Target Acquisition**

1. Increased need for marking and designating CAS targets.

2. The ability of fixed- and rotary-wing aircraft to provide fires may be limited by the structural make up of the urban location.

3. Tall buildings make it difficult for pilots to identify targets and may require specific attack headings to achieve LOS with the target.

4. Detailed gridded maps or photos derived in planning will aid in target description and location. Roads and buildings may be numbered to speed the target acquisition process from the air. Prior planning is required to ensure all units, both on the ground and in the air, have the correct charts or imagery.

(b) **Munitions Effects.** Whenever ordnance is delivered, the unexpected consequences of collateral damage in the form of fratricide, damage or destruction of unintended targets, should be a consideration. Detailed planning of weapons and delivery tactics will minimize the risk to friendly forces, noncombatants and adjacent buildings/structures.

(c) **Observation/Terminal Attack Control.** Consider the use of FAC(A)s. Observers may be placed on upper floors of buildings to improve visibility.

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

(8) **Limited Visibility/Adverse Weather.** The execution of limited visibility or night CAS is one of the most difficult missions on the battlefield. 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. Units can take advantage of their night vision and navigational superiority to gain tactical and psychological advantages over the enemy. See Appendix A, "Planning Considerations for Close Air Support Using Night Vision Devices and Infrared Pointers."

(a) **Advantages.** The most important advantage of night and adverse weather CAS is the limitation it imposes on enemy optically-directed AAA and optical/IR-guided SAMs. Selectively placed airborne and ground illumination may further degrade enemy night vision capabilities while preserving or enhancing those of friendly forces. As an example, overt airborne illumination flares, selectively placed at a distance well behind and above friendly positions (at the backs of, but not close enough to silhouette), could be employed to "gain down" enemy NVDs, improve low ambient light conditions, and counter enemy IR SAMs.

(b) **Disadvantages.** Darkness and weather can impose several limitations on CAS employment. During periods of low illumination and reduced visibility, both CAS aircrews and ground forces may have difficulty in acquiring targets and accurately locating enemy and friendly forces. Accurate target marking plays a vital role in target acquisition. Low ceilings may require CAS aircraft to operate in the low to very low altitude environment. Consideration must be given to target marking SEAD and fires deconfliction. CAS aircraft operating in the low to very low environment will also have reduced target acquisition times.

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

(d) **Visual Employment.** Visual employment is a viable option for conducting night CAS. With detailed prior planning and coordination, target area illumination and target marking can provide effective conditions for CAS. Specific visual employment considerations include:

1. Illumination. Coordination and approval for illumination must occur prior to CAS aircraft entering the target area. Artificial illumination may be used to enhance target acquisition. The target may be illuminated or marked by the JTAC, artillery/mortars, direct fire weapons or by CAS or FAC(A) aircraft delivering parachute flares (e.g., LUU-2) in conjunction with an attack.

2. Marking. Laser marks are extremely effective for target marking and should be used to the maximum extent possible commensurate with CAS aircraft capabilities. WP rockets, mortars (red phosphorus), or artillery rounds are excellent night and low visibility marking rounds and may be used in conjunction with airborne delivered illumination.

(e) **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, radar, radar beacon, and GPS.

1. Laser. Night procedures for target 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.

2. EO/IR systems. Cloud cover, humidity, precipitation and thermal crossover, battlefield conditions (smoke, dust, or other obscurants) may degrade forward looking infrared (FLIR) and low light level television effectiveness.

3. Radar. Although not preferred, radar deliveries are an option in certain instances. During severe weather or when the target cannot be marked, this type of weapons delivery may be the only option available. The FM 90-20, MCRP 3-16.8B, NWP 3-09.2, AFTTP 3-2.6 *Multi-Service Procedures for the Joint Application of Firepower (J-FIRE)* publication

lists the aircraft capable of radar-directed bombing. In order to perform a radar delivery, the target or offset aimpoint(s) must be radar significant.

4. GPS. Weapons can be delivered at night or through the weather at specific coordinates by GPS-equipped aircraft. When supplied with a 10-digit grid location or equivalent by JTACs, computed deliveries can be accurate. CAS planners, JTACs, and aircrew must ensure that the same coordinate datum plane is used by both controller and weapon delivery platform. 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 error can result if different datums are used. This will increase the likelihood of fratricide.** They must also ensure that the JFC's ROE supports the use of inertial navigation system (INS)/GPS-aided munitions.

f. **Time Considerations**

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

(2) **Air Tasking Order Planning Cycle.** The joint ATO cycle is related to the joint targeting cycle. The specific theater or joint operations area (JOA) will have established ATO cycle "cut off" times for pre-planned requests. CAS requirements that do not meet the established cut off times are submitted as a change to the ATO through the combat operations division of the JAOC or as an immediate request per theater/JOA standing operating procedures (SOPs).

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

g. **Civil Considerations.** Review and adhere to the LOAC when considering collateral damage risk to civilians, civilian structures and properties associated with CAS attacks. This may require precision-guided munitions.

7. Integrating Close Air Support with Surface Fire Support

The goal is to integrate CAS aircraft with other supporting arms in a manner that quickly achieves the commander's objectives and supports the commander's scheme of maneuver and intent. **An additional goal is to offer a reasonable measure of protection to the aircraft from friendly surface fire. There are two types of fire support that support CAS individually or in combination. They are SEAD and target marking.**

a. **SEAD. 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 should first evaluate different mission profiles, in order to minimize the aircraft's

exposure to the threat envelope from known or suspected anti-air 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. Before requesting CAS that would require SEAD support, fire support personnel must first consider whether artillery or NSFS can range the target and achieve the desired results. Like other suppression missions, surface-delivered SEAD normally requires only a few rounds per target for a short period. Effective SEAD depends on accurate intelligence on the position and type of enemy weapons. The FSC, working with the JTAC and forward observer, may coordinate surface-delivered SEAD with target marking.

b. **CAS Target Marking.** JTACs should mark targets whenever possible. Plan to mark the target in sufficient time prior to weapons employment to ensure target acquisition. When one of the following marking methods is not possible, the CAS target may be identified by narrative description provided by the JTAC. This is known as a "talk on" to target. The JTAC marking his position with devices such as strobe lights, mirrors, or air panels may aid this narrative. Care must be taken to not highlight the JTAC's position to the enemy. The target mark can be provided by:

(1) Indirect fire. Fire delivered on a target that is not itself used as a point of aim for the weapons or the director, such as mortars, artillery, and direct fire weapons fired from defilade.

(2) Direct fire weapons (fires delivered on a target using the target itself as a point of aim for either the weapon or the director), such as a tank main gun or heavy machine guns.

(3) Laser designators.

(4) FAC(A) aircraft (e.g., laser, IR, rockets).

(5) IR pointers (when used in conjunction with NVDs airborne or ground IR pointers may be used to verify target location).

c. **Fire Support Coordinating Measures.** Within their operational areas, land and naval force commanders employ permissive and restrictive FSCMs which are positioned and adjusted in consultation with superior, subordinate, supporting, and affected commanders. The supported commander establishes FSCMs based on the recommendations of the FSC, who coordinates all fire support impacting in the operational area of his commander. FSCMs are used to facilitate timely and safe use of fire support and may be permissive or restrictive in nature. Figure III-3 depicts common FSCMs.

See JP 3-09, Doctrine for Joint Fire Support, *for further details of control and coordination measures.*

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

(a) **Coordinated Fire Line (CFL).** A line beyond which conventional, indirect, surface fire support means may fire at any time within the boundaries of the establishing HQ without additional coordination.

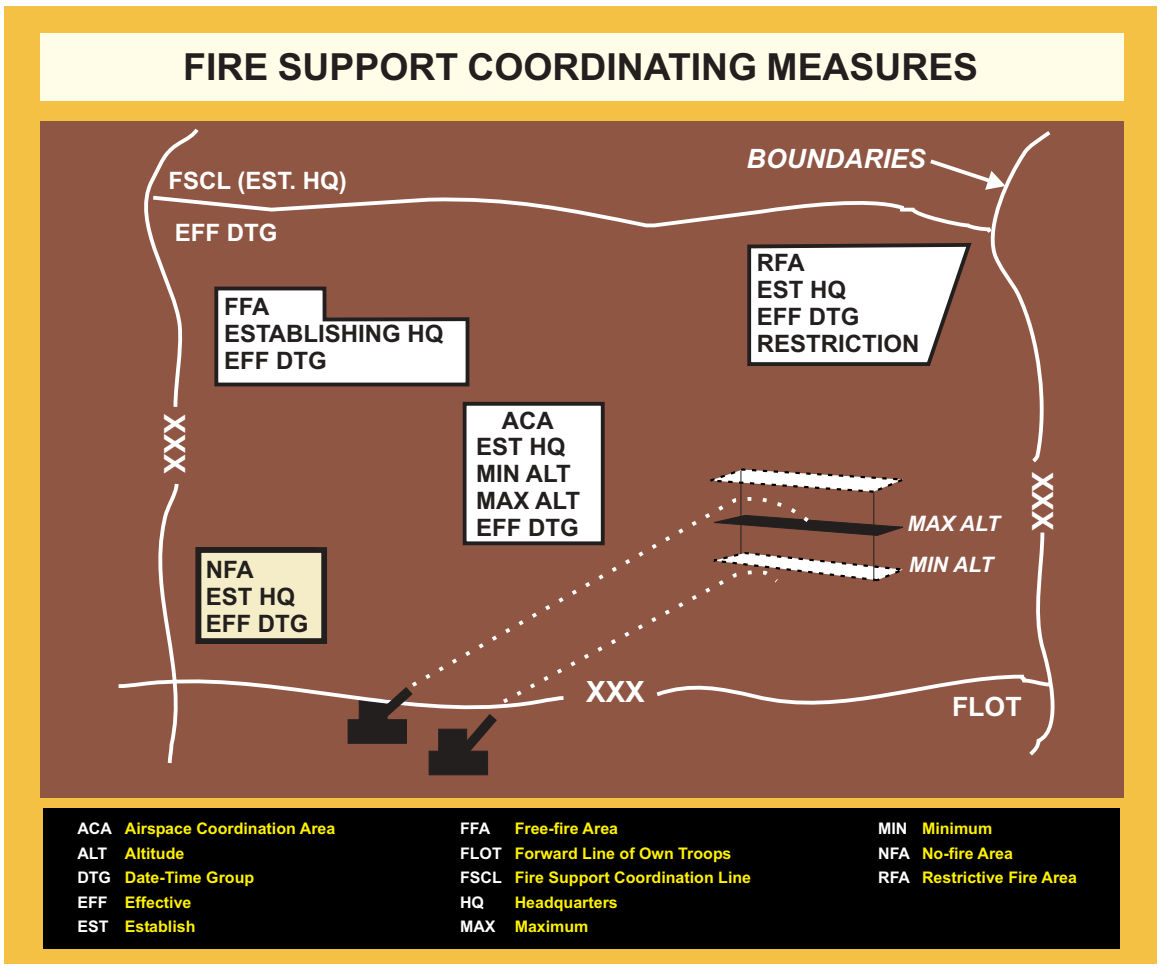

Figure III-3. Fire Support Coordinating Measures

(b) **Fire Support Coordination Line (FSCL).** A FSCM that is established and adjusted by appropriate land or amphibious force commanders within their boundaries in consultation with superior, subordinate, supporting, and affected commanders. FSCLs facilitate the expeditious attack of surface targets of opportunity beyond the coordinating measure. A FSCL does not divide an area of operations by defining a boundary between close and deep areas or create a zone for CAS. The FSCL applies to all fires of air, land, and sea-based weapon systems using any type of ammunition. Forces attacking targets beyond a FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid fratricide. Supporting elements attacking targets beyond the FSCL must ensure that the attack will not produce adverse effects on, or to the rear of, the line. Short of an FSCL, the appropriate land or amphibious force commander controls all air-to-ground and surface-to-surface attack operations. The FSCL should follow well-defined terrain features. Coordination of attacks beyond the FSCL is especially critical to commanders of air, land, and special operations forces. In exceptional circumstances, the inability to conduct this coordination

will not preclude the attack of targets beyond the FSCL. However, failure to do so may increase the risk of fratricide and could waste limited resources.

(c) **Free-Fire Area (FFA).** A FFA is a specific area into which any weapon system may fire without additional coordination with the establishing HQ.

(2) **Restrictive Measures.** Restrictive measures safeguard friendly forces.

(a) **No-Fire Area (NFA).** A land area designated by the appropriate commander into which fires or their effects are prohibited. Two exceptions are:

1. When establishing, HQ approve fires temporarily within the NFA on a mission by mission basis.

2. When an enemy force within the NFA engages a friendly force, the commander may engage the enemy to defend his force.

(b) **Restrictive Fire Area.** 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) **Restrictive Fire Line (RFL).** A line established between converging friendly forces — one or both may be moving — that prohibits fires or their effects across that line.

(d) **Airspace Coordination Area.** A three-dimensional block of airspace in a target area, established by the appropriate ground commander, in which friendly aircraft are reasonably safe from friendly surface fires. 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 ground 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 SACC/FSCC/FSE fire direction center (FDC) can determine the trajectory for a specific ground or NSFS asset firing at a specific target, each target must be evaluated to ensure the trajectories of the rounds do not penetrate the ACA. The FSC should consult the FDC when deciding the altitude of an ACA to determine if that altitude would allow the majority of targets to be attacked without interference or problems. Formal ACAs are promulgated in the ACO or the ATO, SPINS (see Figure III-4). **Note**: Due to their restrictive nature, formal ACAs are not the preferred method of airspace deconfliction.

2. **Informal ACA.** Informal ACAs can be established using separation plans and may be established by any ground commander. Aircraft and surface fires may be separated by distance (laterally, in altitude, or a combination thereof) or by time.

(e) **Lateral Separation.** 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.

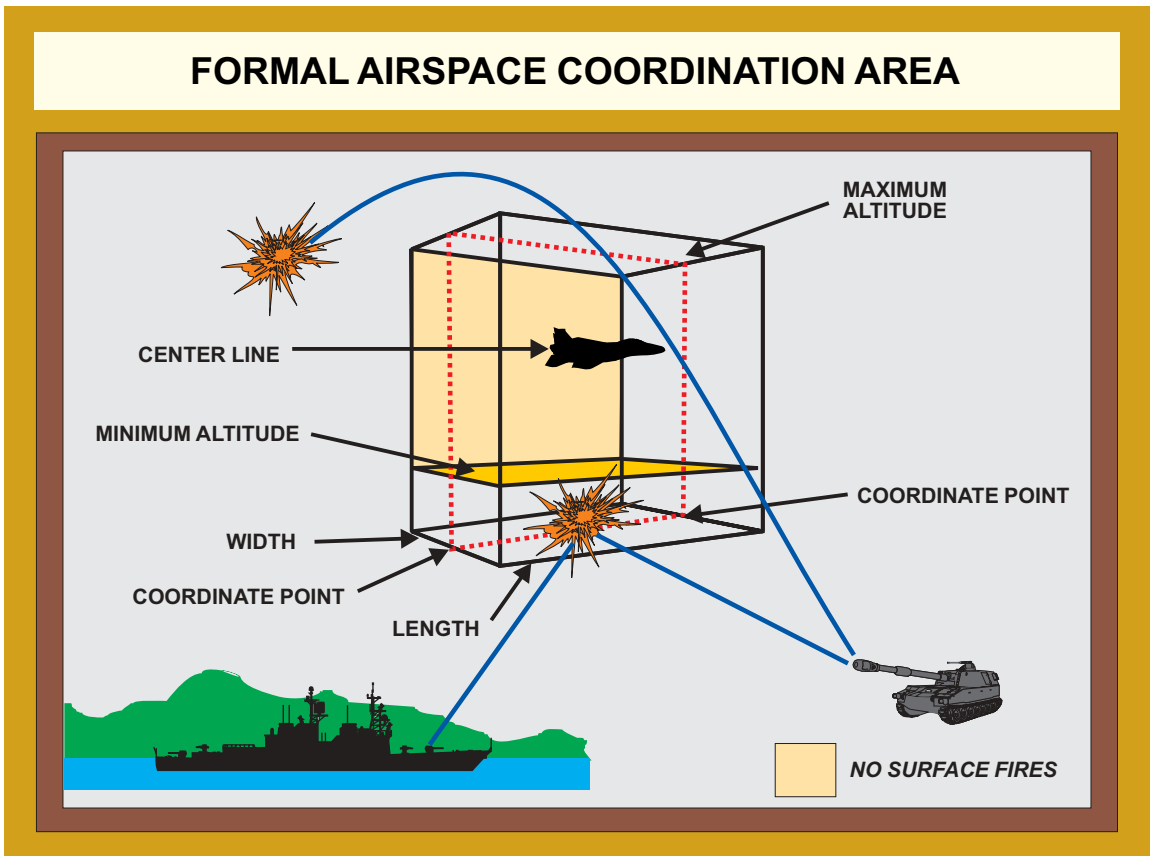

Figure III-4. Formal Airspace Coordination Area

(f) **Altitude Separation.** Altitude separation is effective for coordinating fires when aircraft remain above or below indirect fire trajectories and their effects.

(g) **Altitude and Lateral Separation.** Altitude and lateral separation is the most restrictive technique for aircrews and may be required when aircraft must cross the firing unit's gun-target line.

(h) **Time Separation.** Time separation requires the most detailed coordination and may be required when altitude restrictions from indirect fire trajectories adversely impact aircraft ordnance delivery (e.g., mortar trajectory).

d. **Airspace Control Measures.** The JFC uses the airspace control authority to establish airspace control measures (see Figure III-5). 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. See JP 3-52, *Doctrine for Joint Airspace Control in the Combat Zone*, for a detailed definition of joint ACMs, which include:

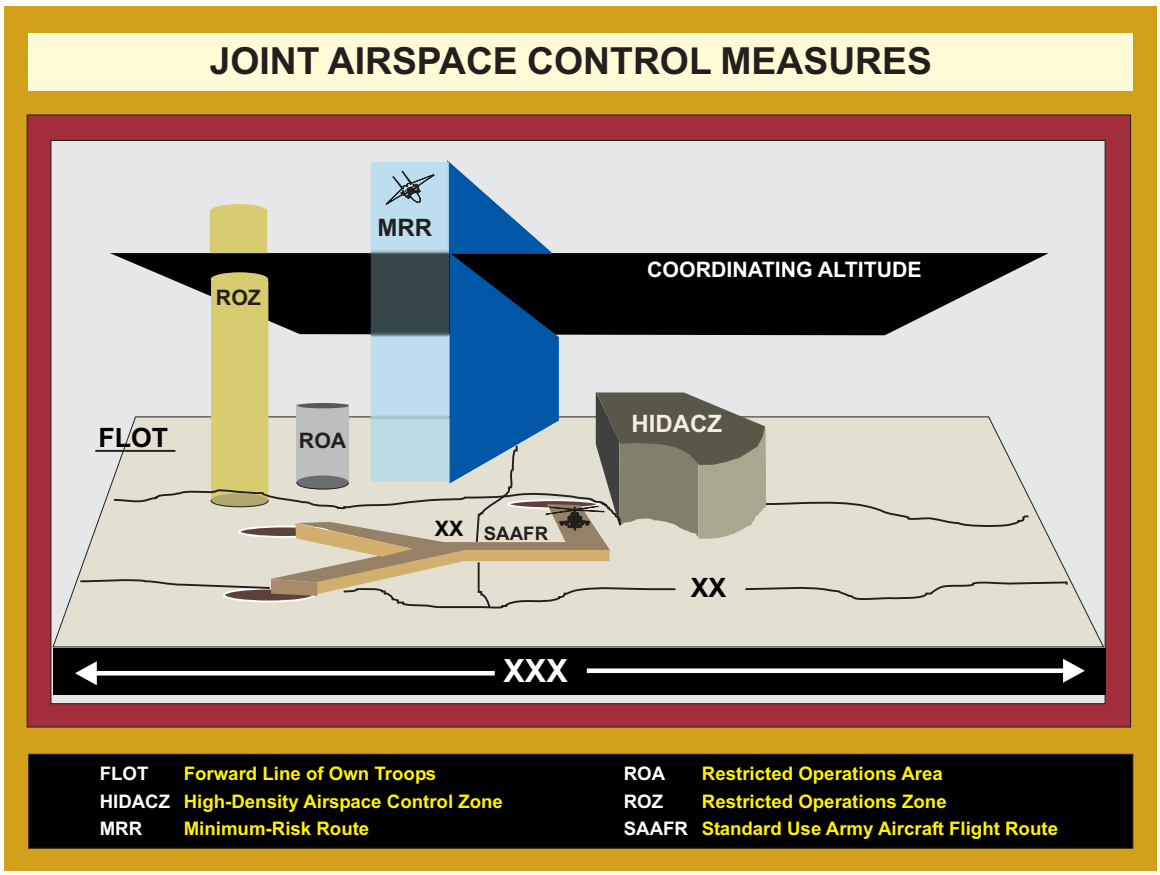

Figure III-5. Joint Airspace Control Measures

(1) **Coordinating Altitude.** A procedural method to separate fixed- and rotary-wing aircraft by determining an altitude below which fixed-wing aircraft normally will not fly and above which rotary-wing aircraft will not normally fly.

(2) **High-Density Airspace Control Zone.** Airspace designated in an airspace control plan or ACO, in which there is a concentrated employment of numerous and varied weapons and airspace users. A HIDACZ has defined dimensions which usually coincide with geographical features or navigational aids. Access to a HIDACZ is normally controlled by the maneuver commander. The maneuver commander can also direct a more restrictive weapons status within the HIDACZ.

(3) **Restricted Operations Zone (ROZ).** Airspace of defined dimensions created in response to specific operational situations or requirements within which the operation of one or more airspace user is restricted.

(4) **Minimum-Risk Routes (MRRs).** A temporary corridor of defined dimensions recommended for use by fixed-wing aircraft that presents the minimum known hazards to low-flying aircraft transiting the combat zone.

(5) **Standard Use Army Aircraft Flight Routes.** Routes established below the coordinating altitude. They facilitate the movement of Army aviation assets and are normally located in the corps through brigade rear areas of operations. These routes do not require approval of the airspace control authority.

8. Requesting Close Air Support

There are two types of CAS requests, preplanned and immediate. Preplanned requests may be filled with either scheduled or on-call air missions while most immediate requests are filled with on-call missions (see Figure III-6).

a. **Preplanned Requests.** Those CAS requirements foreseen early enough to be included in the joint ATO are submitted as preplanned requests. As soon as the requirements for CAS are identified during the planning process, CAS planners submit a preplanned request for CAS prior to the request cut off time, as specified by HHQ. CAS planners prepare preplanned requests by using DD FORM 1972 (Joint Tactical Air Strike Request) (see Appendix B, "Joint Tactical Air Strike Request"). Submission procedures (i.e., numbering system, time frame for inclusion in the ATO) for preplanned requests are theater-specific, and detailed guidance should be found in unit SOPs.

(1) **Precedence.** Each preplanned request is assigned a **precedence**, which orders the requests in descending order of importance.

(2) **Amount of Detail.** The amount of detail the requester is able to include in the request is critical. If possible, **the requesting unit should identify the target, TOT, and other mission data (e.g., munitions, FSCMs).** This information will provide more effective coordination and a higher likelihood that the aircraft will have the proper weapons load for

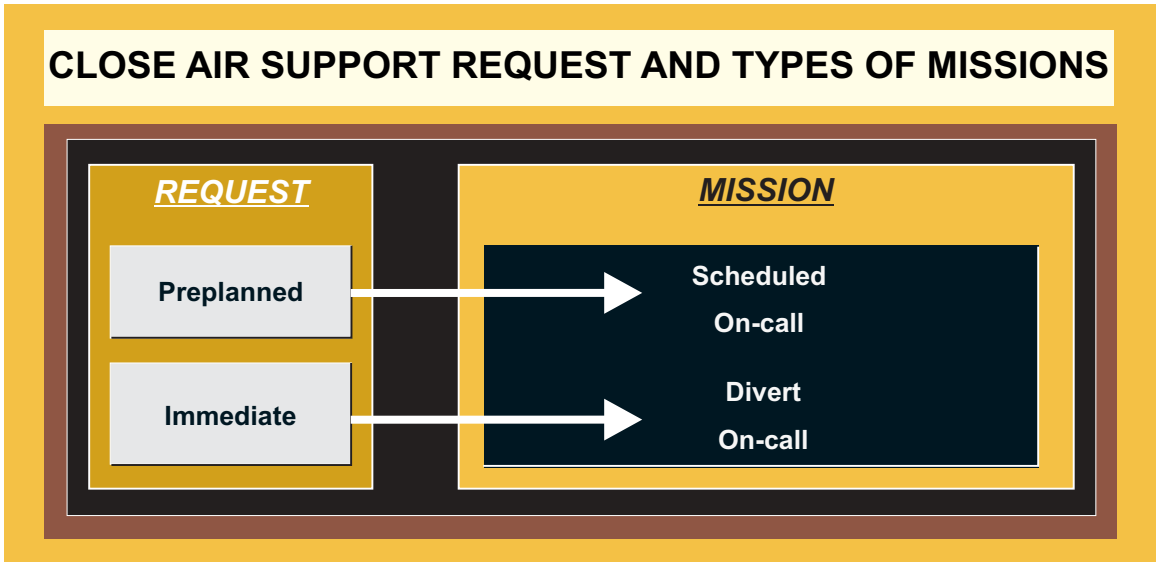

Figure III-6. Close Air Support Request and Types of Missions

the assigned target. 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.

(3) **Timeliness.** A high level of detail is not always available prior to the ATO cut-off time. In these cases, preplanned requests can still **identify an anticipated requirement for CAS to be available during a period of time, with the exact time and place to be coordinated as the battle develops**. The requesting commander should provide a time frame, probable target type, and place where the need for CAS is most likely. The important thing to remember for preplanned requests is to get the request in before the ATO cut-off time. Then, as the situation develops, **update the request with the ASOC/DASC referencing the original request number as needed.**

(4) **Submission.** CAS planners at each echelon consolidate their requests and submit them to the next higher echelon. 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-7).

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

For further explanation of the preplanned request process, see JP 3-30, Command and Control for Joint Air Operations.

b. **Immediate Requests.** Immediate requests arise from situations that develop outside the ATO planning cycle. Because these requirements cannot be identified early on, tailored

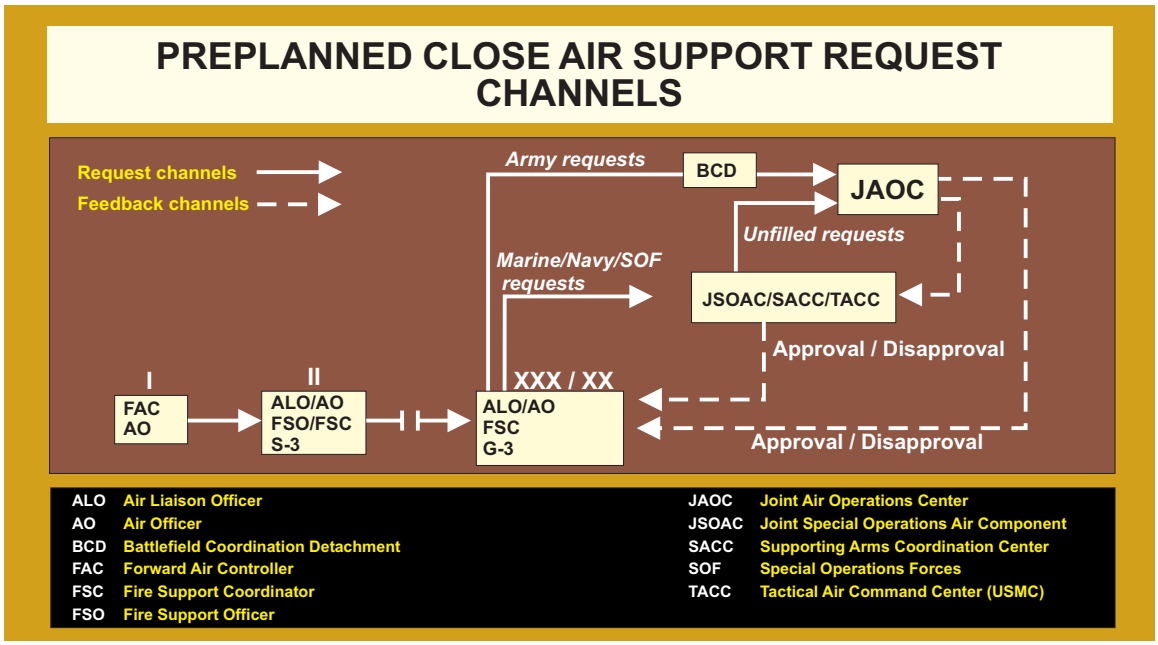

Figure III 7. Preplanned Close Air Support Request Channels

ordnance loads may not be available for specified targets. If CAS is unavailable, the senior ground echelon (e.g., Corps) AO/ALO may advise the G-3/S-3 to divert preplanned CAS missions or forward additional requests to the JAOC. During the execution phase of the ATO, the JFACC staff may need to redirect missions to cover immediate requests for CAS (see Figure III-8).

(1) **Conventional Force Submission. Immediate requests are forwarded to the appropriate command post by the most rapid means available** (see Figure III-9). Requests are broadcast directly from the TACP to the ASOC/DASC using AFARN 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 the DD Form 1972 (See Appendix B, "Joint Tactical Air Strike Request") back to the requestor. Silence by intermediate HQ implies consent to the request.

(2) **SOF Submission.** SOF HQ' communications capabilities are usually adequate to link directly to component communications nets that can scramble or divert CAS aircraft as required.

(3) **Priority.** For immediate requests, each DD Form 1972 is assigned a priority. Use the numerical designation below to determine priority (e.g., define the tactical situation).

(a) Alpha — Targets preventing or immediately capable of preventing the execution of the plan of action. This designation supersedes all other categories of mission priority.

(b) Bravo — Targets seriously interfering with the execution of the plan of action. Targets that supersede priority Charlie requests.

(c) Charlie — Targets capable of limited interference with the execution of the plan of action.

(4) **Request Format.** Use of the DD form 1972 as a guide is the preferred method for requesting CAS through the ASOC/DASC.

(a) **Mission Data.** For preplanned requests, mission data can be passed through maneuver force or ASOC/DASC communications channels. Data may be included in the ATO, mission order, or fire support plan. For approved immediate requests, mission data is passed down the same air request net used by the requesting unit.

(b) Mission data is passed using the DD Form 1972 Section III format to the requesting unit. As a minimum, mission data will include:

1. Line 20 Mission Number.

2. Line 21 Call Sign.

3. Line 22 Number and Type of Aircraft.

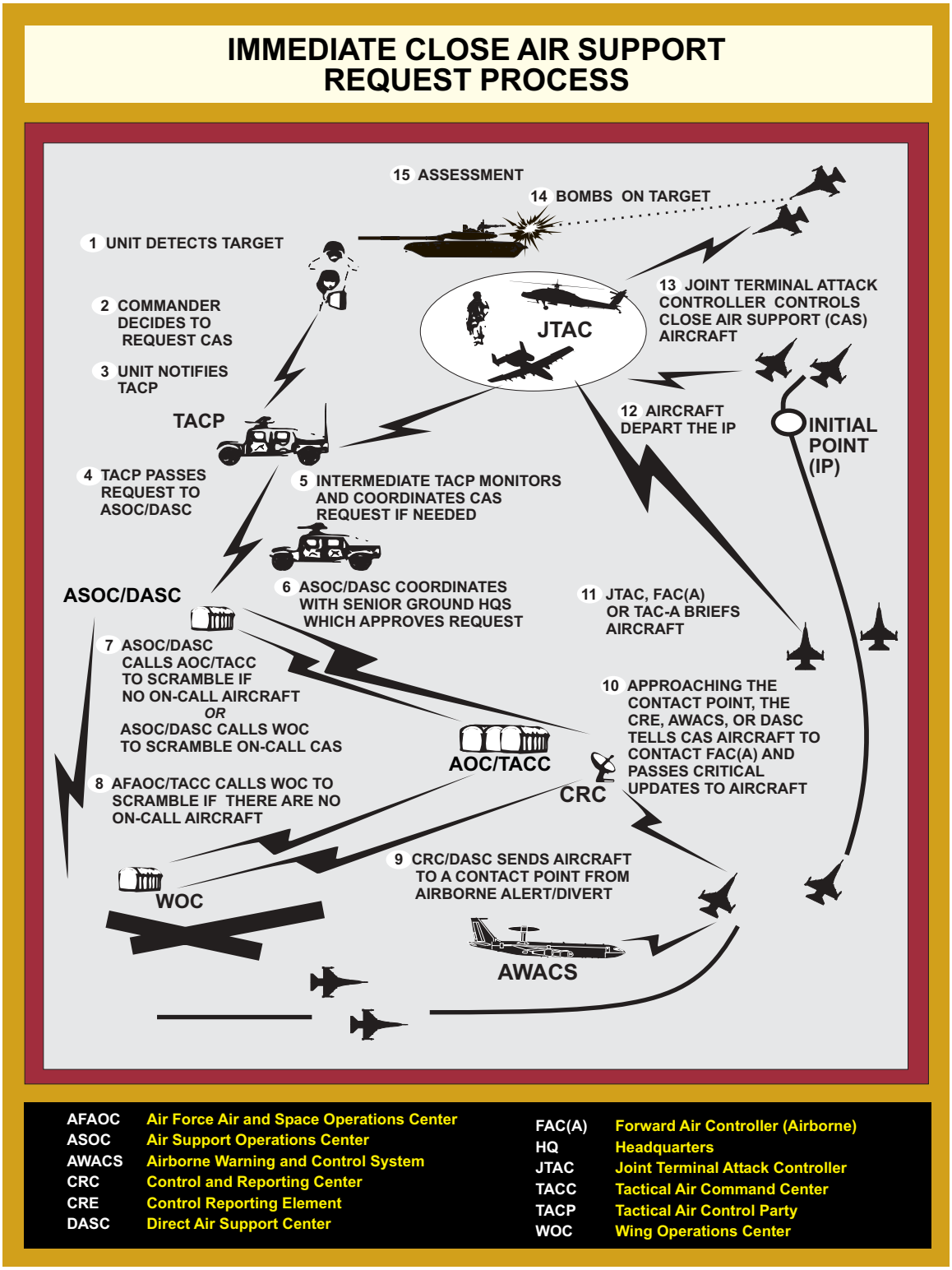

Figure III-8. Immediate Close Air Support Request Process

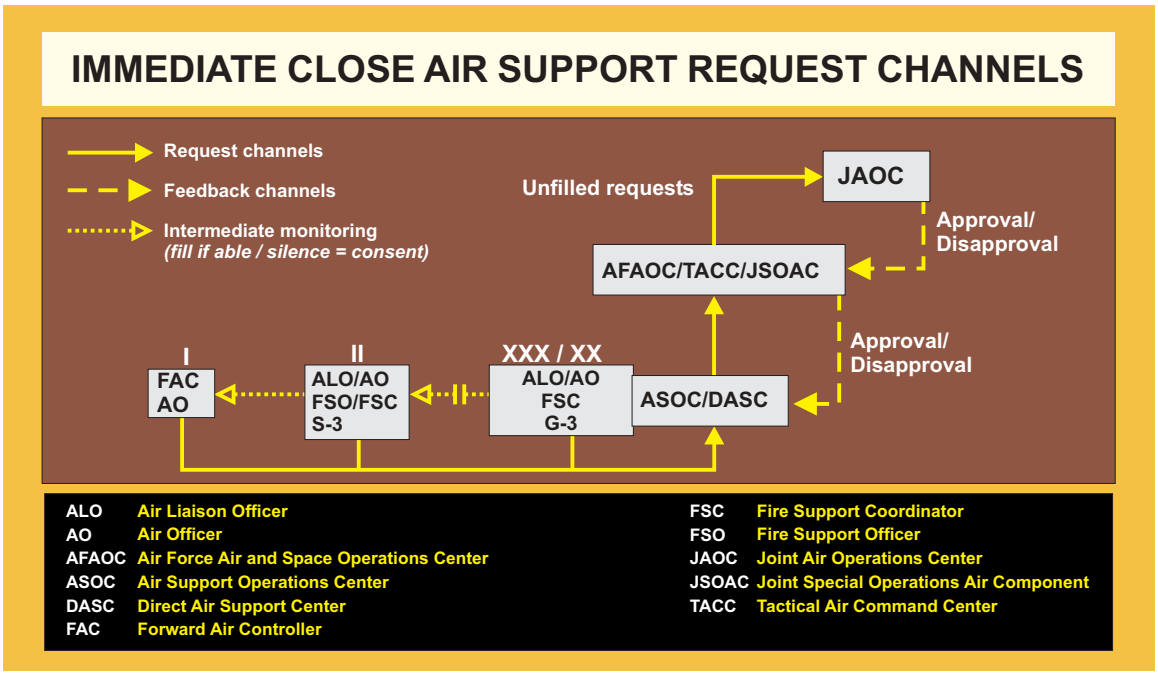

Figure III-9. Immediate Close Air Support Request Channels

4. Line 23 Ordnance.

5. Line 25 Estimate TOT.

6. Line 26 Contact Point (CP).

7. Line 27 Initial Contact (who the aircrew will contact first).

8. Line 28 Call Sign and Frequency of Final Control Agency.

9. Forward Air Controller (Airborne) Planning

a. **Introduction.** The FAC(A) is an airborne extension of the TACP. The FAC(A) extends the range that the TACP can detect, identify, and destroy targets. He can serve as an additional controller for the TACP, support a maneuver element without a TACP, or supplement the capability of a TACP. A FAC(A) must be able to coordinate supporting arms missions in conjunction with CAS missions, without assistance from the TACP. The FAC(A) must be capable of executing the desires of the ground commander in day, night, and adverse weather conditions. To accomplish this, the FAC(A)s must conduct detailed planning and integrate with the maneuver element.

b. **Pre-Mission Planning.** FAC(A)s are unlikely to be on hand during the planning stages of the ground scheme of maneuver. AO/ALO will be responsible for advising the ground commander on how and when to employ a FAC(A). There are several steps that FAC(A)s

must take to ensure that they can accomplish the mission, and execute within the intent of the ground commander. The following sections list the responsibilities of the aforementioned individuals.

(1) **FAC(A) Responsibilities.** FAC(A)s must be familiar with the OPLAN/OPORD, applicable theater/operation SOPs, and the ATO. FAC(A)s should conduct liaison with the supported unit's AO/ALO and FSC. In some cases, a face-to-face meeting will be possible; however, most of the time this will have to take place via other means. This liaison should clarify the information contained within the OPLAN/OPORD/ATO and any particular requirements of the supported ground unit. Upon completion of the liaison, this individual is responsible to disseminate the following information to the rest of the squadron/group:

(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) Target Precedence List.

(i) Fire support assets.

(j) SEAD SOP.

(k) LASER employment plan.

(l) FAC(A) employment plan.

(m) CAS assets available.

(n) FAC(A) assets available.

(o) Tanker assets available.

(p) Forward arming and refueling point (FARP) locations.

(q) Routing.

(r) Control points and initial points (IPs).

(s) Battle positions (BPs) and holding areas (HAs).

(t) Communications plan and nets.

(u) Code words/procedure words (prowords).

(2) **Air Officer/Air Liaison Officer.** The AO/ALO is responsible for advising the regimental and BN commanders, S-3s 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. The AO/ALO is also expected to understand the ground maneuver force to enhance situational awareness. They are also expected to advise on the employment of FAC(A)s in the accomplishment of their specified tasks. The AO/ALO will conduct liaison with the FAC(A)s to ensure that they understand the scheme of maneuver and the ground commander's intent. The AO/ALO should be ready to provide the following information to the FAC(A):

(a) **Ground Scheme of Maneuver and Ground Commander's Intent.** Without the knowledge of the scheme of maneuver and desired end state, the FAC(A) will not be able to effectively provide support to the ground forces.

(b) **Specified and Implied Tasking.** What the FAC(A) is expected to accomplish. The FAC(A) can be used to detect and destroy targets, coordinate or conduct target marking, provide terminal attack control for CAS, perform aerial reconnaissance, conduct aerial spotting for artillery and naval surface fires, act as a radio relay for TACPs, and provide BDA.

(c) **Initial Unit and TACP Locations.** These can change rapidly, but can be used for initial planning information for the FAC(A)s.

(d) **Communications.** Verification of the expected TACP (Local)/TACP (Admin), and TAD nets, and call signs of the TACPs and FACs.

(e) **Air Fire Plan.** Defines how CAS (preplanned and immediate) missions will be integrated into the overall fire support plan.

(f) **Plan for FAC(A) Use.** Will the FAC(A) be an airborne extension of an existing TACP, or as an additional TACP for a maneuvering unit? Positioning and planned tactics of the FAC(A) should be discussed.

(g) **Target Area Coordination.** The plan for combining CAS (rotary- and fixed-wing) and indirect fire support assets in the target area.

(h) **Control of CAS Assets.** How terminal attack control will be passed from the JTAC to the FAC(A). This includes who will provide marks, who will provide a 'cleared hot' when required, and approval authority to run a mission.

(i) **CPs and IPs.** Expected points that will be used in conjunction with the ACO and supports the scheme of maneuver.

(j) **BPs and HAs.** Positions that best support the planned scheme of maneuver.

(k) **Reference Map Datum-Spheroid.** Defined for the entire theater, but verify with the supported unit.

(l) **Medical Evacuation (MEDEVAC) Plan.** Operational area plan for using aviation to provide this support.

(3) **Fire Support Coordinator/FSO.** The ground officer responsible for the integration of all fires in support of the operation. Close coordination and integration between FSC/FSOs and AO/ALOs is critical to mission success. FSC/FSOs and the AO/ALOs will work closely together in the development and dissemination of the following:

(a) **Fire Support Plan.** The overall plan to integrate surface- and air-delivered fires, to include priority of fires, groups, series, programs, triggers, etc.

(b) **High Payoff Target List (HPTL).** The priority of all HPTLs by phase of the operation.

(c) **Communications.** Verification of the Conduct of Fire 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.

(d) **Target List.** Preplanned targets.

(e) **List of Targets.** Other targets of interest.

(f) **Fire Support Assets.** General and direct support artillery positions and AOFs, multiple launch rocket system, mortar units positions and AOF, counterfire radar sites, and displacement schedules.

(g) **FSCMs.** Verification of all active and planned control measures.

(h) **SEAD SOP.** The plan for suppressive fires including targets requiring suppression, suppression assets, fire plans and standard calls for fire.

(i) **LASER employment plan.** Available assets and expected employment guidelines. Verify LASER code assignments and de-confliction as per the ATO.

(4) **Operation Order.** The OPORD is a directive from the commander issued to subordinate commanders to coordinate the execution of an operation. A thorough understanding of the OPORD, its annexes and appendices, will provide the FAC(A) planner much of the information required to successfully plan for the mission. The following sections and respective information should be read and understood.

(a) **Operations Section**

1. Friendly Situation. The status and missions of higher, adjacent and supporting units.

2. Maneuver Control Measures. Unit boundaries, operational areas, phase lines.

3. Main Effort. Where the main effort and weight of support will be concentrated during all phases of the operation.

4. Reconnaissance Units. The initial and planned location, mission, fire support assets and communication nets of these units.

(b) **Intelligence Section**

1. Priority Intelligence Requirements.

2. Target Intelligence.

3. Possible and Probable Enemy COAs.

4. Intelligence Estimates.

5. Collection Plan.

6. Ground Order of Battle.

7. Air Order of Battle.

8. Missile Order of Battle.

(c) **Fire Support Section**

1. Scheme of Maneuver.

2. Fire Support Plan.

3. ROE.

4. Air Fire Plan.

5. Preplanned Air Support (preplanned scheduled and on-call missions).

6. Air Fire Plan.

7. Air Target Overlays (depicts planned air targets, FSCMs, and unit boundaries).

8. Artillery Fire Plan.

9. Artillery Targets.

10. Initial Position Area/Fire Capabilities (overlay depicting initial position areas assigned to artillery units, unit boundaries, and their fire capabilities).

11. Artillery Target (overlay depicting artillery targets, groups, series, FSCMs, and unit boundaries).

12. Artillery Fire Support Tables.

13. Naval Surface Fire Plan.

14. Fire Support Coordination Overlay (depicts applicable FSCMs to include unit boundaries).

(d) **Communications-Electronics Section**

1. C3 Assets.

2. Planned Nets.

3. Communication electronics operations instructions (CEOI)/AKAK/AKVH/AKTV authentication procedures.

4. Communications security procedures.

(e) **Air Operations Section**

1. Tactical Air Control Procedures.

2. FAC(A) Procedures.

3. Mission Report (MISREP) Procedures.

4. Target Marking for Air Attack.

5. Interdiction and Armed Reconnaissance.

6. CAS Briefing.

7. Attack Helicopter Brief.

8. Assault Support.

9. Armament.

10. Airspace Control Measures.

11. Tactical Routing.

(f) **Theater/Operation SOPs.** These documents will supplement the information that is found in the OPORD. There may exist Memorandums of Agreement/Understanding that FAC(A)s will need to be familiar with and adhere to where applicable.

(g) **Air Tasking Order.** The ATO or equivalent Integrated Tasking Order contains the JFACC's plan for providing the air support required in the OPLAN/OPORD. FAC(A)s must read the ATO, the ACO, and the SPINS thoroughly to derive the following information:

1. CAS and FAC(A) assets available (mission number, Type/Model/Series, Ordnance, Time on Station, etc.).

2. Routing (Rotary- and Fixed-Wing).

3. Control Points.

4. Airspace Control Measures.

5. Expected Area of Operations.

6. Tanker Availability/Locations/Times.

7. Code Words.

8. Communications Plan.

9. FSCMs.

10. FARP Locations.

(h) **Automated Communication Electronic Operating Instructions (ACEOI).** The ACEOI provides the daily communications plan including monitored nets, frequencies, call signs, and encryption/authentication tables.

c. **Summary.** FAC(A)s may not have the opportunity to meet with the ground forces they are supporting. However, every attempt should be made to establish liaison with the supported unit. Rotary-wing FAC(A)s have a unique capability to land at the command post and speak directly with the AO/ALO, the FSC, the S-3 and the commanding officer if available. There are times when fixed-wing FAC(A)s may be able to do the same, but this will probably only occur during the initial planning of an operation. Once the operation starts, face-to-face meetings with fixed-wing FAC(A)s are unlikely to occur. Knowing this, the planners that are sent to a JAOC need to have an understanding of the capabilities that a FAC(A) brings to the battle. AO/ALOs must learn this as well to appropriately brief the FSC, S-3, and ground commander. Finally, the FAC(A)s must realize that they have to make every effort to liaise with the supported units to ensure that they provide the best possible support to the ground commander.

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, pre-combat/communication checks, and movement (see Figure IV-1).

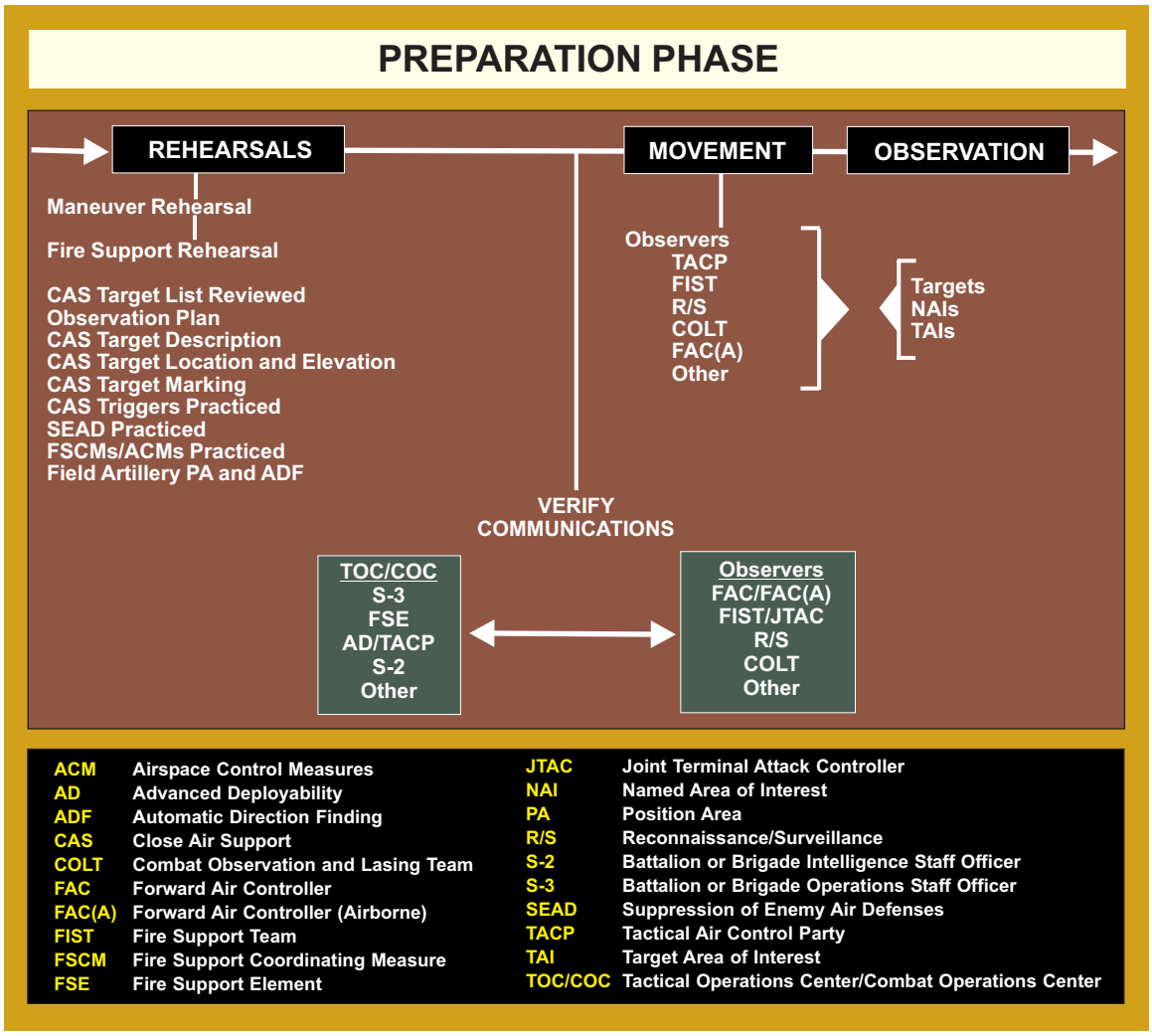

Figure IV-1. Preparation Phase

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 TACP employment plan should be feasible, executable, and tactically sound.** Preparation by the TACP, 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 JIPB) with the goal of providing accurate situational updates for commanders. Whether incorporated into a formal process or not, the staff's preparatory activities such as JIPB, targeting, fire plan refinement, etc., continue throughout preparation and execution.

d. Preparation requires staff, unit, and individual actions. Rehearsals help staffs, units, and individuals prepare for operations. Preparation includes concept of employment (COE) briefs, COE mission rehearsals, OPORDs, brief-backs, equipment and communications checks, SOP reviews, load plan verification, troops readiness preparation, 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. **There are six types of rehearsals: full dress, reduced force, terrain model, sketch map, map, and radio.**

b. Local SOPs should identify appropriate rehearsal types and techniques as well as standards for their execution. This section focuses on the key areas that CAS participants should focus on, be prepared to discuss/cover in the rehearsal, and leave the rehearsal understanding.

c. **Combined Arms Rehearsal.** The combined arms/maneuver rehearsal is normally conducted by a maneuver unit HQ and performed after subordinate units have issued their OPORD. The following CAS related areas should (at a minimum) be covered and/or rehearsed during the combined arms rehearsal.

(1) **Commander's Intent for Fires/CAS.** The commander's intent for fires should include his intent for CAS. During the planning phase, the AO/ALO should advise the commander with respect to threat, aircraft availability, and potential weapons loads to ensure a viable, obtainable intent is developed. JTAC requests for CAS should clearly describe the desired effects to meet the commander's intent. JAOC planners should then tailor aircraft and weapons loads to achieve the desired effects. Often, there is no separate "intent for CAS"

defined, however, the commander's intent for fires is inclusive for all fires of which CAS is an integral part.

(2) **Priority of CAS Fires.** Priority of fires for each phase of an operation must be identified. For CAS sorties, a projection of "who" will get CAS, "when" it's expected, "what" the commander's desired end state is, and "where" the primary and alternate observers are located needs to be understood. Additionally, at the conclusion of the rehearsal, participants should have a thorough understanding of the following:

(a) Verification of grid coordinates/locations for critical targets, primary and alternate observers, unit locations (defense), and projected movements (by phase) for offensive operations.

(b) Triggers for targets and target engagement criteria.

(c) FSCMs/ACMs and how they facilitate fire and maneuver.

(d) Verify SEAD plan.

(e) Communications connectivity.

(f) Verify CAS target marks, and if necessary, friendly marking.

(g) Terminal attack control types to be utilized.

(h) Which JTAC will provide terminal attack control of aircraft conducting CAS.

(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 of the ground commander. During the combined arms rehearsal, the AO/ALO or FSO will address the following:

(a) Confirm commander's intent for CAS.

(b) Number of CAS sorties expected.

(c) Type aircraft.

(d) Weapons load information.

(e) CAS on-station times.

(f) CPs/IPs.

(g) ACMs/FSCMs.

(h) SEAD plan.

(i) Target marks/laser plan.

(j) Friendly marking procedures.

(k) TACP battlefield employment.

(l) TACP battlefield recovery.

(m) TACP communications plan.

(n) Approved/disapproved CAS requests.

(o) Terminal attack control types.

d. **Fire Support Rehearsal.** Fire support rehearsals focus on the execution of EFSTs 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 FSCC/FSE, and confirm the feasibility of the current plan.

(1) 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:

(a) Identify and confirm that FSCMs support the scheme of maneuver and fires.

(b) Verify consolidated target list to include CAS targets.

(c) Verify coordinate locations for critical targets using the proper map datum.

(d) Verify that each target has a TPME, and that targeting priorities are clearly delineated.

(e) Verify trigger points for each target and target engagement criteria.

(f) Confirm observation plans:

1. Primary/alternate observers: (JTAC, FAC(A), forward observer, FIST, COLT, R&S, scouts).

2. Infiltration and exfiltration routes.

3. Disengagement criteria.

(g) Verify likely CAS attack tactics (high/medium altitude, low/very low altitude).

(h) Verify primary and back-up communications links/connectivity for fire support/CAS execution:

1. Call signs.

2. Code/Brevity words.

3. Nets:

a. Command.

b. Fire Support.

c. Air.

(i) Verify attack guidance for each target (unit(s) to fire, shell fuze combination, number of volleys, if the information is available, number and type of aircraft available and SCLs).

(j) Verify/deconflict the movement plan specifying when and where firing units will move:

1. Gun Target Lines.

2. Positioning Areas.

(k) Verify the method of engagement (at my command, TOT, or when ready).

(l) FSCMs/ACMs:

1. ACAs.

2. Formal.

3. Informal.

(m) Identify CPs/IPs and general aircraft flow.

(n) Synchronize timing of air assets and surface fires.

(o) Verify SEAD plan/procedures.

(p) TOT/TTT.

(q) Verify CAS target marking procedures:

1. Verify unit to fire.

2. Type of mark.

(r) Review type of CAS control for CAS targets:

1. Type 1-3 (see Chapter V, "Execution").

2. Identify observer and controller connectivity.

3. Review clearance procedures for CAS targets.

4. AO/ALO/FSO/S3-Air/NGLO recap critical fire support, CAS, and naval surface fire events.

5. Make refinements as necessary.

6. FSCMs discussed/understood.

7. Discuss indirect fire system position areas and AOF/gun target lines (GTLs). CAS changes or updates made during combined arms or fire support rehearsals should be forwarded to the DASC/ASOC 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, equipment and vehicles.

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, CONOPS, scheme of maneuver, and fires.

(2) **Mission Essential Equipment.** Ensure all required equipment is operating and accounted for. Recommended items for a JTAC include NVDs, an IR laser pointer, laser rangefinder/designator, IR strobe light, chemlights, spotting scope, multi-band radio, radar beacon, pyrotechnics (smoke/illum), access to an M203 grenade launcher with illumination and smoke rounds, compass, mirror, common objective graphics and GPS. 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, TAIs.

(e) Decision points and triggers.

(f) Aircraft CPs and IP.

(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. Priority of fires.

2. Priority targets.

3. SEAD targets.

4. Preparatory fires.

5. FPFs.

6. Groups and series.

7. Target blocks.

(4) **Aviation Preparation.** See Appendix C, "Sample Close Air Support Aircrew Mission Planning Guide," for sample aircrew mission planning guide.

4. Communications

a. During the preparation phase, and often in consonance with the pre-combat inspections, communication links are checked and verified. This ensures that primary and backup voice and digital systems are checked, crypto material is current, time is synchronized, and code words, brevity codes, 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) Conduct of fire (COF).

(b) Mortar COF.

(c) FSC nets.

(d) Air Spot.

(3) Air Nets:

(a) TAR/HR.

(b) AFARN.

(c) TADs.

(d) TACP local.

(e) TATC.

(f) NSFS Ground Spot.

(g) NSFS Air Spot.

(h) Shore fire control party.

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) Pro words posted or noted for communicators.

d. **Friendly day/night marking procedures.** Equipment available and correctly displayed/checked.

(1) IR marker lights/pointers.

(2) Strobe lights (visual and/or IR).

(3) Air panels.

(a) VS-17 panels.

(b) Thermal panels.

(c) Chemical lights.

(4) Pyrotechnics.

(a) Smoke.

(b) Star clusters.

(5) Radar beacons and codes.

(6) Tagging devices (Grenadier Brat, etc.).

A-10 Aircraft

5. Movement/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 battle positions 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 his elements where they will optimize the unit's battlespace and facilitate execution of his 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 must be 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 must consider 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 must permit 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 are the tactical radios. The TACP must be positioned to allow communications with the commander, HHQ (TACP), and the CAS aircraft.

c. **Reconnaissance.** If time and the tactical situation permit, take advantage of the opportunity to conduct reconnaissance of the battlefield. Confirm when observation positions offer visibility of engagement areas, enemy avenues of approach, and dead space. Verify communications connectivity.

CHAPTER V
EXECUTION

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

T. Miller Magure
***The Development of Tactics*, 1904**

1. Introduction

CAS execution, as depicted in Figure V-1, begins with a target nomination from the supported commander and involves two processes that are continuous and overlapping in nature: JTAC/Operations Center coordination and CAS target engagement. This chapter discusses the concepts and considerations required for the detailed integration of CAS with the fire and maneuver of the supported unit.

2. Joint Terminal Attack Controller to Combat Operations Center/Tactical Operations Center Coordination

It is critical for JTACs and COC/TOC elements to coordinate their efforts prior to each CAS engagement. Key issues such as battle tracking, target nomination, airspace deconfliction and coordination, synchronization, weapons release authority, tactical risk assessment, types of terminal attack control, and which JTAC provides terminal attack control must be clearly understood. **Only through effective coordination can the CAS "team" successfully achieve the supported commander's objectives for CAS.**

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

(1) **FSCMs/ACMs** as applicable: IPs, CPs, BPs, ingress/egress routes, MRRs, ACAs, NFAs, and ROZs, CFLs, RFLs, and FSCLs.

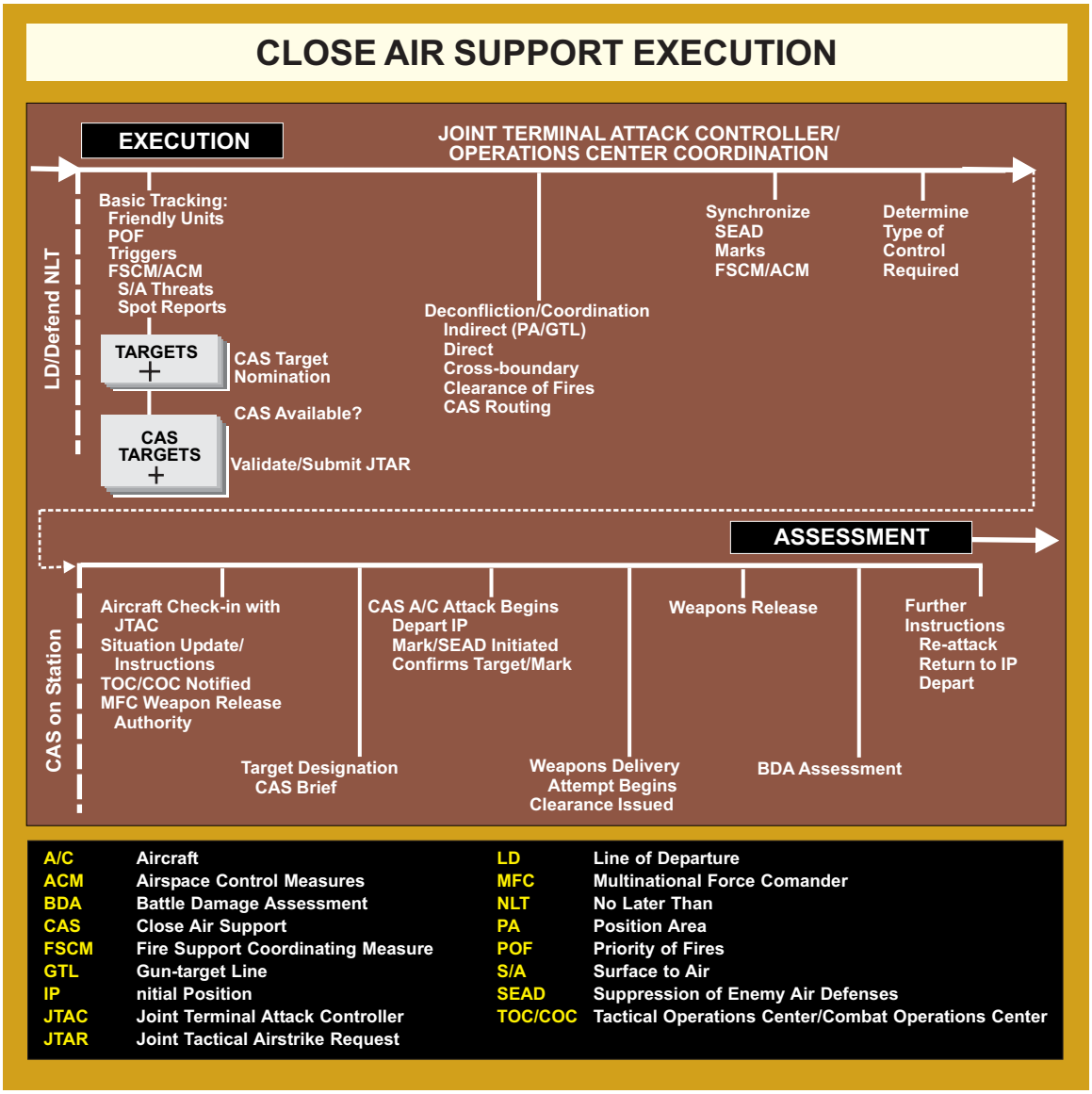

Figure V-1. Close Air Support Execution

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

(3) **Artillery.** Current and planned artillery locations and GTLs.

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

(5) **Targeting.** Preplanned target locations, CAS target triggers, air requests, observation plan, and fire support plan.

(6) **Fragmentary Orders, spot reports, and ATO updates.**

b. **CAS Target Nomination.** A nomination occurs when the commander or his representative tells a JTAC to engage a target with CAS. 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 CP.

c. **Airspace Deconfliction.** Direct and indirect fires may interfere with aircraft operations. JTACs and fire support personnel must deconflict airspace to provide a reasonably safe operating space for aircraft to maneuver and attack targets. Deconfliction must also accommodate other airspace users to include UAVs, MEDEVAC, C2, ISR, and transport aircraft as listed in ACO. CAS aircraft may require specific deconfliction and coordination using time, space, and altitude. **JTACs and fire support personnel should select the separation techniques that require the least coordination without adversely affecting the ability to safely complete the mission.** To be successful, all participants must be well versed in ACA terminology and have knowledge of all applicable ACAs in use (see Figure V-2).

For further detail concerning airspace deconfliction, refer to JP 3-52, Doctrine for Joint Airspace Control in the Combat Zone.

Note: Deconfliction methods should facilitate simultaneous CAS and indirect fire operations.

(1) **Deconfliction.** Deconfliction may be accomplished with a formal ACA (see Chapter III, "Planning and Requesting") in the ACO or, more frequently, with informal methods.

(2) **Informal ACAs.** 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, and combination of lateral and

FORMAL AIRSPACE COORDINATION AREA TERMINOLOGY

TERMINOLOGY	DEFINITION
Airspace Coordination Area (ACA) Established but not activated	The ACA size and location have been defined and designated, usually by code name, but *NO CLEARANCE* has been given to enter the airspace. *Fires allowed through the ACA without coordination.*
ACA Activated	ACA is activated at this time. Aircraft are *CLEARED* to operate in the defined airspace. A time limit may be established. *Fires prohibited through the ACA.*

Figure V-2. Formal Airspace Coordination Area Terminology

altitude) or by time. Although relatively easy to set up and deconflict with CAS, informal ACAs can be more difficult for the FSCC/FSE to coordinate. FSCC/FSE must ensure restrictions to indirect fires or aircraft are limited to those required to successfully execute the attack and are coordinated with all affected agencies. When FSC/FSO set up informal ACAs, they use one of the following deconfliction methods.

(a) **Lateral Separation** (see Figure V-3). Lateral separation allows coordinated attacks against two adjacent targets. The 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 a universal transverse mercator 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 must know the GTLs so they can prevent aircraft from flying through trajectories. For example: "Stay west of the grid line 62" or "Remain west of the river."

(b) **Altitude Separation** (see Figure V-4). This technique permits indirect fires to continue when the aircraft must cross the GTL. Clearance from the indirect fire trajectory and fragmentation pattern is provided by "stay above" or "stay below" altitude restrictions.

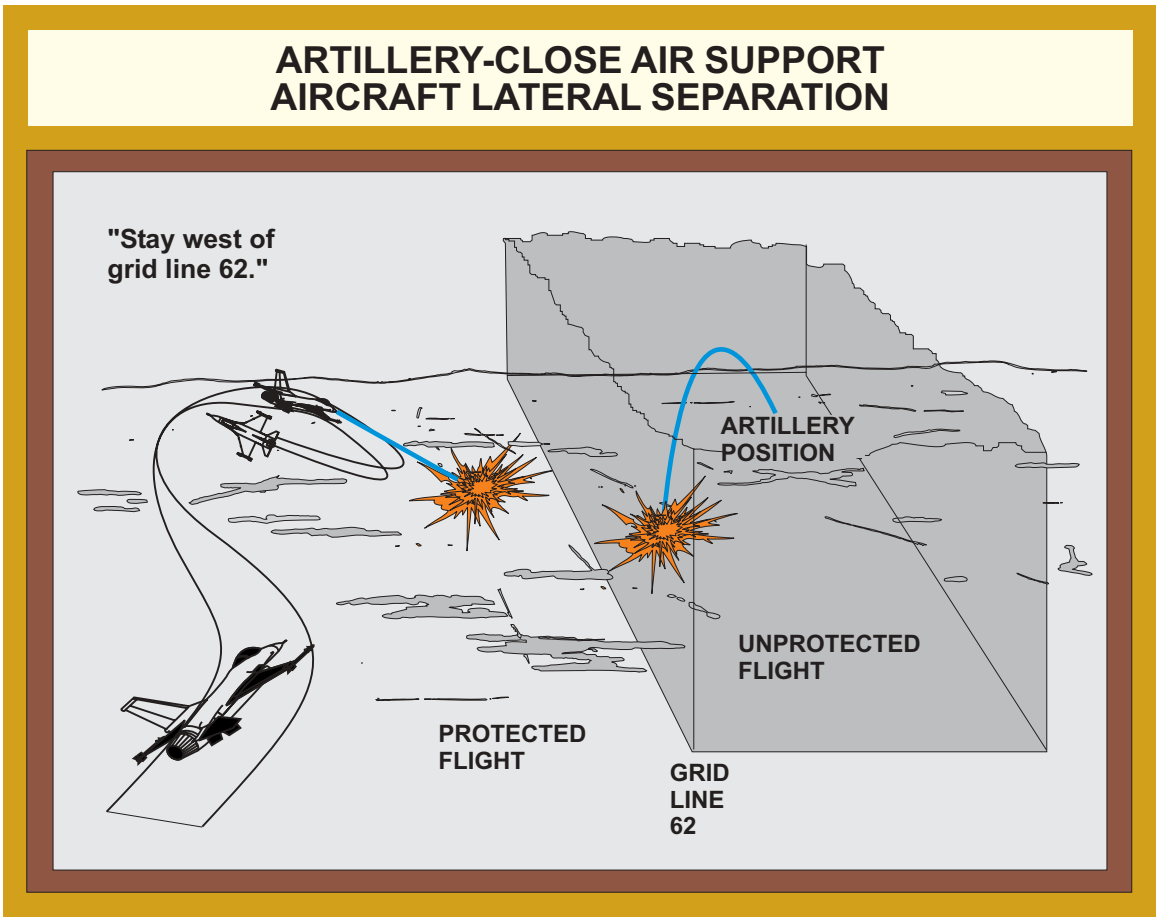

Figure V-3. Artillery-Close Air Support Aircraft Lateral Separation

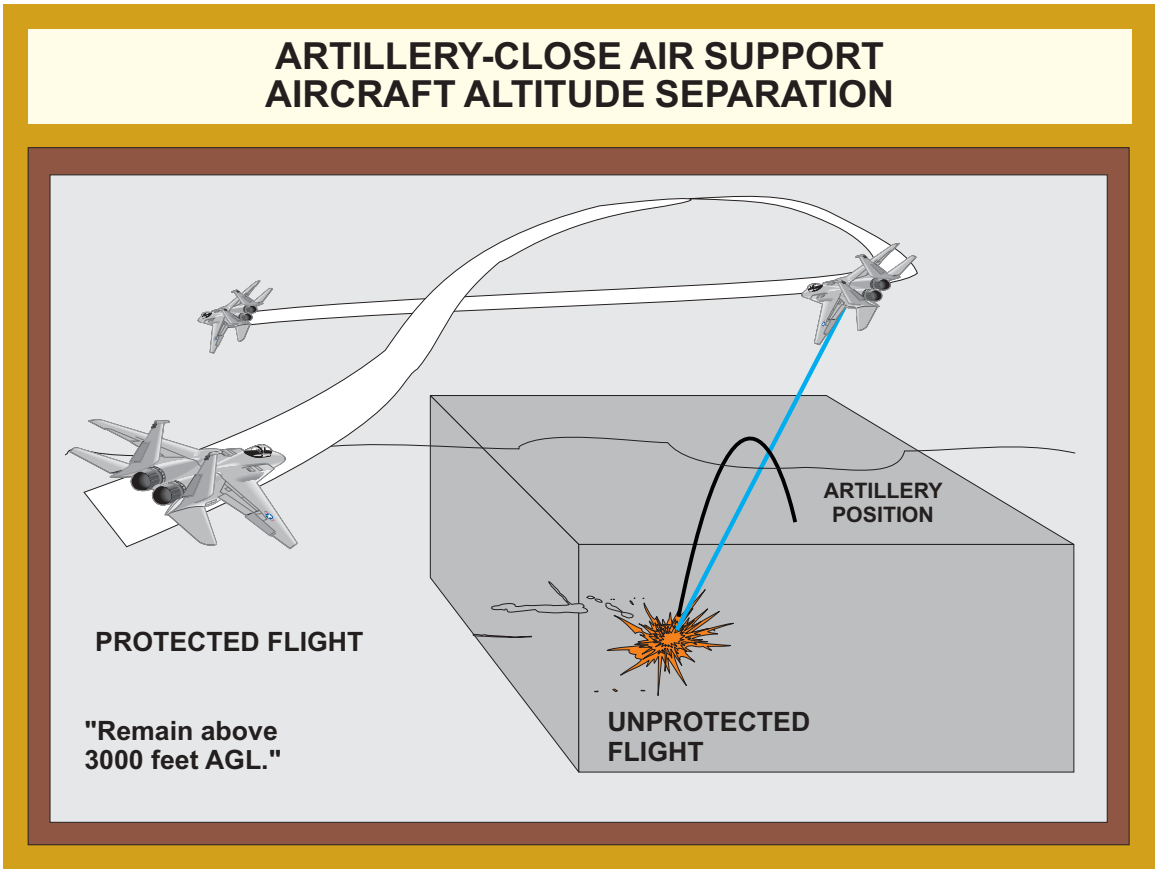

Figure V-4. Artillery-Close Air Support Aircraft Altitude Separation

When calculating the safe separation for an aircraft to stay above or below the maximum ordinate (MAXORD), the JTAC and FSC/FSO use tabular firing tables and apply a margin of safety above the MAXORD. Convert this number to mean sea level (MSL) before passing it to the aircraft. (For example, "Stay above 5000 MSL.")

(c) **Altitude and Lateral Separation** (see Figure V-5). 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 indirect fire trajectories. To calculate safe separation from indirect fires, 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 the 62 easting and remain below 3000 feet MSL" or "Stay above 5000 feet MSL west of the 62 easting."

(d) **Time Separation.** Time separation requires the most detailed coordination and may be required when aircrews must fly near indirect fire trajectories or ordnance effects. The timing of surface fires must be coordinated with aircraft routing. This technique is appropriate when aircrews and firing units engage the same or nearby targets, when indirect fire is providing SEAD in coordination with the aircraft attack, or when the target is being marked by indirect fire. When deconflicting sorties, consider 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).

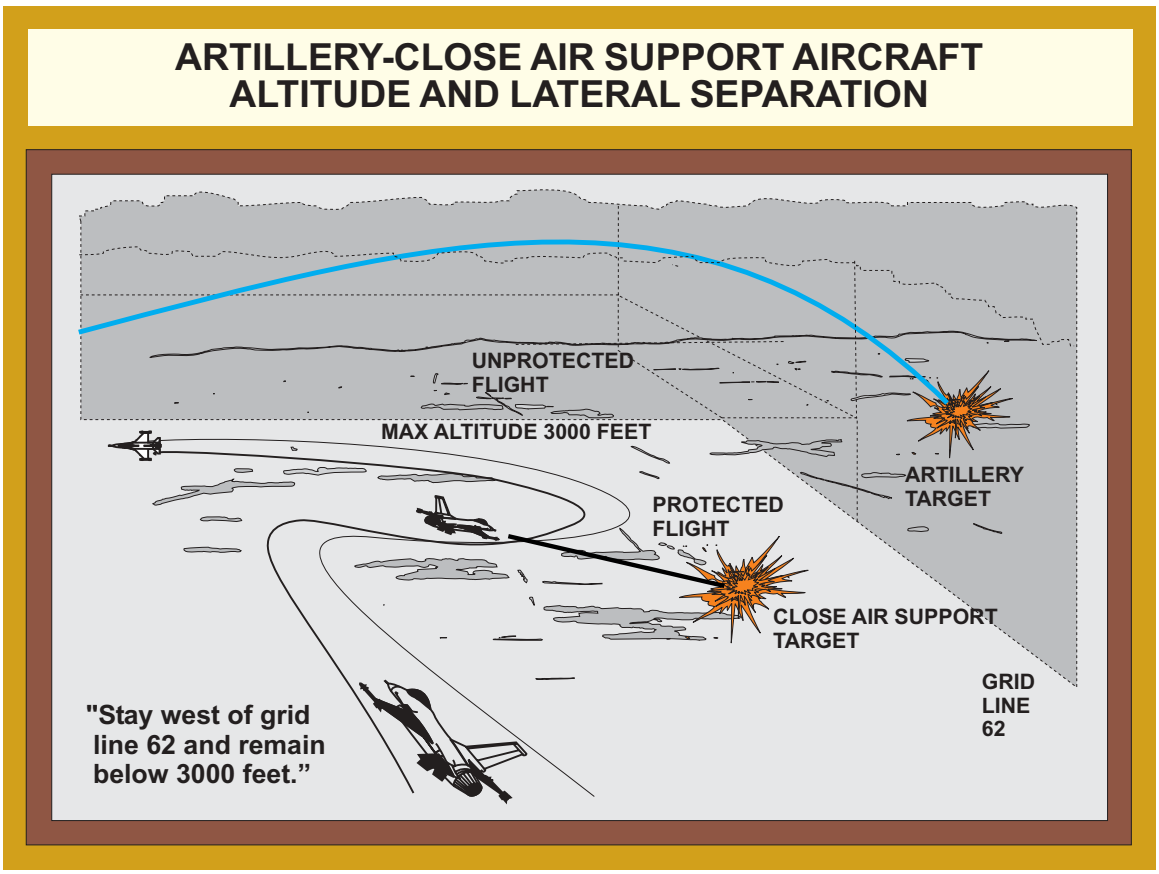

Figure V-5. Artillery-Close Air Support Aircraft Altitude and Lateral Separation

1. **Time on Target.** TOT is a time at which the aircraft are to have bombs on target and around which supporting surface fires can be coordinated. TOT requires minimum communication and is usually easier to employ than TTTs. All participants, air and ground, must understand the time standard in use (Zulu or local), and the JTAC must ensure all clocks are synchronized by providing a time hack. **GPS time, if available, is normally used to establish a TOT.** Strict adherence to timing by participants is required for aircraft safety. Aircrews can update the clock on check-in with air control/fire support coordination agencies. Figure V-6 illustrates time separation using a TOT.

2. **Time to Target.** TTT establishes a precise number of minutes and seconds that elapse between an established time hack and bombs on target. This is an accurate method of time control and is easy to implement when few participants are involved. The time hack must be of sufficient duration for the FSC/FSO to synchronize indirect fires. Additionally, the JTAC 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 normally provides the "hack." Aircrew will acknowledge receipt of the time hack.

d. **Coordination.** Once a target has been nominated, the JTAC and COC/TOC must coordinate the CAS attack with affected maneuver elements. Cross-boundary clearance of

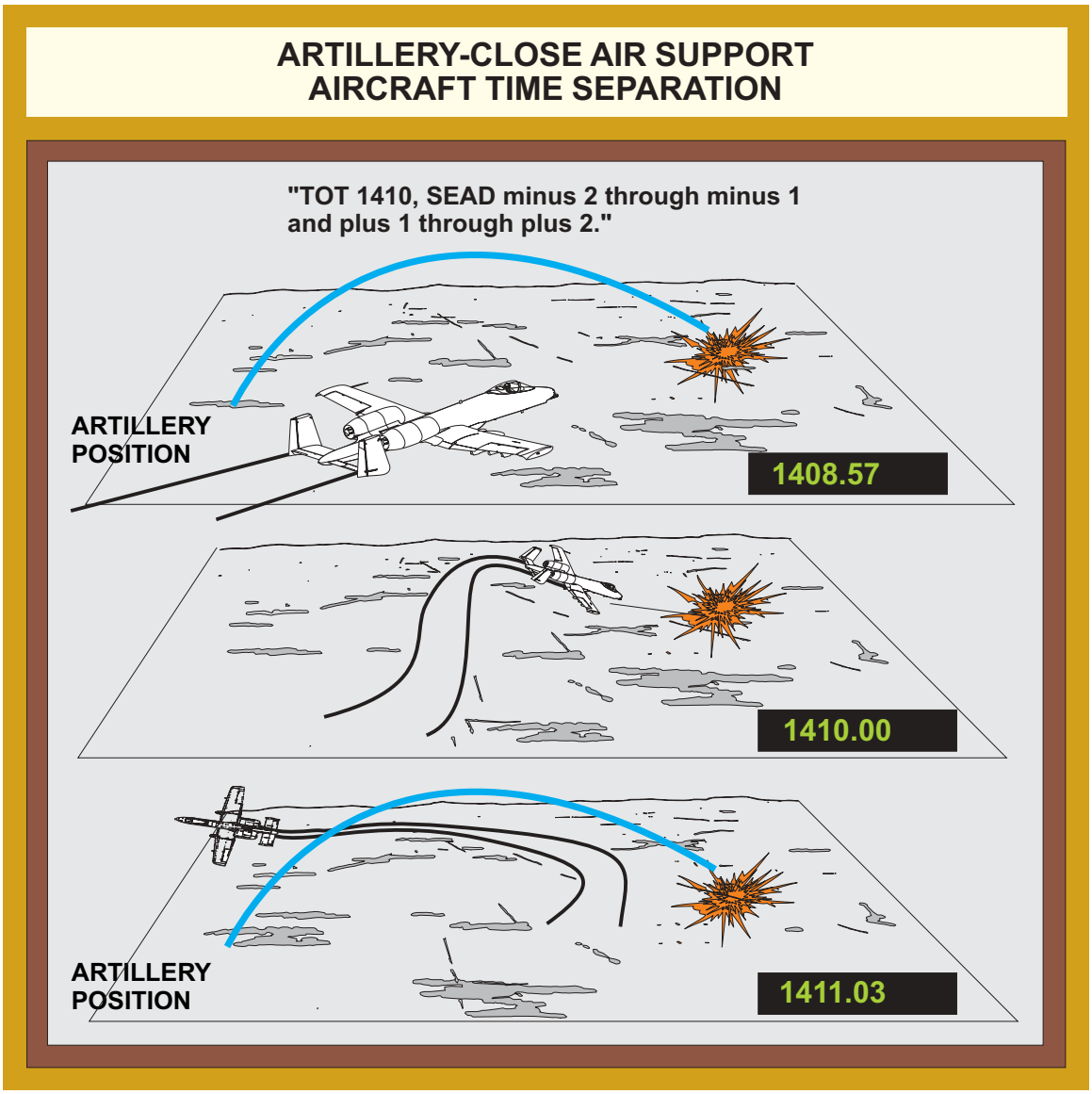

Figure V-6. Artillery-Close Air Support Aircraft Time Separation

fires, friendly air defense artillery (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 fires effects across a boundary unless those fires are coordinated with the affected unit. The FSC/FSO must conduct clearance of fire procedures directly with the cross-boundary COC/TOC, or the common HHQ COC/TOC.

(2) **Friendly ADA.** To avoid fratricide, COC/TOC should announce "friendly air on station" to subordinate units. TACP and ADA personnel must coordinate CP/IP usage, target location, type and number of aircraft, altitudes, and times on station. The SPINs and ACO should include MRRs or safe return corridors and associated procedures for aircraft to return from CAS target areas.

(3) **Procedural Control Measures.** Procedural control measures provide target orientation to aircrew, align aircraft for the attack or egress, provide separation from other supporting fires, and provide separation from enemy air defense assets. **Procedural control measures include IP selection, offset direction, and attack heading.**

(a) **IP Selection.** The JTAC selects the IPs based on enemy capabilities, target orientation, friendly location, weather, aircraft capabilities, and fire support coordination requirements. IPs should be identifiable visually and with radar, and normally located from 5 to 15 nautical miles (nm) from the target.

(b) **Offset Direction.** The offset direction tells the aircrew on which side of the IP-to-target line they can maneuver for the attack (see Figure V-7). JTACs 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.

(c) **Attack Heading.** JTACs assign attack headings for several reasons: to increase ground troop safety, aid in aircraft acquisition, aid aircrews in target acquisition by the JTAC, meet laser safety cone attack restrictions, and facilitate fire support coordination. Controllers may employ attack cones that allows aircrew to maneuver on either side of the attack heading. This gives aircrew more flexibility in prosecuting the target while maintaining the required degree of restriction on the aircraft heading. Attack cones might be particularly useful when the attack aircraft are using coordinate dependent weapons, since it is possible the weapon final attack heading may significantly differ from the aircraft heading. Aircrews and JTACs must understand that the attack cones may differ between both the aircraft and weapon. JTACs must weigh the advantages of issuing an attack heading with the disadvantages of restricting aircraft tactics. Final attack headings are not issued when there is no requirement.

e. **Synchronization**

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

(2) **A common time reference is essential** to accomplish the high degree of coordination necessary for effective CAS. All participants (aircrew, JTAC, TACC/SACC, DASC/ASOC,

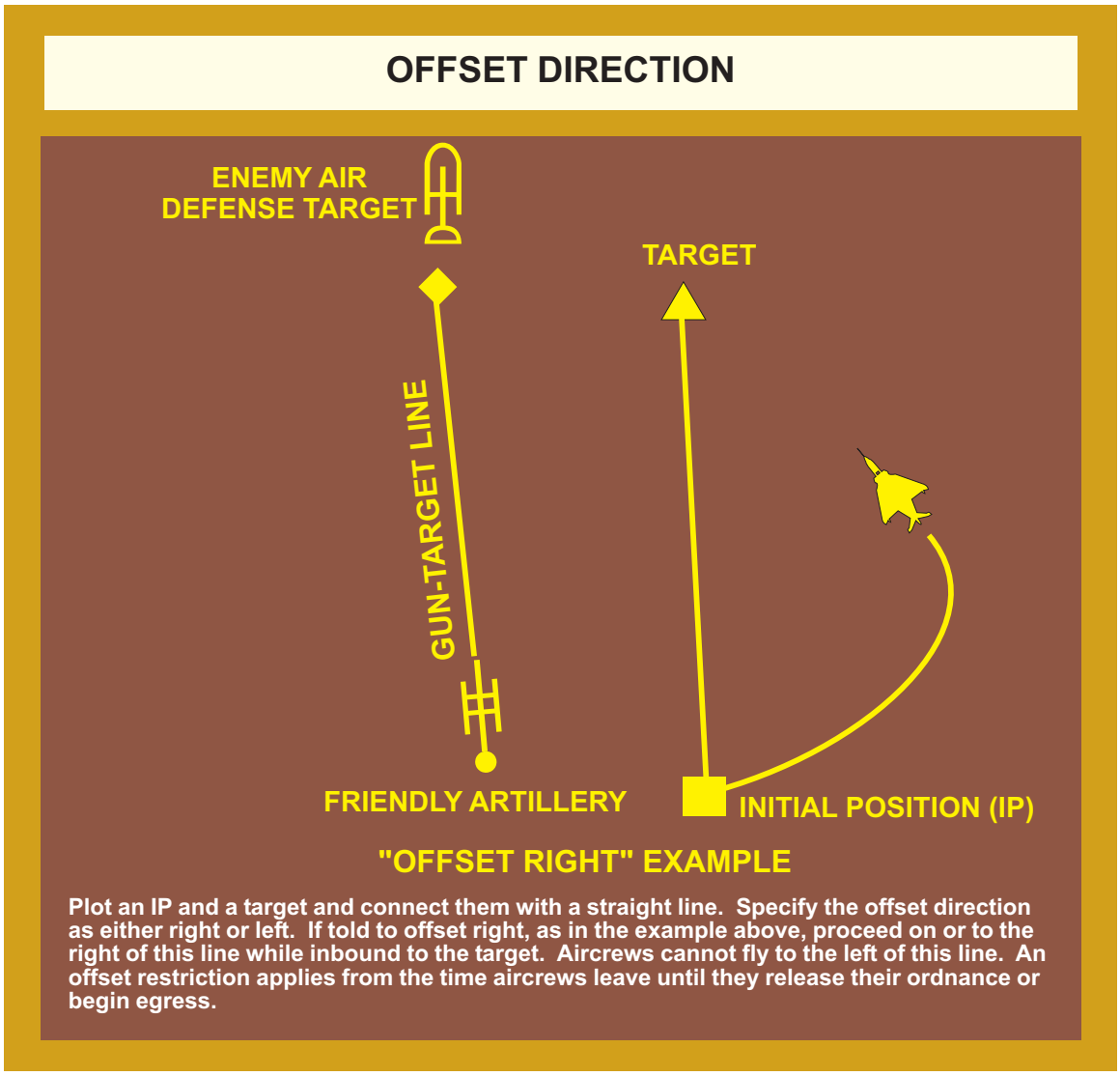

Figure V-7. Offset Direction

FSCC/FSE, and artillery) 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.

(a) **Marks.** A target mark should be provided for CAS aircraft whenever possible. Target marks should be planned to include sufficient time before weapons employment to ensure target acquisition by the CAS aircrew. The target mark can be provided by direct or

indirect fire weapons (heavy machine gun tracer, mortars, artillery, or naval gunfire) or an airborne platform such as a FAC(A). See Figure V-8 for standard marking brevity terms.

1. **Marking by indirect fire.** 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 indirect fire acquisition systems, and the additional coordination between supporting arms required for this mission. Caution must be applied when using a WP and/or red phosphorous mark on a crowded battlefield that the mark is not confused with other activities on the ground. Marking rounds should be delivered as close to CAS targets as possible, with WP marks timed to impact 30 to 45 seconds prior to the CAS TOT/TTT and illumination marks timed to impact 45 seconds prior to the CAS TOT/TTT (the illumination mark must be earlier than 45 seconds at night). This lead time ensures that the marking round is in position early enough and remains visible long enough for the JTAC to provide final control instructions and for the pilot of the attacking aircraft to acquire the target. Indirect fire marking rounds are most effective when delivered within 100 meters of the CAS target, but those within 300 meters of the CAS target are generally considered effective enough to direct CAS aircraft. When indirect fire marking rounds are not timely or accurate, JTACs should use a backup marking technique or verbal instructions to identify the target to CAS aircrew. If the situation requires precise marks, observers or spotters can adjust marking rounds to ensure that accurate marks are delivered to meet the CAS schedule.

2. **Marking by direct fire.** Direct fire weapons can be used to mark targets. While this method may provide more accuracy and timeliness than indirect fire marks, **its use may be limited by range and the visibility of the burst from the air and on the battlefield**.

3. **Laser designators.** For laser spot tracker (LST) equipped aircraft, designating/marking targets by laser is very effective. If using lasers (ground or airborne) to mark the

STANDARD MARKING BREVITY TERMS

CALL	MEANING
VISUAL	The joint terminal attack controller has the attack aircraft in sight, or the attack aircraft has positively identified the terminal attack controller's or friendly position.
CONTACT	Acknowledges the sighting of a specific reference point.
TALLY	The enemy position/target is in sight.
NO JOY	Aircrew does not have visual contact with the target/bandit/bogey/landmark. Opposite of tally.

Ref: FM 3-97.18; MCRP 3-25B; NWP 6-02.1, and AFTTP(I) 3-2.5, Multiservice Operations Brevity Codes

Figure V-8. Standard Marking Brevity Terms

target, laser designation must be selective and timely as lengthy laser emissions may compromise friendly positions. The CAS aircrew can also confuse the laser with the intended target. When employing lasers to designate/mark, include "LASER", along with the 4-digit laser code in the marks portion of the CAS briefing. **JTACs should also provide the laser-target-line in degrees magnetic *from the operator to the target*.** For laser marks, the aircrew will provide **a ten second warning** to activate the mark. Use the standard laser brevity terms listed in Figure V-9.

See JP 3-09.1, Joint Tactics, Techniques, and Procedures for Laser Designation Operations, *for more information.*

4. **FAC(A) marks.** Some FAC(A) aircraft can mark with WP/high explosive rockets, IR pointer, and/or LASER. In addition, AC-130 gun ships can mark a target with 105mm WP, 40mm high-explosive incendiary, and/or laser. See FM 90-20, MCRP 3-16.8B, NWP 3-09.2, AFTTP 3-2.6 *Multi-Service Procedures for the Joint Application of Firepower (J-FIRE)* publication for a complete listing of aircraft target marking capabilities.

5. **IR pointers.** JTACs may use IR pointers and other IR devices to mark targets at night for aircrews that are using NVDs. Unlike laser designators, IR devices cannot be used to guide munitions. Use IR pointers with caution as they may expose the JTAC to an enemy with night vision capability. IR marks should be initiated 20 to 30 seconds prior to the CAS TOT/TTT, or when requested by the aircrew.

STANDARD LASER BREVITY TERMS

CALL	MEANING
TEN SECONDS	Prepare to start LASER designation in 10 seconds
LASER ON	Designate the target with LASER energy
SPOT	Aircraft has acquired LASER energy
NEGATIVE LASER	Aircraft has not acquired the LASER energy
SHIFT	Call to shift LASER energy from the offset position next to the target onto the target
TERMINATE	Cease LASER designation

Ref: FM 3-97.18; MCRP 3-25B; NWP 6-02.1, and AFTTP(I) 3-2.5, Multiservice Operations Brevity Codes

Figure V-9. Standard Laser Brevity Terms

WARNING

Use extreme caution when using an IR pointer or laser sources as the sole source for target mark/designation/verification. Attack aircraft may confuse 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 CAS briefing. JTACs should also provide the Pointer-Target-Line or Laser-Target-Line also known as the Designator-Target-Line in degrees magnetic from the operator to the target. JTACs should consider the use of a discriminate target mark whenever possible.

6. **Combination. JTACs should use a combination of marking methods when practicable** to aid in orienting the CAS aircrew to the target.

7. **Marking Friendlies. Marking friendlies is the least desirable method of providing a target mark. Marking friendlies can be confusing and should be used cautiously and only when no other method is available.**

(b) **Suppression of Enemy Air Defenses.** SEAD may be accomplished by surface- and air-delivered weapons. To minimize exposure of friendly aircraft to enemy air defenses, JTACs should first evaluate the option to route the aircraft away from known or suspected anti-air threats. If aircraft cannot be routed away from enemy air defenses, aircraft vulnerability must be balanced against the risk of exposing SEAD delivery systems.

1. **Objectives.** The primary objective of SEAD is to allow friendly aircraft to operate in airspace defended by an enemy air defense system, including the target area and ingress/egress routes.

2. **Coordination. Surface-delivered SEAD** involves planning and coordination by the FSCC/FSE and at the maneuver units down to the company level. **Air-delivered SEAD and EW** must be coordinated and deconflicted in order to provide necessary support during the time CAS is being conducted. For these reasons, SEAD is another critical timing factor associated with CAS. Effective SEAD also depends on accurate intelligence on the position and type of enemy weapons. The FSC/FSO, working with the JTAC and forward observer, must coordinate surface-delivered SEAD with target marking to minimize confusion.

See JP 3-01.2, Doctrine for Offensive Operations for Countering Air and Missile Threats, *for more information.*

f. **Weapons Release Authority.** The authority and responsibility for the expenditure of any ordnance on the battlefield rests with the supported commander. The supported commander will delegate weapons release clearance authority to his JTACs to facilitate CAS attacks. Weapons release authority grants JTACs the authority to provide the following to attacking aircraft:

(1) **"Cleared Hot"** — Term used by a JTAC during Types 1 and 2 control, granting weapons release clearance to an aircraft attacking a specific target.

(2) **"Cleared To Engage"** — Term used by a JTAC during Type 3 control, granting a "blanket" weapons release clearance to an aircraft or flight attacking a target or targets which meet the prescribed restrictions set by the JTAC.

g. Tactical Risk Assessment. As the battlefield situation changes, 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 noncombatants. Based on the current risk assessment, the supported commander will weigh the benefits and liabilities of authorizing a particular type of terminal attack control. Specific levels of risk should not be associated with each type of terminal attack control. Information to consider when assessing risk includes:

(1) Confidence and 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) Noncombatant locations.

(c) Enemy locations.

(6) Confidence in targeting information:

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

(b) Stationary or moving.

(c) Ability to mark the target.

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

(7) Ordnance available for attack:

(a) Capabilities.

(b) Limitations.

(c) Restrictions.

(d) Proximity of friendlies/noncombatants.

(8) Risk-Estimate Distance

(a) **Troops in Contact.** JTACs and aircrews must be careful when conducting CAS when friendly troops are within 1 kilometer (km) of enemy forces. The JTAC should regard friendlies within 1 km as a "troops in contact" situation and so advise the supported commander. However, friendlies outside 1 km may still be subject to weapons effects. JTACs and aircrews must carefully weigh the choice of munitions and types of terminal attack control against the risk of fratricide (e.g., troops in contact does not necessarily dictate a specific type of control). Risk-estimate distances allow the supported commander to estimate the danger to friendly troops from the CAS attack. They are described in terms of 10 percent probability of incapacitation (PI) and 0.1 percent PI. These estimates, listed in Appendix D, "Risk-Estimate Distances," are based on specific conditions. Different factors such as target elevation, terrain, buildings, trees, etc., can significantly reduce or increase PI.

(b) Danger close ordnance delivery inside the 0.1 percent PI 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 PI distance. Risk acceptance is confirmed when the supported commander passes his initials to the attacking CAS aircraft through the JTAC, signifying that he accepts the risk inherent in ordnance delivery inside the 0.1 percent PI distance. Risk-estimate distances allow the supported commander to estimate the danger to friendly troops from the CAS attack. When ordnance is a factor in the safety of friendly troops, the aircraft's axis of attack should be parallel to the friendly force's axis or orientation. This will preclude long and/or short deliveries from being a factor to friendly forces.

h. Types of CAS Terminal Attack Control. Recent technological advances in aircraft capabilities, weapons systems and munitions have provided JTACs additional tools to maximize effects of fires while mitigating risk of fratricide when employing air power in close proximity to friendly forces. GPS-equipped aircraft and munitions, laser range finders/designators, and digital system capabilities are technologies that can be exploited in the CAS mission area. There are three types of terminal attack control (Type 1-3). The commander considers the situation and issues guidance to the JTAC based on recommendations from his staff and associated risks identified in the tactical risk assessment. The intent is to offer the lowest level supported commander, within the constraints established during risk assessment, the latitude to determine which types of terminal attack control best accomplish the mission. Specific levels of risk should not be associated with each type of terminal attack control. The tactical situation will define the risk associated with a given type of terminal attack control, (e.g., GPS and digital targeting systems used in Type 2 control may be a better mitigation of risk than using Type 1). The three types of control are not ordnance specific.

(1) **Type 1 control** is used when the JTAC must visually acquire the attacking aircraft and the target for each attack. Analysis of attacking aircraft geometry is required to reduce the risk of the attack affecting friendly forces. Language barriers when controlling coalition aircraft, lack of confidence in a particular platform, ability to operate in adverse weather, or aircrew capability are all examples where visual means of terminal attack control may be the method of choice. **Type 1 control procedures** are as follows:

(a) JTAC will visually acquire the target.

(b) JTAC will send a CAS briefing (9-line or theater standard) to attack aircraft (verbally or digitally).

(c) Attack aircraft will verify target location correlates with expected target area.

Note: Attack aircraft validates target location by cross-checking that the position is coincident with the expected target area by using all appropriate means: map plot, target designation displayed on digital map set, head-up display symbology, FLIR, radar, etc.

(d) Attack aircraft will read-back verbally or confirm digitally Line 4 (elevation), Line 6 (target location), and any restrictions provided by the JTAC.

(e) Aircraft will provide an "IP INBOUND" call if requested (verbally or digitally).

(f) JTAC will mark/designate target (as practicable).

(g) Attack aircraft will provide "IN" call indicating maneuvering for weapons firing solution (verbally or digitally).

(h) Attack aircraft will visually acquire target or mark.

(i) JTAC will visually acquire the attacking aircraft.

(j) JTAC will analyze attacking aircraft geometry to reduce the risk of the attack affecting friendly forces.

(k) JTAC will provide a "CLEARED HOT" or "ABORT" based on the above procedures being met (verbally or digitally).

Note: In the case where aircraft acquisition/analysis by the JTAC is difficult or not possible, attack aircraft may be forced to modify their attack profile to aid in acquisition.

*The following scenario provides a step-by-step example of how **Type 1** control is conducted.*

— JTAC visually acquires target and verifies target location. At the direction of the supported commander, the JTAC submits an immediate Joint Tactical Air Strike Request and receives two aircraft with 4 MK-82 low drag general-purpose bombs. The JTAC also coordinates with the fire support representative for integration of a target mark and SEAD.

— Attack aircraft checks in and receives the CAS briefing.

JTAC: "Dragon 31, this is Icebox 11, Type 1 in effect, advise when ready for 9-line."

Attack Aircraft: "Icebox 11, Dragon 31 ready to copy."

JTAC:

"PLYMOUTH

275 left

9.1

350

Platoon of infantry dug in

CM 367971

White Phosphorous (wp)

South 900, troops in contact

Egress east to DODGE

Advise when ready for remarks"

Attack Aircraft: "Ready to copy remarks"

JTAC: "Final attack heading 285-330. ZSU 23-4 (from the target) north 1000, continuous suppression, gun-target line 275, report IP inbound"

— Attack aircraft validates target location by cross-checking that the position is coincident with the expected target area by using all appropriate means: map plot, target designation displayed on digital map set, head-up display symbology, FLIR, radar, etc.

ATTACK Aircraft: **"**350, CM 367971, final attack heading 285-330"

JTAC: "Readback correct, TOT 50"

Attack Aircraft: "Roger, TOT 50"

— Prior to weapon release, each attack aircraft in the flight will provide JTAC with an "IN" call with direction.

Attack Aircraft: "Dragon 31 IP INBOUND"

JTAC: "Dragon 31 CONTINUE."

JTAC: "Mark is on the deck."

Attack Aircraft: "CONTACT the mark."

JTAC: "From the mark, south 100"

Attack Aircraft: "Dragon 31 "IN" from the east"

JTAC: "Dragon 31, CLEARED HOT"

Attack Aircraft: "Dragon 31 off, two away."

JTAC: "Dragon 32, from lead's hits, west 100"

Attack Aircraft: "Dragon 32 IN from the southeast."

JTAC: "Dragon 32, CLEARED HOT"

(2) **Type 2 control** is used when the JTAC requires control of individual attacks and any or all of the conditions highlighted in the following text box exist.

- JTAC is unable to visually acquire the attacking aircraft at weapons release.
- JTAC is unable to visually acquire the target.
- The attacking aircraft is unable to acquire the mark/target prior to weapons release.

Examples of when Type 2 control may be applicable are night, adverse weather, and high altitude or standoff weapons employment. Successful attacks depend on timely and accurate targeting data that may be provided by another source (e.g., scout, COLT, FIST, UAV, SOF, or other assets with accurate real time targeting information). Considerations for employing Type 2 control are emphasized below.

- When employing unguided munitions using Type 2 control, consideration must be given to host aircraft navigation/weapons system accuracy.
- Inaccurate navigation/weapon systems can result in extensive miss distances.
- Weapon time of flight will be a factor relative to movement of enemy targets and friendly forces when employing standoff weapons incapable of receiving in-flight targeting updates. Detailed planning and preparation by both the JTAC and the aircrew are required to identify situations and locations conducive to standoff weapons attacks, and to address flight profile and deconfliction (aircraft/weaponry/terrain) considerations.
- Digital or data link systems capable of displaying aircraft track, sensor point of interest, etc., significantly enhance situational awareness and the effectiveness of terminal attack control.

Type 2 control procedures are listed in the following subparagraphs:

(a) JTAC visually acquires the target or acquires targeting data from a scout, COLT, FIST, UAV, SOF or other assets with accurate real-time targeting information.

(b) JTAC will send a CAS briefing (9-line or theater standard) to attack aircraft (verbally or digitally).

(c) Attack aircraft will verify target location correlates with expected target area.

Note: Attack aircraft validates target location by cross-checking that the position is coincident with the expected target area by using all appropriate means: map plot, target designation displayed on digital map set, head-up display symbology, FLIR, radar, etc.

(d) Attack aircraft will read-back verbally or confirm digitally Line 4 (elevation), Line 6 (target location), and any restrictions provided by the JTAC.

(e) When delivering GPS/INS guided weapons, attack aircraft will confirm that the briefed target location and elevation have been accepted by the selected munition. When using aircraft system targeting, aircrew will confirm the coordinates loaded into the waypoint, offset, or target points. Aircrew will verify correct data is selected prior to the "IN" call.

(f) Aircraft will provide an "IP INBOUND" call (verbally or digitally) if requested.

(g) Attack aircraft will provide the JTAC with an "IN" call indicating maneuvering for a targeting solution (verbally or digitally). Aircrew should make this call at the appropriate time to allow clearance before entering the release window. Given the extended time-of-flight and standoff ranges of some weapons at medium and high altitudes, aircrew employing standoff precision munitions may consider making a "ONE-MINUTE" call one minute prior to the "IN" call to build JTAC situational awareness.

(h) JTAC will provide a "CLEARED HOT" or "ABORT" (verbally or digitally).

*The following scenario provides a step-by-step example of how **Type 2** terminal attack control may be used for a coordinate-dependent, weapon employment.*

— JTAC is unable to acquire the target but receives accurate targeting information from a scout. The JTAC verifies target location and coordinates the use of an aircraft—with Joint Direct Attack Munition.

— Attack lead aircraft checks in, informs the JTAC regarding his onboard capabilities, and is provided the CAS briefing.

JTAC: "Hog 11, this is A3C, Type 2 in effect, advise when ready for 9-line"

Attack Aircraft: "A3C, Hog 11 ready to copy"

JTAC:

"MAZDA

360 right

9.9

450

T-80 dug in

NB 8652342745

NONE

South 900, troops in contact

Egress east to CHEVY

Final attack heading 300-345"

— Attack aircraft validates target location by cross-checking that the position is coincident with the expected target area by using all appropriate means: map plot, target designation displayed on digital map set, head-up display symbology, FLIR, radar, etc.

Attack Aircraft: "450, NB 8652342745, final attack heading 300-345"

JTAC: "Readback Correct. Report IP inbound, TOT 45"

Attack Aircraft: "Roger, TOT 45"

— Each attack aircraft in the flight may call "ONE MINUTE" if expected to release from standoff ranges.

— Prior to weapon release, each attack aircraft provides the JTAC with an "IN" call

Attack Aircraft: "Hog 11 IP INBOUND"

JTAC: "Hog 11 CONTINUE"

Attack Aircraft: "Hog 11 ONE MINUTE"

JTAC: "Hog 11 CONTINUE"

Attack Aircraft: "Hog 11 IN from the south"

JTAC: "Hog 11, CLEARED HOT"

(3) **Type 3 control** is used when the JTAC requires the ability to provide clearance for multiple attacks within a single engagement subject to specific attack restrictions. Like Type 1 and 2, only a JTAC can provide Type 3 control. During Type 3 control, JTACs provide attacking aircraft targeting restrictions (e.g., time, geographic boundaries, final attack heading, specific target set, etc.) and then grant a "blanket" weapons release clearance ("CLEARED TO ENGAGE"). Type 3 control does not require the JTAC to visually acquire the aircraft or the target; however, all targeting data must be coordinated through the supported commander's battle staff. The JTAC will monitor radio transmissions and other available digital information to maintain control of the

engagement. The JTAC maintains abort authority. Observers may be utilized to provide targeting data and the target mark during Type 3 Control. Type 3 is a CAS terminal attack control procedure and should not be confused with TGO or air interdiction. **Type 3 control procedures** are as follows:

(a) JTAC acquires the target or acquires targeting data from a scout, COLT, FIST, UAV, SOF, or other assets with accurate real-time targeting information.

(b) JTAC will send a CAS briefing (9-line or theater standard) to attack aircraft (verbally or digitally). Briefing must include area for attacks, restrictions/limitations, and attack time window.

(c) Attack aircraft will verify target location correlates with expected target area.

Note: Attack aircraft validates target location by cross-checking that the position is coincident with the expected target area by using all appropriate means: map plot, target designation displayed on digital map set, head-up display symbology, FLIR, radar, etc.

(d) Attack aircraft will read-back verbally or confirm digitally Line 4 (elevation), Line 6 (target location), and any restrictions provided by the JTAC.

Note: When delivering GPS/INS guided weapons, attack aircraft will confirm that the briefed target location and elevation have been accepted by the selected munitions. When using aircraft system targeting, aircrew will confirm the coordinates loaded into the waypoint, offset, or target points. Aircrew will verify correct data is selected prior to the "IN" call.

(e) Once satisfied the attacking aircraft have situational awareness (SA) of the target area, the JTAC will provide attack aircraft "CLEARED TO ENGAGE" (verbally or digitally).

(f) Aircraft will provide an "IP INBOUND" call (verbally or digitally) if requested.

(g) Prior to initial weapons release, the attack aircraft will provide "COMMENCING ENGAGEMENT" to the JTAC (verbally or digitally).

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

(i) Attack aircraft will provide "ENGAGEMENT COMPLETE" to the JTAC (verbally or digitally).

Note: The JTAC maintains abort authority in all cases.

*The following scenario provides a step-by-step example of how **Type 3** control may be used.*

— The supported commander has just been informed that a reconnaissance team has spotted a company of mechanized infantry approaching 15 km to the north. A very discernible river conveniently separates friendly forces from the enemy. The commander and staff are confident in their situational awareness of friendly force disposition provided by sound battle tracking, and the commander has authorized the JTAC to determine which type of CAS control best suites the situation. A division of AV-8Bs is currently in the CAS stack and has sensors in the target area verifying the recon team's sighting. Upon consideration of all these factors, the JTAC decides to utilize Type 3 terminal attack control against the mechanized company. The following 9-line is provided:

JTAC: "Razor 11, this is A3C, Type 3 in effect, advise when ready for 9-line."

Attack Aircraft: "A3C, Razor 11, Roger, Type 3, ready to copy"

JTAC:

"MAZDA

360

9.0

450

Mechanized company in the open

NB 922556

Laser 1111

South 3000

Egress S to MAZDA, advise when ready for remarks"

Attack Aircraft: "Razor 11 ready to copy"

JTAC: "Razor 11, you're "CLEARED TO ENGAGE" from time 45-55. Execute attacks north of the river. No attack run-ins from north to south. Cobra recon team is currently 3000 S in position to lase, as required. Contact him this TAD. Report COMMENCING ENGAGEMENT and ENGAGEMENT COMPLETE with BDA."

— Note: Attack aircraft validates target location and cross-checks that the position is coincident with the expected target area by using all appropriate means: map plot, target designation displayed on digital map set, head-up display symbology, FLIR, radar, etc.

Attack Aircraft: "A3C, 450, NB 922556, execute attacks north of the river with no north to south run-ins, TOT 45-55."

JTAC: "Razor 11, readback correct."

— Attack aircraft establishes communications with Cobra recon team.

Cobra: "Razor 11, your target's estimated to be a mechanized company of BRDMs and BMPs with dismounted infantry. Your target is located on the north side of the river, 100 meters west of the large brown suspension bridge with the burning vehicle about mid-span. Report "contact" that bridge."

Attack Aircraft: "Cobra, Razor 11 is "contact" the brown suspension bridge and a large staging area just to the west along the tree line that appears to have multiple vehicles parked in rows."

Cobra: "Razor 11 that's your target; wind in the target area is light and variable, designator target line 360, final attack heading 300 to 315, laser will be on the southernmost vehicle, confirm laser code 1111."

Attack Aircraft: "Laser code 1111. "

Attack Aircraft: "A3C, this is Razor 11, COMMENCING ENGAGEMENT."

— Cobra recon team and Attack Aircraft conduct terminal guidance of laser guided weapons using standard terminology. JTAC monitors progress of the mission via radio.

— Attack Aircraft make multiple attacks within the time window while complying with other restrictions. Laser designation from Cobra recon team is provided for laser-guided weapon employment against the BRDMs and BMPs. The attacks continue until time 55.

Attack Aircraft: "A3C, ENGAGEMENT COMPLETE at time 55. Advise when ready to copy BDA."

— Aircrew passes BDA to JTAC.

(4) Because there is no requirement for the JTAC to visually acquire the target or attack aircraft in Type 2 or 3 control, JTACs may be required to coordinate CAS attacks using targeting information from an observer. An observer may be a scout, COLT, FIST, UAV, SOF, or other asset with real-time targeting information. The JTAC maintains control of the attacks, making clearance or abort calls based on the information provided by other observers or targeting sensors. The JTAC must consider the timeliness and accuracy of targeting information when relying on any form of remote targeting.

(5) JTACs will provide the type of control as part of the CAS brief. It is not unusual to have two types of control in effect at one time for different flights. For example, a JTAC may control helicopters working Type 2 control from an attack position outside the JTAC's field of view while simultaneously controlling medium or low altitude fixed-wing attacks under Type 1 or 3 control. The JTAC maintains the flexibility to change the type of terminal attack control at any time within guidelines established by the supported commander. Senior commanders may impose restrictions that will prevent subordinate commanders from choosing certain terminal attack control 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.

Note: The JTAC maintains abort authority in all cases.

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

3. Close Air Support Target Engagement

This section will provide standard procedures for CAS execution. While theaters or specific commands may have unique requirements, JTACs, CAS aircrews, and fire supporters should be familiar with the standard formats used in passing key information between CAS participants. One way to ensure this is to follow standardized procedures. This begins with CAS aircraft check-in procedures, providing situation updates, and includes following standard TTP during final attack control. There may be instances where ground-based JTACs and FAC(A)s combine their efforts in support of a maneuver force. In these instances, it is critical that ground JTAC and FAC(A) actions are complementary.

a. **Ground JTAC to FAC(A) Coordination.** The responsibilities of the ground 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 who provides final attack clearance.

b. **CAS Aircraft Check-in.** Aircraft check-in procedures are essential for establishing the required flow of information between the CAS aircrews and control agencies. Controlling agencies should update all CAS assets on the current situation en route to the area of operations. Consequently, it is important for the JTAC to brief the current situation to the DASC/ASOC allowing CAS aircraft to arrive with the most current information available.

c. **Aircraft on the ATO.** If the aircraft are on the ATO, they may simply state "AS FRAGGED", which would eliminate the need to pass anything other than the mission number and abort code. **At check-in, the aircrew establishes the abort code for terminating the attack using AKAC authentication procedures.** This eliminates unnecessary heads-down time in the target area. Authentication and abort procedures are identified in the ATO SPINS. JTACs should have current SCLs available and confirm actual ordnance loads at aircraft check-in. The CAS check-in briefing format is found in Figure V-10.

d. **Situation Update**

(1) After CAS aircrew checks in, the JTAC will provide a current situation update. This update should include:

(a) Unit mission.

(b) Enemy disposition.

(c) Threat activity in target area.

(d) Weather (if required).

(e) Friendly positions.

(f) Current FSCMs.

CLOSE AIR SUPPORT CHECK-IN BRIEFING

(Aircraft Transmits to Controller)

Aircraft: " _____ , this is _____ "
(controller call sign) *(aircraft call sign)*

1. Identification/Mission Number: _____
Note: Authentication and an appropriate response are suggested here. This brief may be abbreviated for brevity or security ("as fragged" or "with exception")

2. Number and Type of Aircraft: _____

3. Position and Altitude: _____

4. Ordnance: _____

5. Time on Station: _____

6. Abort Code: _____
(if applicable)

Figure V-10. Close Air Support Check-In Briefing

(2) A technique for an effective update is to build a logical briefing format. JTACs (when able) should pass their update to the DASC/ASOC 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, aircraft should state if they have the latest ground situation. The JTAC should provide a detailed target area situation at this time.

e. **CAS Attack Control**

(1) **CAS Briefing.** JTACs will use a standardized briefing to pass information rapidly. The CAS brief (Figure V-11), also known as the "9-Line Briefing," is the standard for use with fixed- and rotary-wing aircraft. The CAS briefing form helps aircrews in determining if they have the information required to perform the mission. The brief is used for all threat conditions and does not dictate the CAS aircraft's tactics. The mission brief follows the numbered sequence (1-9) of the CAS Briefing Form. The first 9 lines are understood, and line numbers do not need to be passed. When applicable, remarks should include those items listed in paragraph 4e(1)(j) below. Lines 4, 6, and any restrictions are mandatory read-back items (verbal or digital) for all three types of control. Additionally, the JTAC may need confirmation that the aircraft has correctly received other critical items of the brief. In these situations, the JTAC will specify the additional items to be confirmed.

CLOSE AIR SUPPORT BRIEFING FORM (9−LINE)

CLOSE AIR SUPPORT BRIEFING FORM (9−LINE)

Do not transmit line numbers. Units of measure are standard unless otherwise specified. Lines 4, 6 and any restrictions are mandatory read-back items. JTAC may request read-back of additional items as required.

"JTAC:_____, this is_____
(aircraft call sign) *(JTAC)*

Type_____Control_____"
(1,2, or 3)

1. IP/BP: "_____"
(IP/BP to target)

2. Heading: "_____Offset: L/R_____"

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

4. Target elevation: "_____" (in feet MSL)

5. Target description: "_____"

6. Target location: "_____"
(latitude/longitude or grid coordinates or offsets or visual)

7. Type mark: "_____" Code: "_____"
(WP, laser, IR) **(actual code)**

8. Location of friendlies: "_____"
(from target, cardinal directions and distance in meters)
Position marked by: "_____"

9. "Egress: _____"
(cardinal direction and/or control point)

Remarks (As appropriate): "_____"

Laser to target line: "_____(degrees)"

Time on Target (TOT): "_____"

Time-to-Target (TTT): "Stand by_____Plus_____, Hack."
(Minutes)_____(Seconds)_____

Figure V-11. Close Air Support Briefing Form (9-Line)

(a) **IP/BP.** The IP is the starting point for the run-in to the target. For rotary-wing aircraft, the BP is where attacks on the target are commenced.

(b) **Heading and Offset.** The heading is given in degrees magnetic from the IP to the target or from the center of the BP to the target. JTACs give an offset (offset left/right) if a restriction exists. The offset is the side of the IP-to-target line on which aircrews can maneuver for the attack.

(c) **Distance.** The distance is given from the IP/BP to the target. For fixed-wing aircraft, the distance is given in nm and should be accurate to a tenth of a nm. For attack helicopters, the distance is given in meters from the center of the BP and is accurate to the nearest 5 meters. The unit of length must be specified.

(d) **Target Elevation.** The target elevation is given in feet above MSL.

(e) **Target Description.** The target description should be specific enough for the aircrew to recognize the target. The target should be described accurately and concisely.

(f) **Target Location.** The JTAC can give the target location in several ways (e.g., grid coordinates, latitude and longitude, relative to a navigational aid, or visual description from a conspicuous reference point). Because of the multiple coordinate systems available for use, the datum that will be used must always be specified in the JTAR. If using grid coordinates, JTACs must include the 100,000-meter grid identification. For an area target, give the location of the target's center or location of the greatest concentration. For a linear target, give the location of intended end impact point, orientation, and the distance to each end in the remarks section of the 9-line brief if required.

(g) **Mark Type.** The type of mark the JTAC will use (smoke, laser, or IR). If using a laser, the JTAC will also pass the code he will use.

(h) **Friendlies.** The distance of friendlies from the target is given in meters and is a cardinal heading from the target (north, south, east, or west). If the friendly position is marked, identify the type of mark. **Caution —** Friendly positions should not be defined by anything other than bearing and range from the target.

(i) **Egress.** These are the instructions the aircrews use to exit the target area. Egress instructions can be given as a cardinal direction or by using control points. The word "egress" is used before delivering the egress instructions.

(j) **Remarks.** The following information should be included if applicable:

1. Laser-to-target line (in degrees magnetic).

2. Ordnance delivery.

3. Threat, location and type of suppression (if any).

4. Any active GTLs.

5. Final attack heading (final attack headings).

6. Hazards to aviation.

7. ACAs.

8. Weather.

9. Restrictions (if any, should be brief and concise).

10. Additional target information.

11. Night vision capability.

12. Danger close (if applicable and with commander's initials).

13. Other time considerations.

(k) **TOT/TTT.** The JTAC gives aircrew a TOT or TTT.

1. **TOT.** TOT is the synchronized clock time when ordnance is expected to hit the target. TOT is the timing standard for CAS missions. There is no time "Hack" statement when using TOT.

2. **TTT.** TTT is the time in minutes and seconds, after the time "Hack" statement is delivered, when ordnance is expected to hit the target. The time "Hack" statement indicates the moment when all participants start the timing countdown.

(2) **Mission Brief Accuracy.** Ideally, the controlling agency (e.g., ASOC, DASC, TACC, TAC[A]), briefs the aircrew before contact with the JTAC using the information from the JTAR, Section 1, Block 8 (see Appendix B, "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.

(a) **Clearance to Drop/Fire.** Once the clearance requirements for a particular type of control are met, it is important to pass clearance in a timely manner to give aircrews time to prosecute the attack before release parameters have expired. A wide variety of ordnance is available and suitable for CAS missions. Mixed weapons loads on aircraft or between flight members will require the flight lead and the JTAC to coordinate different delivery patterns. When employing standoff munitions or delivery methods, the JTAC must provide a timely clearance appropriate for the weapon being delivered. For example, medium-altitude level attacks can result in weapon releases at more than 4 miles from the target.

(b) **Re-attacks.** Re-attacks allow CAS aircraft to quickly reposition to attack the same target, and while maneuvering, maintain compliance with any restrictions in force. A re-attack may be requested if additional weapons effects are required on the target. In a low/very low altitude environment, aircraft may be unable to make multiple passes due to enemy defenses.

The JTAC issues clearance for immediate re-attack and must be aware of any threats to the aircraft. As was required in the initial attack, clearance to drop/fire on a re-attack must be issued by the JTAC before ordnance release. Corrections and new restrictions can be given to the aircrew during maneuvering. If ordnance adjustments are required, they must be given in a timely manner. Corrections are given in cardinal direction and distance in meters from the previous bomb impact point. In the following example a correction is being given to the second attacking aircraft in the flight based on lead aircraft's impacts (e.g., "Razor 02, from lead's hits, north 100").

(c) **Abort Procedures.** The JTAC should direct CAS aircrews to abort if they are not aligned with the correct target, and must abort them if it appears that friendly troops may be endangered, or for the safety of the CAS aircrew. The CAS abort procedure uses the "challenge-reply" method to authenticate the abort command. During the CAS check-in briefing, the flight lead gives the JTAC a challenge code for use with his flight only. The JTAC refers to his authentication document, finds the reply, and notes but does not transmit it. The reply "letter" becomes that flight's abort code. If no abort code was briefed, then the CAS attack is aborted by simply transmitting, "ABORT, ABORT, ABORT" (see Figure V-12).

(3) **Brevity.** A brevity code is a single word or phrase that does not provide security but shortens the message rather than concealing its content. Using brevity eases coordination and improves understanding in tactical communications since brevity codes have only one meaning. In periods of communications jamming, brevity is required to "get the message across" since transmissions must be minimized. CAS players should always use brevity for clearer and more concise communications. See Figure V-13 for a list of CAS related brevity codes or FM 3-97.18, MCRP 3-25B, NWP 6-02.1, AFTTP 3-2.5 *Multi-Service Air-Air, Air-Surface, Surface-Air Brevity Codes* for a complete list of all multi-Service brevity codes.

f. **Battle Damage Assessment**

(1) BDA is used to update the enemy order of battle. Accurate BDA is critical for determining if a target should be re-attacked. In a high-threat environment, BDA may be

ABORT CALL ILLUSTRATION

(The FAC is "NAIL 11"; the 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 FAC calls for an abort) "SPIKE 41, NAIL 11, ABORT DELTA, ABORT DELTA, ABORT DELTA."	SPIKE 41 aborts the pass.

Figure V-12. Abort Call Illustration

JOINT TERMINAL ATTACK CONTROLLER'S CALLS

CALL	MEANING
ABORT (abort code)	Abort the pass. Do not release ordnance.
CLEARED HOT	You are cleared to release ordnance on this pass.
CONTINUE	Cleared to proceed with the attack, but you may not release any ordnance yet. Used to acknowledge aircraft without providing clearance.
CLEARED TO ENGAGE	Type 3 control clearance. Attack Aircraft Flight Leaders may initiate attacks within the parameters imposed by the JTAC. Attack platform will provide "attack complete" to the JTAC.

WARNING
The word "CLEARED" will only be used when ordnance is actually to be delivered. This will minimize the chances of dropping ordnance on dry passes further reducing the risk of fratricide. Non-standard calls must be avoided at all times.

Figure V-13. Joint Terminal Attack Controller's Calls

difficult to judge. BDA at the operational level must be based on objectivity, not guesswork. There is no simple answer as to who is in the best position to determine BDA. Aircraft and JTACs have different capabilities based on experience, weather, terrain, weapons employment techniques, and enemy actions when assessing BDA. BDA is crucial in determining mission effectiveness, enemy disposition, and re-attack requirements. BDA will be difficult to ascertain in a high threat environment, but the difficulty can be mitigated by integration of JIPB early in the deliberate planning process. This assists in developing an appropriate mix of ISR assets that maximizes collection and exploitation potential. Determination of who reports or collects BDA within a given scenario is based upon the objective, capabilities, experience, weather, terrain, employment techniques, and enemy actions. The BDA should be sent using joint Service formats. At a minimum this information should include:

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

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

(c) Location — Where was the target you attacked or observed.

(d) Time — What time did you attack the target or when did you observe the target.

(e) Your Actions — Munitions expended, observed damage (number of tanks destroyed), mission number, and mission accomplished.

(2) **JTAC Responsibilities.** Whenever possible, the JTAC provides attack flights with the BDA of their attack as they egress. The JTAC gives BDA for the flight, not for individual

aircraft in the flight. The JTAC should not assume the target is completely destroyed since the enemy may employ deception. TACP personnel must use their judgment and be precise ("if you do not see it, do not report it") in reporting BDA. BDA must be passed to intelligence and controlling agencies as soon as possible. If conditions preclude briefing complete BDA, at a minimum pass "SUCCESSFUL" or "UNSUCCESSFUL" to the aircraft and the controlling agency. Additionally, the JTAC should provide all available BDA information to the DASC/ASOC and TOC, or appropriate C2 agency. 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), and whether the mission was successful.

(3) **Aircrew Responsibilities.** Use the abbreviated US message text format (USMTF) inflight report (INFLTREP) (Figure V-14) to report CAS mission results. The INFLTREP can be used to report other tactical information of such importance and urgency that if the aircrew were to wait for a normal post-flight debriefing the information might no longer be useful. This might include the presence of SAMs, AAA, or radar warning receiver indications or numbers of remaining targets. Send the INFLTREP directly to any TAGS/MACCS agency, the supported unit, or via any available relay. Message recipients may add additional information and forward via another INFLTREP. INFLTREP information is incorporated in all-source intelligence reports. Use the standard USMTF MISREP format to report mission results after return to base.

INFLIGHT REPORT

INFLIGHT REPORT (INFLTREP)

Aircrew transmits:

"_____, this is_____,INFLTREP, over."
(addressee) *(aircrew call sign)*

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

"This is_____, INFLTREP."

Line One/Call Sign_____

Line Two/Mission Number_____

Line Three/Location_____
(latitude/longitude, UTM grid, place name)

Line Four/Time-on-Target_____

Line Five/Results_____

Remarks_____
(Target area weather, significant sightings, essential elements of information)

Figure V-14. Inflight Report

4. Close Air Support Aircraft Tactics

This section identifies some basic JTTP used by aircrews to conduct CAS. Standardized procedures and tactics provide a baseline for further refinement and improvement. This section describes basic fixed- and rotary-wing CAS aircraft tactics. Tactics are ever changing and must be adapted to the specific situation. JTACs must be familiar with these as well as advanced CAS tactics. Aircrew will ultimately decide aircraft tactics but must ensure the tactics used fall within any constraints issued by the JTAC.

a. **Fixed-Wing Tactics**

(1) **Medium/High Altitude Tactics.** Medium/High altitude tactics are flown above approximately 8,000 above ground level (AGL) feet. **High altitude bombing** can be described as "**bombing with the height of release over 15,000 feet AGL**." These tactics are employed when slant range and altitude can be used to negate the adverse effects of the local threat systems. For visual deliveries, the local weather conditions must include sufficient visibility and ceilings for the desired/required weapons deliveries to be employed. Terrain must also be considered when selecting employment altitudes. More time may be available for target acquisition, but bombing accuracy with unguided munitions may be degraded.

(a) **Advantages of medium/high altitude tactics include:**

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

2. Lower fuel consumption and increased time on station.

3. Reduced navigation difficulties.

4. Improved formation control.

5. Improved mutual support.

6. Allows considerable maneuver airspace and allows aircrews to concentrate on mission tasks instead of terrain avoidance tasks.

7. Communications between aircrews and control agencies are less affected by terrain.

8. Reduces exposure to AAA and man-portable IR SAMs.

9. The ability to roll-in from any axis requested by the JTAC.

10. Easier timing of TOT.

(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 GPS-guided weapons).

4. May make it difficult for the JTAC to visually acquire the aircraft.

5. Visual target acquisition can be more difficult from higher altitudes and slant ranges.

(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 may route CAS aircraft to the target area via IPs, geographic references, dead reckoning (time, distance, and heading) or a combination of these techniques. JTACs should use caution to not send friendly aircraft into uncoordinated adjacent unit airspace or known areas of concentrated enemy air defense. Multiple attack flights can be deconflicted using vertical and horizontal separation.

(d) **CAS Aircraft Observation and Holding Patterns.** When possible, CAS aircraft should be given enough airspace to hold in an area of relatively low AAA activity that provides a good position to observe the target area. JTACs should not restrict attack aircraft to specific observation or holding patterns but should specify the observation or holding area that will best accomplish the mission. Considerations for observation or holding area and altitude selection include: artillery GTLs, 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 hard, 180 degree turns on each end.

2. **Figure Eight:** The same as the racetrack pattern except the turns at each end of the pattern are made toward the target area and are 230 degrees of turn instead of 180 degrees.

3. **Wheel:** Circle around the designated target. Ideal for non-linear battlefields with “pockets” of enemy activity.

(e) **Attack. Types of Delivery:**

1. **Dive Deliveries:** Used for both free fall and forward firing ordnance, these dive deliveries typically use dive angles of 20 to 60 degrees. Most modern fighter aircraft delivery systems incorporate some type of continuously computed impact point (CCIP) display. CCIP allows the aircrew to accurately deliver ordnance without having to fly predictable wings level passes.

2. **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.

(2) **Low/Very Low Altitude Tactics.** Low/very low altitude tactics are flown below approximately 8,000 feet AGL. **Low altitude bombing** can be described as "**horizontal bombing with the height of release between 900 and 8,000 feet**." Very low can be described as a height below 500 feet. These tactics are employed when threat system capabilities and/or weather conditions 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.

(b) **Disadvantages of low/very low altitude tactics include:**

1. Navigation is demanding and requires a high level of aircrew skill (Navigation is easier for aircraft equipped with INS or GPS).

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 limited to the attack.

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 more critical than in higher altitude tactics.

7. Exposes aircraft and aircrew to small arms, man-portable air defense system (MANPADS) and AAA.

(c) **Ingress:** Aircrews and mission planners may employ support aircraft and other countermeasures to degrade threat system effectiveness. Aircrews, JTACs, 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. Helicopter aircrews using terrain flight techniques must remain close to the terrain. This becomes critical when fixed-wing aircrews traverse vertically-developed terrain. 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 and aircrews tailor communications and control requirements to counter the threat.** Normally, control of CAS flights is handed over to the JTAC at the CP. In a limited communications environment, scheduled missions may be the primary method used to limit the required communications. Proper planning increases the chances for mission success even if there is little or very difficult radio communications after the flight becomes airborne.

(d) **Attack.** During low/very low altitude attacks, many of the same considerations apply as in high/medium altitude attacks. However, aircrews will have less time to acquire the target and position their aircraft for a successful attack. When planning ordnance and attack profiles, consider the requirement for fragmentation pattern avoidance in the low altitude environment. The final run-in from the IP to the target is the most crucial phase of the CAS mission. Aircrew tasks intensify as the aircrew must follow a precise timing and attack profile. The terrain dictates the type of formation flown by the attack element. Figure V-15 illustrates the attack phase of a typical fixed-wing CAS mission. A level delivery attack is a common method for fixed-wing CAS attack aircraft to engage targets in the low altitude environment.

(e) **Types of Delivery:**

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

2. **Loft.** To execute a loft delivery, the aircrew proceeds inbound to the target from the IP. At a calculated point, the aircrew starts a loft maneuver pull up. Once released, the weapon continues an upward trajectory while the aircrew 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 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.

(f) **Coordinated Attacks.** The JTAC must approve use of coordinated attacks. Coordinated attacks include multiple aircraft using timing splits over the target, multiple sections using a combination of timing and heading splits, multiple flights using dissimilar aircraft in coordinated laser designator/bomber attacks. Coordinating flights for attacking

FIXED-WING CLOSE AIR SUPPORT ATTACK PHASE EXAMPLE

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 contact point (CP) 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.**
   d. **Distance/time to pull-up point (from TP or IP, whichever preferred).**
   e. **Pull-up angle (as applicable).**
   f. **Apex/roll-in altitude (as applicable).**
   g. **Release altitude (based on threat, friendly fires, and ordnance).**
3. **Joint terminal attack controller provides:**
   a. **Mark on target 30-45 seconds before time on target/time to target.**
   b. **Final corrections/directions, given concisely in cardinal direction and distance from the mark, to help the aircrew to find the target.**
   c. **Clearance to deliver ordnance.**

Figure V-15. Fixed-Wing Close Air Support Attack Phase Example

the same target/target area can add firepower to the attack and help to split target defenses. An on-scene commander (OSC) is appointed for coordinated attacks. The OSC is usually the flight lead with the highest SA of the target area. He will coordinate all attacks with the JTAC. While the OSC directs deconfliction between flights, the JTAC is still the "owner" of the target area. While the JTAC 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). Figure V-15 shows the relationship between attacks and attack timing.

(g) **Type of Attack** (Figure V-16). The type of attack is principally based solely on the avenue to the target, and does not apply to the target itself. Example: "Combined/Sequential/Visual" means the avenue to the target is shared airspace; timing on target is sequential, with the trailing flight taking visual spacing on the lead flight's last attacker. "Sectored/Sequential/1 Minute" means the avenue to the target is sectored (using an acknowledged sector), and

COORDINATED ATTACK TYPES			
Type of Attack	**Simultaneous**	**Sequential**	**Random**
COMBINED Same avenue of attack	Visual or Hack (Visual spacing or time hack separation)	Visual or Hack (Visual spacing or time hack separation)	NOT NORMALLY USED
SECTORED Acknowledged sector	Visual or Hack (Visual spacing or time hack separation)	Visual or Hack (Visual spacing or time hack separation)	Free Flow *
* Must ensure strafe fan / bomb and missile frag deconfliction			

Figure V-16. Coordinated Attack Types

timing on target is sequential with the trailing flight taking one minute spacing from the lead flight's TOT.

(h) **The following procedural guidelines are considered standard:**

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

2. The JTAC must approve re-attacks after coordination with the ground force commander.

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

4. JTAC and aircrew must coordinate munitions that may enter the other flight's sector before the attack.

(i) **Attack Heading.** An attack heading is the assigned magnetic compass heading that an aircrew flies during the ordnance delivery phase of the attack. JTACs assign attack headings for several reasons: to increase ground troop safety, aid in target acquisition, and help fire support coordination. Attack headings, especially during visual attacks, may reduce the flexibility and survivability of aircraft.

(j) **Immediate Re-attacks.** The aircrew's goal is to complete a successful attack on the first pass. Once acquired in the target area, an aircraft that remains for re-attacks may be more vulnerable to enemy fire. A re-attack can help assure the desired result, aid visual orientation for the aircrew, and increase responsiveness to the supported commander. JTACs authorize re-attacks. If a re-attack is necessary and possible, the JTAC may give the aircrew a pull off direction and may assign different attack headings. The JTAC may provide additional

target marks for the re-attack and can describe the target location using the last mark, last hit, terrain features, or friendly positions. The re-attack may engage other targets within a specific target area.

(k) **Egress.** While operating in a low/very low 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 re-attack, return to a CP for further tasking, or return to base.

(l) **Combination Low/Very Low, Medium, and High Altitude.** Aircrews can **combine low/very low and medium altitude tactics** to gain the advantages of both while reducing the disadvantages of each. The en route portion of the flight is normally beyond the range of enemy air defense weapons and flown at a **medium or high altitude**. The attack force descends to low/very low altitude to avoid detection by certain enemy SAM threats and/or gain surprise.

b. **Rotary-Wing.** It is understood that US Army attack helicopter units support maneuver commanders as a subordinate maneuver unit. They are given mission type orders and execute these orders as a unit. With this in mind, this section identifies some of the TTP attack helicopter aircrews can use to perform CAS.

(1) **Launch and departure procedures.** The appropriate controlling agency issues launch orders through the proper C2 or fire support agency. Attack helicopters can be launched and moved to HAs, forward assembly areas, forward arming and refueling points, or directly into an attack or support by fire position depending on mission or current situation.

(2) **En Route Tactics**

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

(b) **Navigation.** En route navigation tactics depend on the threat, need for and availability of support aircraft, friendly air defense requirements, weather, and fuel. As aircrews approach the target area or probable point of enemy contact, they fly lower and with increased caution to 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 a weaving or unpredictable path to avoid detection by the enemy. En route terrain flight profiles fall into three categories: low level, contour, and nap-of-the-earth (NOE).

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

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.

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. NOE flight should be used in high threat environments.

(c) **Ingress Tactics.** Ingress tactics apply from arrival at the release point or HA until the target attack phase begins at the BP.

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

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

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

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

2. **Techniques of Movement.** Due to proximity to the threat, aircrews use terrain flight to move during ingress to the BP. If aircrews are close to friendly artillery and mortars, they use terrain flight in conjunction with ACMs to deconflict with artillery and mortar trajectories. Particularly when conducting terrain flight, helicopter movement must be coordinated with the applicable FSCC/FSE. Aircrews use three techniques of movement: traveling, traveling overwatch, and bounding overwatch (see Figure V-17).

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

b. **Traveling Overwatch.** Traveling overwatch is a technique that aircrews use when enemy contact is possible. The flight moves using contour or NOE terrain flight. While caution is justified, speed is desirable. The flight consists of two major elements: the main element and the overwatch element. The overwatch element may contain multiple sub-elements. The main element maintains continuous forward movement. The overwatch elements move to provide visual and weapons coverage of the main element. The overwatch elements provide weapons coverage of terrain from which the enemy might fire on the main element.

c. **Bounding Overwatch.** Bounding overwatch is a technique that aircrews use when enemy contact is imminent. The flight moves using NOE terrain flight. Movement is deliberate and speed is not essential. The flight consists of two elements. One element moves or "bounds" while the other element takes up an overwatch position. The overwatch

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 V-17. Movement Techniques

element covers the bounding elements from covered, concealed positions that offer observation and fields of fire.

3. **Communications and Control.** An attack helicopter's inherent flexibility allows a variety of communication and control procedures. Terrain flight and techniques of movement may restrict the JTAC'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 before leaving the HA. An airborne relay may be used to maintain communications.

(d) **Attack Phase (Within the BP).** The attack phase is the most important phase of the attack helicopter mission. The attack must produce the necessary result. Figure V-18 illustrates an example of rotary-wing tactics during CAS attacks.

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

2. **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.

a. **Hovering Fire. Hovering fire is performed when the aircraft is stationary or has little forward motion.** Aircrews perform hovering fire after unmasking from a defilade position. To prevent being targeted by enemy weapons, aircrews maintain the hovering fire

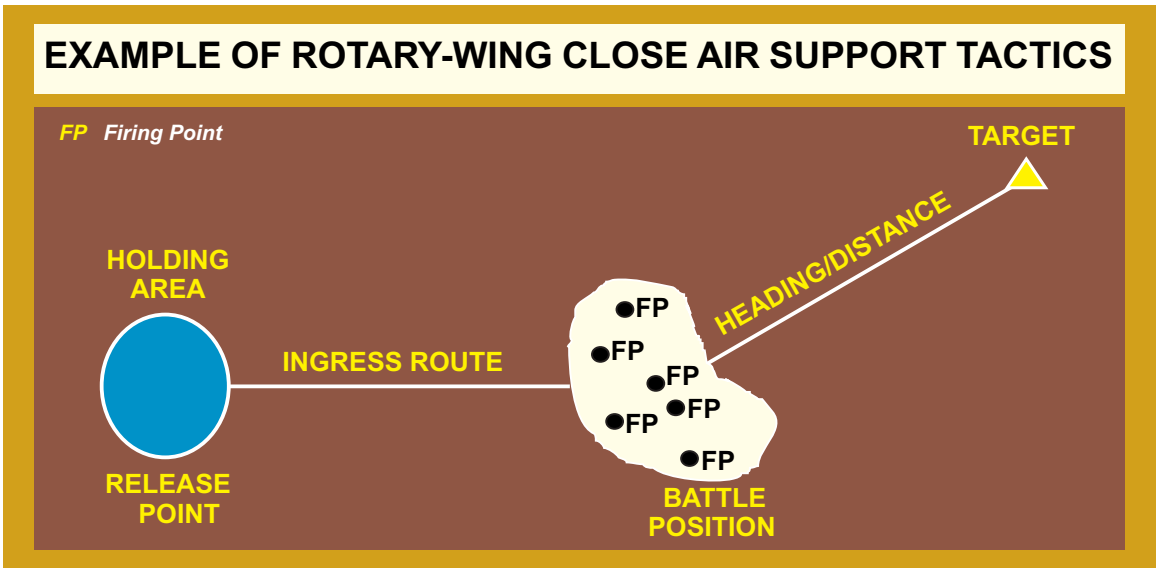

Figure V-18. Example of Rotary-Wing Close Air Support Tactics

position only for **short periods,** and deliver indirect hovering fire from **FPs hidden from the enemy** by terrain features. After delivering hovering fire, aircrews **remask behind terrain**. If terrain permits, aircrews should move to an alternate FP. Hovering fire may reduce the accuracy of unguided ordnance (rockets, cannon, or 20/30 mm gun fire) because the aircraft can be less stable in a hover. **Precision-guided weapons are the most effective ordnance** fired from a hover.

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

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

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

1. **Scout Element.** The scout element contains one or more helicopters. Multiple helicopters are preferred, to provide mutual support within the scout element. The air mission commander is normally a member of the scout element. He is responsible for mission planning and execution. The air mission commander's duties include:

a. Providing liaison and coordination between the team and the supported unit to receive the current situation and mission brief.

b. Providing reconnaissance of the HA and BP if time and threat permit.

c. Briefing the attack element.

d. Planning and coordinating target marking/designation.

e. Providing security for the attack element from ground and air threats.

f. Controlling the mission's supporting arms.

2. **Attack Element.** The attack element contains a minimum of two attack helicopters. The attack element is subordinate to the mission commander. The attack element leader's duties include:

a. Assuming all the duties of the mission commander if required.

b. Attacking specified targets with the proper ordnance.

c. Providing a rapid reaction base of fire.

(3) **Disengagement and Egress. Following the attack, the flight disengages and egresses from the BP.** Egress instructions may be as detailed as ingress instructions. **Egress fire support coordination and deconfliction requirements are the** same as those used during ingress. Upon mission completion, the flight can **proceed to an alternate BP, return to the HA** for further operations, **return to the FARP** for refueling/rearming, or **return to the FOB/ship.**

5. Limited Visibility/Adverse Weather Considerations

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, AOs/ALOs, ground units, and aircrews **must routinely train together during these conditions**. In addition to training, limited visibility CAS relies heavily on systems and sensors due to pilot's limited ability to visually ascertain friendly positions and targets. Aircraft and JTACs 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. 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.**

a. **Visual Employment. During night visual employment, JTACs and aircrews must contend with lower ambient light conditions, and use battlefield fires, or artificial illumination to successfully attack targets.** Threat permitting, the JTAC's requirement to see the CAS aircraft may require use of aircraft lights or flares.

(1) **Visual Employment Mission Planning**

(a) **Weather and Reduced Visibility.** Target weather can affect illumination. If the weather is clear and a bright moon is available, additional artificial illumination may not be necessary. Smoke, haze, and precipitation in the target area may cause reduced visibility and force the aircraft to maneuver closer to the threat in order to maintain visual contact with the target. Flying closer to the threat presents an obvious problem. On the other hand, flares employed under an overcast sky will highlight the aircraft for enemy defenses. Heavy haze will cause a "milk bowl" effect that severely limits slant-range visibility and may cause spatial disorientation. Avoid allowing such conditions to drive the aircraft 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.

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

(c) **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.

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

1. Distinguish the need to attack general versus desired mean point of impact.

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

3. Contrast between targets and their background.

4. Lighted versus unlighted targets.

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

6. Theater restrictions.

(e) **Artificial Illumination.** Flare employment is essential for low-illumination night operations without NVDs. If at all possible, do not illuminate friendly positions. Any illumination introduced into the battle area must be coordinated with the ground commander prior to flare release.

1. **Ground-Delivered Flares.** Artillery or mortar flares are not as bright as LUU-2 flares and will not burn as long. The Joint Application of Firepower pamphlet contains the artillery/illumination call-for-fire format.

2. **LUU-2 Flares.** LUU-2 overt illumination flares are designed to illuminate while airborne for approximately 5 minutes.

3. **LUU-19** is a covert illumination flare designed to illuminate while airborne for approximately 5 minutes.

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

5. **Illumination Rockets.** M-257s are overt 2.75-inch rockets that provide an excellent point-and-shoot capability for target illumination. M-257 intensity is approximately one-third the intensity of an LUU-2 and will burn for approximately 2 minutes.

(f) **Marks.** WP rockets/shells are widely used marking devices. The WP detonation is an obvious flash with a 1- to 5-second afterglow. The WP bloom will cast a visible shadow

with good moon-like illumination. Flares, explosive ordnance, burning targets, enemy muzzle flashes, tracers, and various marking rounds can be employed to provide target identification.

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

b. **System-aided Employment.** Aircraft systems (radar, LASER, FLIR, and television) are relied upon more at night and in adverse weather because of degraded visual target acquisition range and recognition cues. Aircrews and JTACs should incorporate redundant methods (e.g., radar, LASER, and FLIR) into an attack, along with a target mark to find and attack a target. Night laser employment techniques are the same as in the daytime. Avoid the temptation to rely solely on one information source.

c. **NVD Employment.** NVDs are an additional sensor for aircrews to use together with other systems to find and attack targets. Maneuver forces and aircrews must ensure there is no confusion between conventional and NVD terms. JTACs must be equipped with IR marking devices to fully integrate with supported maneuver forces and exploit the potential of NVDs.

(1) **NVD Mission Preparation**

(a) **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.

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

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

(d) **Artillery.** Artillery marking round effects are enhanced with NVDs. The high explosive/WP round is obvious upon detonation and will be visible for 1 to 2 minutes. Burning embers may be seen up to 10 minutes after impact. Artillery flares that provide bright visible light are not normally used for NVD operations because they are not covert. The 155mm smoke round provides smoke and burning embers that can be seen for several miles.

(e) **WP Rockets.** They produce a brilliant flash lasting 1 to 5 seconds. The radiated heat from the rocket usually can be seen for 1 to 5 minutes after impact, depending on the terrain.

(f) **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.

(2) **NVD Mission Execution**

(a) **Aircraft Ordnance.** In general, all free-fall munitions (e.g., MK 82, MK 84, and CBU) 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 visible 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.

(b) **Ground Unit IR Marking Devices.** Ground marking devices include the LPL-30, ground commander's pointer (GCP), air commander's pointer (ACP), and IR zoom laser illuminator/designator. Effective range of these 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. When working with IR pointers, try to minimize the target designation time. This will minimize the chance of the friendly position being compromised, especially if the enemy is night vision capable. The ACP is a smaller variant of the GCP that can be carried by an aircrew and used to mark ground targets from the air.

(c) **Airborne IR Marking Devices.** Airborne marking devices include the Litening II targeting pod and the hand held devices. Effective range will vary depending on their power and the amount of illumination and environmental conditions present, but usually these two devices function extremely well in good conditions from medium altitude. They may be set to flash or maintain a steady beam. High-illumination levels will decrease the effectiveness of IR marks but will not negate them completely. These devices may be used to increase FAC and aircrew SA by marking the target prior to ingress and may be used as a primary or secondary mark. Aircraft equipped with these devices must coordinate with the FAC prior to their use.

(d) **IR Pointer Terminology.** When working with IR pointers, use brevity terms. Pilots and JTACs must be familiar with these terms to avoid confusion (see Figure V-19).

(3) **Friendly Marking. Ground forces can illuminate their position with IR devices or other friendly tagging devices.** IR lights should be placed where aircrew overhead can visually acquire and maintain sight of friendly positions. During low illumination conditions, the entire IR beam will be seen with NVDs. The shape of the IR beam can be used to identify the JTAC's and the target's position. The IR beam will appear narrow or pencil-like at the JTAC's position, while the beam will be mushroomed at the target. **IR pointers can also be used to direct the NVD-equipped aircrew to the JTAC's position**, either by walking the beam out to the aircraft (if the aircraft has an NVD external lights package) or by wiggling the IR pointer to designate to the aircrew the JTAC's position (the nonmoving end of the

pointer). Again, it is necessary for the JTAC to ensure that the aircraft uses system aids to ensure that friendlies are not confused with enemy locations due to disorientation. Planning an attack axis (preplanned or as directed by the JTAC) with only a small offset from the controller's pointer-to-target line can also help the aircrew confirm the controller's position.

(a) **IR Marking Devices.**

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

2. **IR Pointers.** Used alone or in conjunction with other IR marking devices, IR pointers are very effective for identifying both friendly and enemy positions. 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. By having the ground party "rope" the aircraft's position or a general direction from them, their position is easily identified, assuming the aircraft is close enough and there are not too many light sources in the area. For example, if the aircraft is egressing from the south and calls "ROPE SOUTH," the ground party should then point their IR pointer south and move it in a circular motion. Enemy NVD capabilities should be considered before using IR pointers.

3. **Gated Laser Intensifier for Narrow Television (GLINT) Tape.** Ground forces with GLINT tape may be seen by the AC-130 low-light level television, depending on the amount of environmental or artificial illumination in the area. Identification of friendly forces by this manner should be verified by other means to avoid misidentification. Do not use more than a 1/2-inch square for an individual or four 1-inch squares per vehicle.

(b) **Clearance Parameters. Aircrews conducting night/limited visibility CAS must be in positive communication with ground forces.** When laser target designators (LTDs) are employed, ground forces must hear "SPOT," meaning the aircraft has acquired laser energy. **"SPOT" does not constitute clearance**. When IR pointers are employed, ground forces must further hear "VISUAL" (meaning JTAC's position is positively identified) and "TALLY" (meaning the aircraft has positive target identification). Always ensure aircraft are using target coordinates and systems aids such as INS steering to prevent confusion of friendly and target locations. This is in conjunction with standard LASER safety cones.

(c) **CAS Briefing Form.** When using IR target pointer/illuminators, indicate the **target mark type in line 7 of the CAS Briefing Form** with "**IR**" or "**IR pointer**." Additionally, include the pointer-to-target line in the remarks section of the CAS briefing form (see Figure V-19).

NIGHT INFRARED CLOSE AIR SUPPORT BREVITY TERMS

CALL	MEANING
SPARKLE	Joint terminal attack controller (JTAC) marks the target with an infrared (IR) pointer. Can be initiated by JTAC or aircrew. Proper aircrew response is "Contact" or "No Joy."
SNAKE	Call made by exception for the JTAC to jiggle the IR beam on the target. This aids in distinguishing the friendly position from the target, verifies that the aircrew are looking at the proper IR pointer and can aid in the acquisition of the IR energy. Proper aircrew response is "Contact," "Steady," or "No Joy."
PULSE	JTAC uses pulse mode available on some IR pointers. Can be initiated by JTAC or aircrew. May be used by JTAC to emphasize that an enemy position is being illuminated by flashing IR energy, which is often used to identify friendly positions. Proper aircrew response is "Contact", "Steady", or "No Joy".
STEADY	JTAC steadies the beam after a "Snake" or "Pulse" call. This can aid in verifying that the aircrew is looking at the proper IR pointer.
STOP	JTAC stops the beam. This can aid in verifying that the aircrew is looking at the proper IR pointer, especially if followed with another "Sparkle" call.
ROPE	Call made by exception if the JTAC is to illuminate the aircraft with an IR pointer. Can be initiated by either JTAC or aircrew. If requested by JTAC, must be approved by aircrew prior to illumination. Proper aircrew response is "Visual" or "Blind".

Figure V-19. Night Infrared Close Air Support Brevity Terms

(d) **Friendly Tagging Devices.** Units equipped with tagging devices can use their capability to relay 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 this information to help confirm or update friendly locations.

6. Terrain Considerations

Terrain must be taken into consideration for CAS execution. Specifically, terrain can effect communications and visual LOS for identifying the target and/or aircraft. Specific considerations exist for desert, jungle/forested and urban terrain.

a. **Desert**

(1) **Ground Considerations**

(a) **Target Identification.** In the absence of timely or accurate battlefield tracking information, the ability to detect potential targets beyond the range where positive identification is possible could lead to fratricide. 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) **Communications.** Non-LOS communications will be adversely affected by non-conductive soil. Repeaters and relay stations may be necessary. Generally VHF/UHF communications will be adequate.

(2) **Aircraft Considerations**

(a) **Target Identification.** In a desert environment, target identification by aircrews may be hampered by enemy capability to cover and conceal potential targets. Camouflage netting and revetments can be very effective if properly employed.

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

(c) **Lack of geographic references.** In flat desert terrain, lack of visual references will make target talk-on techniques more difficult in the absence of target marking aids. In flat desert terrain, IP and CP selection will be impacted by the difficulty selecting points that will be visible from the air.

b. **Jungle/Forested**

(1) **Ground Considerations**

(a) **Target detection/identification.** May be difficult or impossible under dense jungle canopies for both the JTAC and aircraft. In these cases every effort must be made to mark the target by any effective means. Colored smoke or WP rounds may be effective. In thick forest or double and triple canopy jungles smoke tends to disperse as it rises creating an ambiguous mark. FAC(A) aircraft that can remain on station may aid the targeting process due to their increased SA.

(b) **Communications.** Communications will suffer in dense jungles and forests due to limited LOS. Airborne assets should be considered to relay communications.

(c) **Weapons Effects.** Weapons fragmentation and blast effects may be reduced as wooded areas become more dense. Incendiary and sensor-fuzed weapons generally have good effect.

(2) **Aircraft Considerations**

(a) **Communications.** Communications will suffer between the JTAC and aircraft in dense jungles and forests due to limited LOS. Communications may improve at reduced ranges.

(b) **Target Identification.** Target detection and acquisition will be difficult in the forest or jungle. Vehicles will tend to remain near paths or roads that may be visible from the air.

c. **Urban CAS.** Urban operations can be planned and conducted across the range of military missions. They may be conducted on or against objectives in a topographical complex and its adjacent natural terrain where manmade construction and the presence of noncombatants are dominant features. The compressed battlespace in the urban environment creates unique considerations for planning and conducting CAS operations. These include operations in urban canyons, deconfliction in confined airspace, restrictive ROE, difficulty in threat analysis, the presence of noncombatants, the potential for collateral damage, and the increased risk of fratricide.

(1) **Size of Urban Areas.** Population is the most common method of classifying the size of urban areas. The following categories apply:

(a) **Strip Areas** (linear development along roadways, railways, etc.).

(b) **Villages** (population less than 3,000).

(c) **Towns and Small Cities** (population 3,000 to 100,000).

(d) **Large Cities** (population greater than 100,000).

(2) **Threats.** Urban terrain provides excellent cover and concealment for a variety of weapons systems. The urban environment also affects the employment of antiaircraft weapons, including AAA, MANPADS, and SAM systems. Light to medium AAA may be employed from ground sites, from the tops of buildings, or weapons mounted on civilian vehicles. The terrain may limit suppression options. The cluttered environment with lights, fires, and smoke will make threat and target acquisition difficult.

(a) **Infrared Signatures.** IR signatures are affected by the proximity of other buildings and structures. When using FLIR, aircrews must pay particular attention in this environment. 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.

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

(c) **JTAC Considerations.** Recommended items for a JTAC include NVDs, an IR laser pointer, laser rangefinder/designator, IR strobe light, chemlights, spotting scope, multi-band radio, pyrotechnics (smoke/illum), access to an M203 grenade launcher with illumination and smoke rounds, compass, mirror, common objective graphics and GPS. 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 laser designator when in a stationary position and preferably from an elevated position. In brightly lit objective areas, a JTAC may consider shooting out street lights to darken the area for use of IR pointers or if directed by the commander in order to optimize friendly NVDs.

1. **Proficiency.** JTAC proficiency with CAS is critical in order to step into an urban environment with no previous urban training. A JTAC should recommend positioning aircraft over an unpopulated area, an area cleared by friendly forces, a neutral area, or feet wet in order to build the aircrew's SA of the target and friendly locations. Most urban terrain offers a significant amount of nearby uninhabited natural areas, which may be used by aircrew awaiting a CAS request. Fixed-wing aircrew require a minimum of 8 nm to hold effectively. An area as small as 4 nm may be used, but this is extremely demanding and should be avoided as much as possible. Every attempt should be made to hold the awaiting CAS aircrew over non-hostile terrain to allow the aircrew to build SA without having to be overly concerned with the threat. Training in an urban environment is required for JTAC and aircrew proficiency. However, the critical link between the aircrew and the commander for urban CAS is the JTAC. The JTAC must provide extraordinary details in the CAS remarks section of the brief working from big to small features (funnel approach). If not, then the pilots must pull details from the JTAC. The "big" portion of the talk-on brief can be eliminated if the JTAC can mark either his position or the target location visually or electronically with a laser pointer or GPS grid, for example. (Note: Friendly GPS positions should not be passed over the radio.) Even if a ground JTAC cannot see the target, terminal attack control hand-off to a FAC(A) can be done. The JTAC must always keep in mind that his ground perspective is drastically different from the attacking aircraft's. The JTAC may not be in a position to observe all buildings containing friendly forces due to intervening buildings and battlefield confusion. It's likely that a JTAC using rotary-wing CAS will be marking and engaging targets within 100 meters of his own position, within Danger Close parameters. **Historical studies prove that 90 percent of all urban engagements occur where friendly and enemy forces are within 50 meters of each other, and that urban engagements using supporting arms occur with less than 250 meters between the same. The JTAC must select the appropriate ordnance to limit the potential of fratricide, particularly in an urban environment.** The JTAC may not always see the target or whatever is firing at his unit, but only hear where the rounds are coming from and see their impacts. The friendly and enemy situation will be changing rapidly even if only from building to building or room to room inside a building. The CAS aircraft or FAC(A) on station may be required to do aerial

reconnaissance to find and report targets or enemy movement. Aircrews may request to engage, via Type 3-control, once targets are positively identified. Aircrews should volunteer to perform reconnaissance when the threat permits and when not being used to directly deliver ordnance. This may prevent an unexpected ambush or stop units advancing to reinforce. The rotary-wing aircraft can be the "eyes" for the supported unit which means the pilots may need to get very close to see what the maneuver force is experiencing. For aircrew survivability, every effort should be made to exploit standoff capabilities with optics and weapons systems. Likewise, fixed-wing aircraft can be used to overfly the unit's position and reconnoiter adjacent threat avenues leading into the JTAC's location. The commander must decide when organic/attached ground weapons are insufficient for the mission, and CAS is required. JTACs will judiciously use fixed-wing ordnance when troops are in contact, due to fragment and overpressure dangers. Historically, 80 percent of urban combat injuries result from glass shards from blast and overpressure effects. CAS aircraft may reconnoiter and attack enemy forces outside the area of immediate engagement in order to prevent further reinforcement. If the distance between enemy and friendly forces is too close for the JTAC to use CAS, or the target is not suitable for the CAS ordnance, CAS aircrew should provide reconnaissance and assist the JTAC in assessing the overall situation. This is most useful for identifying enemy reinforcements or directing friendly reinforcements. Ground forces are likely to be split-up, even if only separated by buildings on the same block. In these cases, JTAC responsibility may shift from a trained JTAC to an infantryman in contact desperately fighting to stay alive.

2. **Navigation.** Navigation over urban terrain can be more difficult than over natural terrain. **Navigation is more difficult because maps do not show the vertical development of urban terrain.** Rapid movement from position to position can often create confusion between aerial and ground observers as to friendly and enemy locations. Familiarity with the characteristics of urban terrain allows aircrews to discern key features in this environment. Navigational aids, such as GPS, have reduced but not eliminated this challenge. The use of GPS and handheld pointers or designators eases the problems associated with night navigation, orientation, and target identification. Navigation systems may be degraded due to interference induced by buildings. Aircrews and ground controllers should perform detailed mission planning to maximize the effectiveness of all available assets. Regardless of the method utilized, the critical element is directing CAS aircraft onto the target. A running dialog should be emphasized after the brief is given. While this is accomplished, minimizing collateral damage and avoiding noncombatant injury is important, but not at the expense of endangering friendly lives. If appropriate, aircrew and JTACs should ensure that the maps and other geospatial products used incorporate the Military Grid Reference System during pre-mission planning for CAS, assault support, TRAP, etc.

3. **Air-to-Ground Coordination.** An urban grid system labels structures and prominent features (see Figures V-20, V-21, and V-22). **The JTAC and aircrew should select grid sectors based on what the aircrew/aircraft sensors can most easily see such as rivers, road junctions, buildings, bridges, etc.** JTAC's and aircrew should avoid over-targeting (i.e., numbering every building in the city versus numbering the buildings in the expected and adjacent objective area). Over-targeting can lead to time delays and confusion for fixed-and rotary-wing aircrews when sorting through numerous pages of a map attempting to find a specific building. For example, (Figure V-20) starting with the northwestern section of the zone and continuing clockwise, immediate structures surrounding the zone will be labeled Al, A2, A3, etc. City streets, alleys and other easily recognizable topographic features

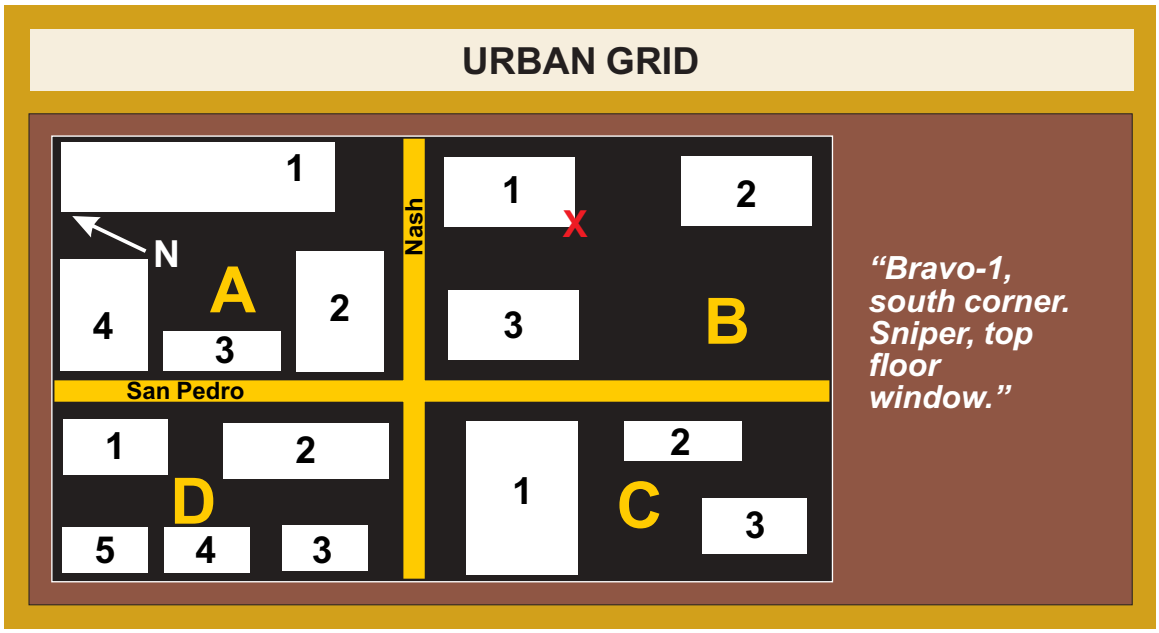

Figure V-20. Urban Grid

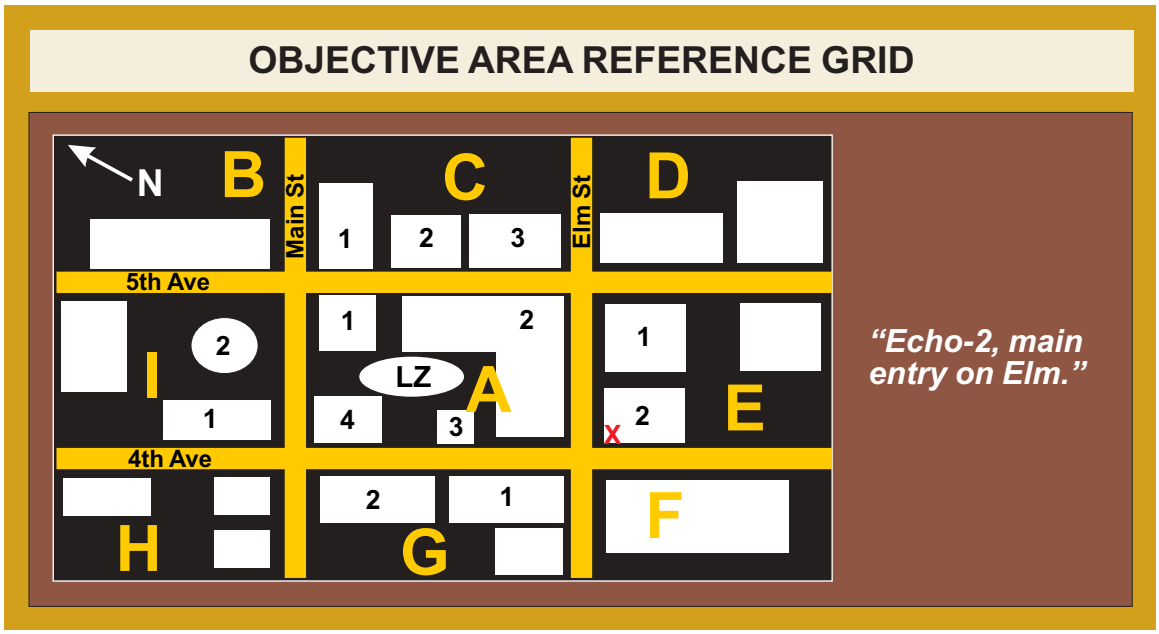

Figure V-21. Objective Area Reference Grid

can delineate the boundaries of Alpha, Bravo or Charlie. Numbering the buildings clockwise, starting at the northwestern most sections, will assist in a quick cueing process.

4. **Target reference points** (Figure V-23) can also be used. Target reference points require labeling buildings or distinctive urban structures in and around the objective area. These can be labeled TRP#1, TRP#2, etc. Target reference points should be committed to memory by aircrew to expedite passing or interpreting a call for fire. If fire is being received,

pass a target reference point number, heading, approximate distance and description of where and what type of fire is being received.

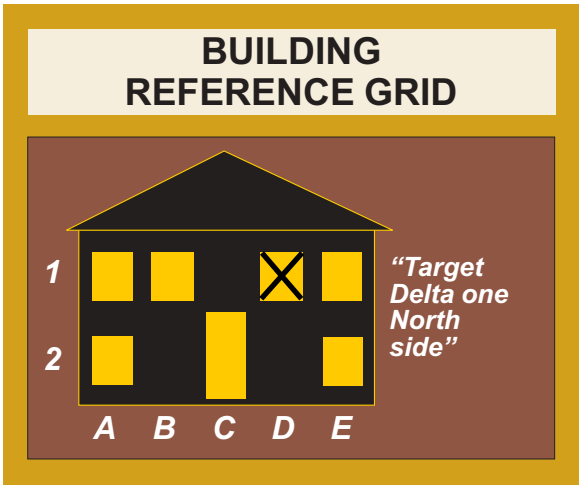

Figure V-22. Building Reference Grid

5. **Reactive 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. If time and communication capabilities exist, use the CAS 9-line brief for fixed-wing aircraft. An abbreviated CAS brief may be more suitable for rotary-wing aircraft. Typical interflight calls should be directive and descriptive, "Razor 11, request immediate engagements, AAA, 320, 100 meters." Whatever briefing format is used, it must ensure critical information is passed between concerned participants. Whether using the traditional 9-line or an abbreviated briefing format, describing the target location as it relates to surrounding structures is essential. Plain language descriptions will greatly assist the CAS aircrew in locating the target. Describing building color, type of roofing, window structure, etc., as it relates to surrounding structures, can greatly assist aircrew in locating the correct target. However, do not proceed with a talk-on without establishing a common reference point for both the JTAC and aircrew. Items that provide **contrast** will allow for faster target acquisition. Any deconfliction or coordination issues required to ensure friendly safety and aircraft flow should be handled by the requesting agency to facilitate CAS responsiveness. **Development and implementation of an urban grid system will only be**

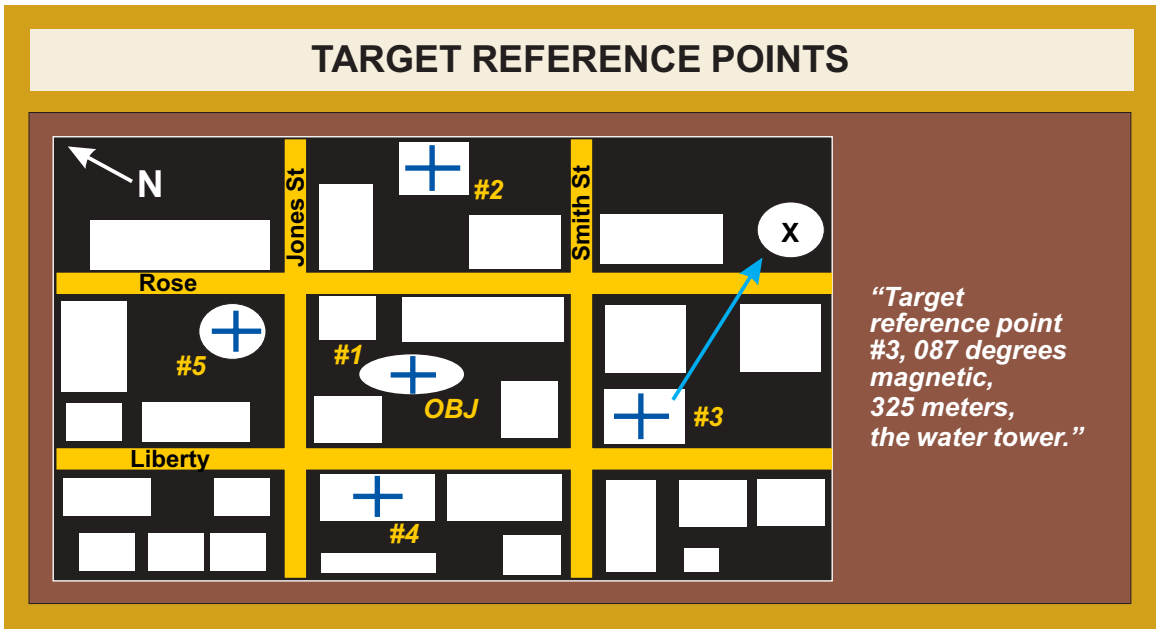

Figure V-23. Target Reference Points

effective if all players utilize it. If the supported unit uses one system and CAS aircrew have their own, it will make fire support impossible. Whatever type of grid system is chosen, it should be standardized so all units have the correct information to include the following: C2 HQ, FSC, R&S teams, intelligence section, and all assets, including artillery, mortars, and rotary- and fixed-wing aircraft. The use of target reference points or an urban grid requires some degree of communication. If aircrew are operating without any of the above preplanned control measures, then disciplined voice communications (cadence, clarity, brevity) will be critical. Even with preplanned or unplanned control measure graphics, JTACs should select the biggest and brightest structure nearby for initial orientation between themselves and the aircrew. The time to pass a brief and then pass talk-on type remarks will decrease as the level of pre-mission planning increases. Whereas it may take 5-10 minutes for a detailed talk-on using only a 1:12,500 city map, it may only take 2-3 minutes given a photograph or line-art urban grid.

6. **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 environment.

7. **Weapons Selection. The requirements for urban CAS weapons must focus on rapid employment, the target set, minimum collateral damage, minimum rubbling, the ability to employ in proximity to ground forces and high precision.** The target set in urban tactical operations will include troops in the open, armored vehicles, and enemy forces using the urban terrain (buildings) as firing positions or strong points. A minimum collateral damage capability is essential to protect noncombatants, preserve whatever local and international support that might exist, and to reduce the cost of rebuilding the urban area upon conflict termination. CAS weapons should minimize rubbling and be deliverable in very close proximity to friendly forces. To achieve the desired level of destruction, neutralization, or suppression of enemy CAS targets, it is necessary to tailor the weapons load to the required results. For example, cluster and general purpose munitions would be effective against troops and vehicles in the open, whereas hardened, mobile, or pinpoint targets may require specialized weapons such as laser guided, EO, IR munitions, or aircraft with special equipment or capabilities. In all cases, the requesting commander needs to know the type of ordnance to be expended (especially cluster munitions). To provide effective CAS, the weapons delivery platform must have adequate sensors to deliver weapons with a high degree of accuracy.

7. Laser, Inertial Navigation System/Global Positioning System Guided, and Digital Information Systems

Technology can assist in effective CAS. Laser and INS/GPS-based systems can aid in target acquisition and weapons guidance. Additionally, digital information systems can expedite the transfer of critical targeting and C2 information between ground units, JTACs, and CAS aircraft.

a. **Laser-Guided Systems.** Laser-guided systems provide the joint force with the ability to locate and engage high priority targets with an increased first-round hit probability. The accuracy inherent in laser-guided systems requires fewer weapons to neutralize or destroy a

target. Laser-guided systems effectively engage a wider range of targets, including moving targets. Laser-guided systems provide additional capabilities, but also have distinct limitations. When enemy equipment includes countermeasures, target illumination may still provide a superior mark on surface features (like rocks) near the target with good security. 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. **Including a laser code and a laser-to-target line in the 9-line briefing to the pilot can enhance mission accomplishment.** This paragraph provides CAS-specific JTTP and background information on laser-guided system employment.

See JP 3-09.1, Joint Tactics, Techniques, and Procedures for Laser Designation Operations, *for more information on lasers and laser employment.*

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

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

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

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

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

(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 lines.

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

(3) **Beam divergence and target size.** If a designator has a beam spread or divergence of 1 milliradian, its spot would have a diameter of approximately one meter at a distance of one thousand meters in front of the designator. If this spot were aimed at a three meter by three meter box three thousand meters away the laser spot would be as wide and tall as the box. The laser spot size is a function of beam divergence and the distance from the laser designator to the target.

(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 laser designator is perpendicular to a surface the reflection can be seen

from all angles on the designated side, but can be detected best near the laser designator to target line. 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 operations** are divided into three primary categories: laser target ranging, target acquisition, and weapons guidance.

(a) **Target Ranging.** Target ranging systems can provide accurate range, azimuth, and elevation information to identified targets.

(b) **Target Acquisition.** Target acquisition involves the use of an LST carried by the aircraft and a LTD aimed by a ground team. LSTs are laser sensors that provide head-up display cueing for aircraft equipped with these systems. While scanning for laser energy, these systems have a limited field of view that depends on range and switch settings. In general, the chances of acquisition are improved when cueing aids such as target marks, landmarks, and INS coordinates help the pilot point the aircraft in the direction of the target.

(c) **Weapons Guidance.** Weapons guidance allows a LGW to home in on reflected laser energy placed on a target by an LTD. This allows precision delivery of weapons as well as some standoff deliveries.

(6) **Laser Hardware**

(a) **Laser-Guided Weapons.** 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. All LGWs require illumination until weapon impact. Typical laser-guided weapons are:

1. **Laser-guided bombs (LGBs):** PAVEWAY II, III, and enhanced PAVEWAY III (GPS aided).

2. **Laser-guided missiles (LGMs):** AGM-65E Laser Maverick and AGM-114 HELLFIRE. **LGMs generally provide greater standoff launch ranges than LGBs.** Greater range provides increased survivability for aircrews operating in a high threat environment. Aircrews and JTACs must exercise caution when launching LGMs from behind friendly troops.

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

a. In the event the laser signal is lost, the weapon will safe itself and overfly the target. The Maverick system allows aircrew to engage targets designated by either air or ground sources with in-flight selectable PRF codes.

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

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

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

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

(b) **Laser Target Designators.** Ground laser target designators (GLTD) 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 km. Airborne LTDs are carried on aircraft and provide the same function as the GLTD. Airborne lasers are capable of very long range lasing and are normally employed below 30,000 feet AGL. See FM 90-20, MCRP 3-16.8B, NWP 3-09.2, AFTTP 2-3.6 *Multi-Service Procedures for the Joint Application of Firepower (J-FIRE)* for laser capable aircraft. See Figure V-24 for advantages and disadvantages of airborne and ground designators.

Note: The PRF of LGBs is normally only adjustable prior to flight and cannot be changed once airborne. Most missiles such as Maverick and HELLFIRE can be adjusted in-flight. JTACs

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 V-24. Airborne and Ground Designators Advantages and Disadvantages

and aircrews must ensure the laser designator PRF matches the code programmed into the weapon or the weapon will not guide.

(c) **Laser Range Finders/Target Locating Devices.** Laser range finders (LRFs) use low power laser pulses to measure range to an object. **These systems will not currently provide the accuracy needed for a single GPS/INS weapon to hit a point target.** Tactical LRF ranges vary from 10 meters to 20 km. Accuracy is range/equipment dependent and generally varies from 1 to 15 meters at maximum ranges. Target locating devices are devices that incorporate a LRF, magnetic or gyroscopic compass, tilt measurement devices, and GPS. These systems measure the range and angles from its position provided by the GPS to mathematically derive a target location. If used correctly the quality of the target location is generally much better than that of a hand-derived coordinate. The accuracy of the coordinate is dependent on many variables. **Errors are induced by inaccurate GPS data, poor azimuth, range and elevation data, system calibration and user skill. These errors are magnified with range and can result in significant target location errors (TLEs). Due to the variables listed previously, TLE will generally vary from 10 meters at 1 km to more than 300 meters at maximum ranges.**

(d) **Laser Spot Trackers.** LSTs are systems that allow visual acquisition of a coded laser designated target. LSTs must be set to the same code as the coded laser target designator for the user to see the target being lased. In the case of airborne LSTs, the aircrew acquires the laser designated "spot" (target) and either employs LGBs or executes visual deliveries of non-laser ordnance. The aircrew can select PRF codes for the LST while in flight. See FM 90-20, MCRP 3-16.8B, NWP 3-09.2, AFTTP 3-2.6 *Multi-Service Procedures for the Joint Application of Firepower (J-FIRE)* for a listing of aircraft with LSTs.

(7) **Laser Procedures**

(a) **Attack Headings.** JTACs provide aircrews with an attack heading. The attack heading must allow aircrews to acquire the reflected laser energy. Due to the possibility of false target indications, attack headings should avoid the target-to-laser designator safety zone, unless the tactical situation dictates otherwise. The safety zone is a 20-degree cone whose apex is at the target and extends 10 degrees either side of the target-to-designator line. The optimal attack zone is a 120 degree cone 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 cone (+/-45 degrees) is preferred (see Figure V-25).

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

(c) **Coordination with JTAC.** Laser-guided systems improve the delivery accuracy of unguided ordnance. If the attack aircraft has an LST, the JTAC can designate the target for aircrew identification. An aircrew can use the LST to visually locate the target. Once the aircrew locates the target, they can conduct an accurate attack using unguided ordnance.

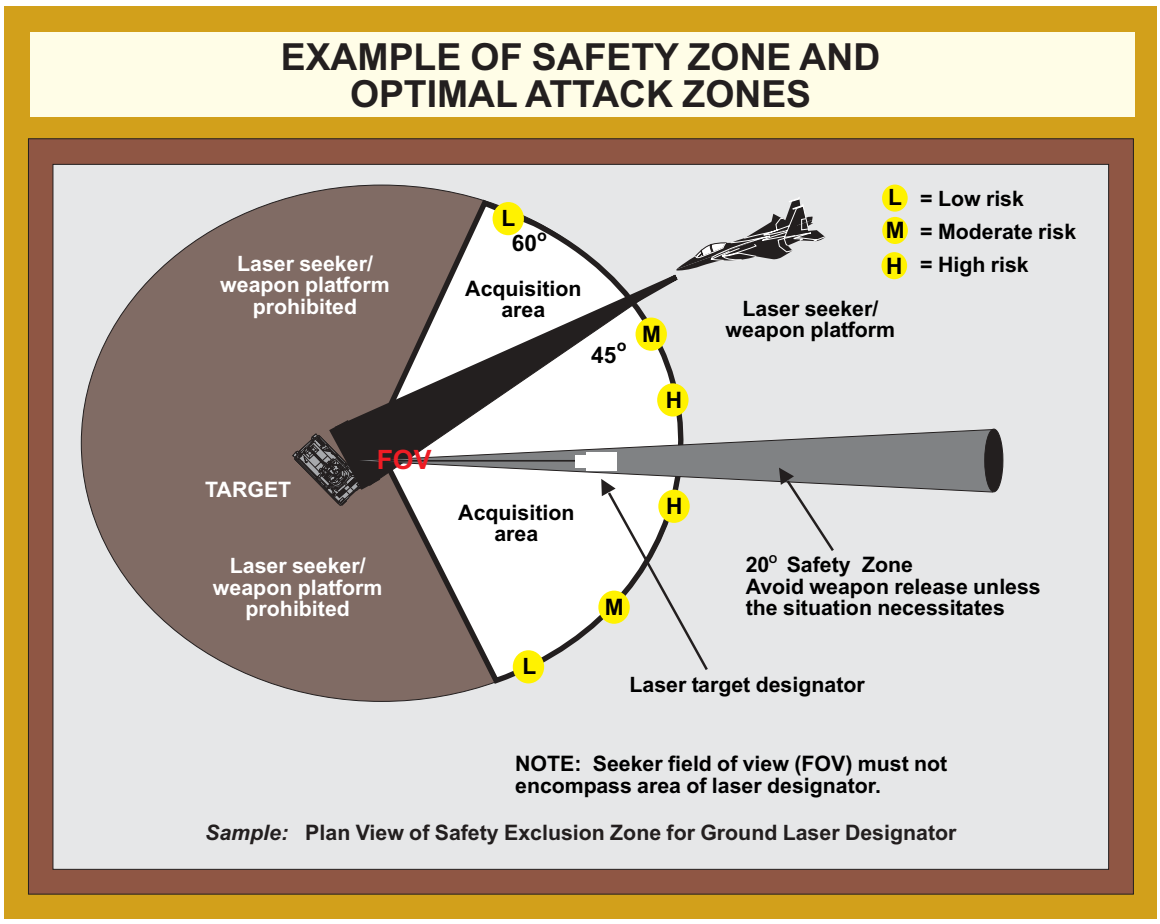

Figure V-25. Example of Safety Zone and Optimal Attack Zones

Aircraft equipped with laser designators can also be "talked onto" the target by the JTAC, then designate the target and deliver the weapon using their own spot or, in some cases, confirm the correct target with an airborne IR marker.

(d) **Employment of LGBs in conjunction with coded laser target designators is either autonomous or assisted.** Autonomous LGB employment uses the CAS aircraft's on-board LTD for terminal weapons guidance. Most aircraft capable of delivering LGBs can provide on-board autonomous self-designation. Assisted LGB employment uses an off-board LTD for terminal weapons guidance. This is typically accomplished by a ground team operating a designator (such as a ground/vehicle laser locator designator) or by another aircraft (known as "buddy lasing"). Aircraft without on-board LTDs (such as A/OA-10s) that can carry and deliver LGBs but have no on-board terminal weapons guidance capability require assisted LGB employment. **Coded LTDs are ground and airborne systems that have two specific purposes.** First, they provide terminal weapons guidance for laser-guided weapons. Second, they designate targets for coded LSTs. Coded laser target designators emit laser energy with a PRF and require input of specific laser codes for operation. Codes are assigned to LGWs and directly relate to the PRF that harmonizes the designator and seeker interface. **Coded LTDs used for terminal weapons guidance must be set to the same code as the laser-guided weapon.** Certain LGWs, such as LGBs, are coded prior to takeoff and cannot be changed once

the aircraft is airborne. However, all coded laser target designators, with the exception of the AC-130H, can change codes while airborne (Note: The AC-130H's LTD is permanently preset with only one code (1688) and cannot be changed). The JTAC will have to coordinate efforts to ensure both the aircraft and designator are on the same code. Coordination for the LTD to match the LGB code is conducted through the ATO, DASC/ASOC, or FAC 9-line briefing. Sometimes, a designator will serve the dual purpose of target designation for a coded laser acquisition/spot tracker and terminal weapons guidance for laser-guided weapons. In these cases, the designator, spot tracker, and the weapon must have the same code. Ground units may pass laser codes in a three number code. For aircraft operations, the first digit is assumed to be a one (e.g., maneuver unit passes a code of 688 which will be transmitted to the aircraft as 1688). When briefing LST-equipped aircraft, include the four-digit laser code and laser-to-target line in accordance with the CAS briefing format. If aircraft check in with a different code, then it is the JTAC's responsibility to make appropriate corrections. Even if the aircraft is capable of self-designation, the JTAC should have a backup ground designator ready if it is available.

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

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

(a) **General.** The HELLFIRE is an air-to-surface laser-guided missile system designed to destroy armored and reinforced hard targets. It is guided by ground or airborne laser designators to rapidly engage multiple targets.

(b) **Laser characteristics.** The HELLFIRE homes in on targets designated by US and NATO laser designators. The HELLFIRE system should use PRF codes in the range of 1111 to 1488 to achieve the highest probability of hit. The HELLFIRE system allows the aircrew to conduct multiple, rapid launches using one or two designation codes simultaneously. The aircrew can assign missiles to search for two codes simultaneously. The aircrew can set or change the missile PRF code from the cockpit. If launching subsequent missiles (all set on the same PRF code) the JTAC/designator shifts the laser designator to the next target prior to missile impact. If using two designators (each set to a different PRF code) the missile launch interval can be as low as two seconds. The use and coordination of multiple designators present a complex problem for the aircrew and the JTACs/designator.

(c) **Employment considerations.** The employment considerations for the HELLFIRE missile follow the same mission analysis used for other platforms or forces. The METT-T format will cover all the requirements.

1. **Mission** — What is required and is the HELLFIRE the best ordnance for the target?

2. **Enemy** — What is the target, how many targets are there, are they moving, and are they close together or spread out?

3. **Terrain and weather** — Are there hills, mountains, or buildings in the battle area? What is the ceiling and visibility in the area?

4. **Troops** — Where are the friendly troops, are designators available, where are the designators, and where are the helicopters?

5. **Time** — How much time is available for the engagement?

(d) **Coordination considerations:** Aircrews and designators consider the following factors when coordinating HELLFIRE engagements.

1. **Communications** between aircrews, maneuver commander, designator, and JTAC, if required.

2. **Number of missiles required, and location of targets.**

3. **Designator codes** for the missiles.

4. **Separation angle** between launch aircraft and designator must be less than 60 degrees, using the target as the corner of the angle.

5. **Range** from launch aircraft and target(s) must be within minimum and maximum missile range for the conditions.

6. **Safety considerations** including the designator outside a 30 degree angle from the firing aircraft to the target using the aircraft as the corner of the angle, and troops or civilians in the surface danger zone.

7. **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. LOAL has three different trajectories that can be used based on required obstacle clearance requirements and cloud ceiling limitations. They are LOAL-Direct (lowest trajectory), LOAL-LO, and LOAL-HI (highest trajectory).

(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 8 seconds between missiles. Use longer intervals based on experience, terrain, target array, and battlefield obscuration. During multiple missile launches, the JTAC/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/designator should consider wind speed and direction when selecting multiple targets. Multiple missile launches require close coordination and timing.

b. **INS/GPS-Guided Weapons.** 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 GPS/INS guided 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 pre-flight planning to achieve optimum accuracy depending on weapon type, mission, etc.

(1) **Advantages**

(a) **Accuracy.** These weapons can be accurate if precise target location data is known. Accuracy is also unaffected (assuming GPS-aided guidance) by launch range.

(b) **Standoff.** These weapons can provide standoff capability at very long distances. Aircraft and aircrew can thereby effectively avoid any threat point defense weapons systems by employing these weapons.

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

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

(2) **Limitations**

(a) **Moving Targets.** These weapons have no inherent capability against moving targets. GPS/INS weapons fly to pre-programmed coordinates. If the target moves between the time it is located, targeted, and the weapon released, the weapon will miss.

(b) **Location Error.** These weapons require extremely accurate target location in both the horizontal and vertical plane. If that information is not available, the commander must be advised as to the effects this will have on accuracy and subsequent reduction in effectiveness. **(All CAS participants must ensure they are using the same charts and same reference system. World Geodetic System-84 is the DOD-assumed standard unless stated otherwise in the SPINs.)**

(c) **Malfunctions.** Precision-guided munitions (GPS/LGB's) are very accurate; however, they can be extremely hazardous when used for troops in contact. 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 indefinably the probability of fratricide. When able, precision-guided munitions should be employed parallel to the forward line of own troops (FLOT).

(d) Depending on type, these weapons may be affected by strong winds encountered after release.

(3) **TTPs.** Significant issues exist when using weapons that will be transiting over or around friendly forces and use pre-programmed flight paths, and impact points. **These weapons once released, may not be recalled. Therefore, great care must be taken to ensure that the best possible target location is obtained and that aircrew verify the correct target coordinates have been input into the weapon.** The following must be taken into account. These weapons require detailed mission planning. If the commander allows the use of these weapons the decision must be made early in the planning cycle. Attacking aircraft must increase altitude to increase range. High release profiles must be deconflicted with other systems operating below release altitudes.

8. AC-130

The AC-130 gunship is a uniquely capable CAS platform. Its extended loiter time and precision fire and control systems offer the ground maneuver unit and JTAC specific capabilities and limitations. This section identifies the basic JTTP used by JTACs and AC-130 aircrews to conduct CAS.

a. **AC-130 En Route Tactics.** This section identifies the basic JTTP used by AC-130 aircrews to conduct CAS. Commanders should adjust these procedures as the combat situation develops.

Because of extended loiter, AC-130 crews can work a series of targets with a single ground party

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

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

(3) **Orbiting.** If no preplanned targets exist, the aircraft will normally proceed to a designated orbit area and contact the ground party (TAC or JTAC, FSO, FIST, etc.) to report on station and await tasking.

(4) **Coordination.** The AC-130 aircrew will make every effort to establish radio contact while en route to speed acquisition of the tactical situation and authenticate the JTAC.

(5) **CAS Briefing Form.** AC-130 aircrews use the AC-130 Call for Fire (see Figures V-26 and V-27). In addition to the standard briefing items, the following items are mandatory for AC-130s: a detailed threat description, marking of friendly locations, identifiable ground features, and the ground commander's willingness to accept "danger close." Because the AC-130 is capable of extended loiter, AC-130 crews can work a series of targets with a single ground party. In these cases, the CAS briefing format can be abbreviated but must include: magnetic bearing and range to the target in meters from the friendly position to the target; and a brief description of the target.

AC–130 CALL FOR FIRE

AC–130 CALL FOR FIRE

1. _____THIS IS_____FIRE MISSION, OVER
(A/C CALL SIGN) *(OBSERVER CALL SIGN)*

2. MY POSITION_____, MARKED BY_____
(GRID, BP, SBF, INT) *(STROBE, BEACON, IR SPINNER)*

_____, _____
(DIRECTION TO TARGET IN DEGREES) *(DISTANCE TO TARGET IN METERS, AS ONE NUMBER)*

_____, OVER
(TARGET DESCRIPTION)

_____THREATS (if applicable)

Figure V-26. AC-130 Call for Fire

b. **Attack Phase**

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

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

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

(a) **Terrain Features.** Firing down an incline can cause considerable miss distances.

(b) **Burst Pattern.** Consider the lethal areas of fragmentation for the various type ordnance (105mm, 40mm, 25mm).

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

ADJUSTING ROUNDS FOR THE AC-130 GUNSHIP

ADJUSTING ROUNDS FOR THE AC-130 GUNSHIP

USE CARDINAL/INTERCARDINAL DIRECTIONS AND DISTANCE (E.G. "NORTHEAST 2OO, OVER")

TO MOVE BURN, SAY: "MOVE BURN" OR "ROLL BURN"

ONCE BURN IS OVER TARGET, SAY: "FREEZE BURN"
If you say "STOP BURN," they will turn it off

AC CAN NOT DISTINGUISH COLORS, THEY CAN DETERMINE IF SOMETHING IS DARK OR LIGHT COLORED

DO *NOT* GIVE CLOCK DIRECTION "TARGET IS AT YOUR 2 O'CLOCK"

TRANSMISSION OF THE FIRE MISSION IS CLEARANCE FOR THE AC TO FIRE, (UNLESS DANGER CLOSE)

****DANGER CLOSE 25 AND 40mm - 125 METERS**
105mm - 200 METERS

Figure V-27. Adjusting Rounds for the AC-130 Gunship

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

APPENDIX A

PLANNING CONSIDERATIONS FOR CLOSE AIR SUPPORT USING NIGHT VISION DEVICES AND INFRARED POINTERS

PREPLANNED/SCHEDULED (PLANNED LOCATION AND TIME)

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

2. What will the light conditions be at TOT?

   a. Moon Phase/Rise/Set/Angle.

   b. Overall Illumination Level.

   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 night vision goggle (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 final attack heading that optimizes the ability of the aircrew to acquire the pointer's location, the beam, and the target?

8. Is it best to self-mark location with an IR source, and/or acquire the aircraft with NVGs? Does the aircraft have IR lights?

9. Will other assets (attack helicopters) using IR pointers confuse the CAS pilot?

10. Can the strike be conducted under EMCON?

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

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APPENDIX B
JOINT TACTICAL AIR STRIKE REQUEST (DD FORM 1972)

Section I – Mission Request

Line 1. UNIT CALLED. Identifies the unit designation/call sign/pre-assigned 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).

A . PRECEDENCE is stated numerically in descending order of importance, as determined by the requestor.

B. PRIORITY is expressed as shown below.

IMMEDIATE:

C. PRIORITY For immediate requests, enter priority (block C). A precedence entry is not required for immediate requests because, by definition, all immediate requests are precedence #1. Use the numerical designation below to determine priority (e.g., define the tactical situation) for preplanned (block B) or immediate (block C):

1. Emergency. Targets that require immediate action and supersede all other categories of mission priority.

2. Priority. Targets that require immediate action and supersede routine targets.

3. Routine. 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.

Line 4. TARGET LOCATION IS. Locates the target by using the military grid reference system prescribed for the area concerned.

A. COORDINATES. Locates a point target or starting point

B. COORDINATES. When used together with A, provides from A to B coordinates.

C. COORDINATES. When used together with A and B, provides a route.

D. COORDINATES. When used together with A through C, provides a route or describes a target area.

E. TARGET ELEV. Target elevation in feet above sea level.

F. SHEET NO. Self-explanatory.

G. SERIES. Self-explanatory.

H. CHART NO. Self-explanatory.

CHECKED. Indicates with whom target information has been crosschecked.

Line 5. TARGET TIME/DATE. Indicates the time/date when the air strike is requested.

A. ASAP As soon as possible.

B. NLT The target is to be attacked before, but not later then the time indicated.

C. AT Indicates time at which target is to be attacked.

D. TO Denotes end of period of time in which support such as airborne alert or column cover is required. When D is used, C and B 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.

A. ORDNANCE Desired ordnance.

B. DESTROY Self-explanatory.

C. NEUTRALIZE Self-explanatory.

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.

A. FAC Transmit the type of terminal control.

B. CALL SIGN Call sign of terminal controller.

C. FREQ Recommended TAD frequency.

D. FIX/CONT PT 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 briefing information not included elsewhere in the request. Enter data of the standard 9-line CAS brief.

Section II – Coordination

Line 9. NSFS Naval surface fire support 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 non-nuclear 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/ACT TAKEOFF Estimated or actual time the mission aircraft will take off.

Line 25. EST TOT Estimated time on target.

Line 26. CONT PT (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. FAC/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. BATTLE DAMAGE ASSESSMENT (BDA) REPORT (USMTF INFLTREP) This optional space is used to record BDA for each mission.

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

SECTION I - MISSION REQUEST

1. UNIT CALLED — REQUEST NUMBER — DATE — SENT — TIME — BY

2. PREPLANNED: [A] PRECEDENCE _____ [B] PRIORITY _____
IMMEDIATE: [C] PRIORITY _____ — RECEIVED — TIME — BY

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

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

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

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

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

8. REMARKS
1. P _____
2. HDNG _____ MAG OFFSET: L/R
3. DISTANCE _____
4. TGT ELEVATION _____ FEET MSL
5. TGT DESCRIPTION _____
6. TGT LOCATION _____
7. MARK TYPE _____ CODE _____
8. FRIENDLIES _____

9. EGRESS _____

THE FOLLOWING MAY BE INCLUDED IN THE "REMARKS", IF REQUIRED.
BCN-TGT _____ MAG — BCN GRID ____/____
BCT-TGT _____ METERS — TGT GRID ____/____
BCN ELEVATION _____ FEET MSL

SECTION II - COORDINATION

9. NSFS | 10. ARTY | 11. AIO/G-2/G-3

12. REQUEST
☐ APPROVED
☐ DISAPPROVED
13. BY | 14. REASON FOR DISAPPROVAL

15. RESTRICTIVE FIRE/AIR PLAN
[A] IS NOT IN EFFECT [B] NUMBER
16. IS IN EFFECT
[A] (FROM TIME) _____ [B] (TO TIME) _____

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

SECTION III - MISSION DATA

20. MISSION NUMBER	21. CALL SIGN	22. NO. AND TYPE AIRCRAFT	23. ORDNANCE
24. EST/ALT 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, JUL 2001 PREVIOUS EDITION MAY BE USED. Reset

Figure B-1. Joint Tactical Air Strike Request (DD Form 1972)

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APPENDIX C
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. CAS Overview

a. **Friendly Situation**

(1) Forward edge of the battle area/FLOT.

(2) Control Points/IPs.

(3) Scheme of Maneuver.

(a) Target Area.

(b) Key Terrain.

(c) JTAC position and call sign.

(d) Supporting arms.

1. Artillery positions.

2. Mortars.

3. Gun target lines.

(e) Control Measures.

1. FSCL/CFL.

2. No fire areas.

3. Free fire areas.

4. Airspace Control Areas.

5. Missile Engagement Zone/Fighter Engagement Zone and status.

b. **Intelligence**

(1) Enemy Position and Number.

(a) Projected Intent.

(b) Likely Avenues of Approach.

(c) Observed Tactics.

(2) Supporting Elements.

(3) Threats.

(a) Locations.

(b) Threat Guidance.

1. RADAR.

2. Optical.

3. IR.

(c) Threat Capabilities.

(d) Indications and Warnings.

(e) Employment Doctrine.

c. **Weather: Takeoff/Target/Land**

(1) Ceiling.

(2) Visibility.

(3) Temperature/Dew Point.

(4) Winds.

d. **Environment**

(1) Sun Azimuth.

(2) Sun Elevation.

(3) Sunrise/Sunset Time.

(4) Moon Azimuth.

(5) Moon Elevation.

(6) Percent Illumination.

(7) Lux Level.

(8) Absolute Humidity.

(9) Historical Temperature.

(10) Predominant Albedos.

(11) Urban Lighting.

e. **Mission/Objective**

(1) Mission Statement.

(2) Commander's Intent.

(3) Unit Supporting.

(4) Target Precedence.

(5) Priority of Fires.

(6) Preplanned Missions.

(a) USMTF.

(b) Groups/Series.

(c) Search Sectors.

(7) TOT/time on station.

(8) Divert Authority.

(9) ROE.

f. **Control Procedures**

(1) AOA Entry.

(a) Routing.

(b) Altitude/Airspeed.

(c) Available Control Agencies.

(d) Air Asset Deconfliction.

(2) CEOI.

(a) Authentication.

(b) HAVE QUICK.

(c) Secure Voice.

(d) Code/Pro Words.

(e) Changeover.

2. Execution

a. **Ground Procedures**

(1) Alert Posture and Upgrades.

(2) Mission Tape/Mission Load.

(3) NVG Eye Lane.

(4) AKAC Issue/checkout.

(5) Step Time.

(6) Weapons Preflight.

(7) Aircraft Preflight.

(8) Engine Start Time.

(a) INS Alignment Anomalies.

(b) Aircraft Lighting.

(c) FLIR Checks.

(d) Built-in Test Checks.

(9) Marshal.

(10) Check-in.

(a) HAVE QUICK Checks.

(b) KY-58/Secure Voice Checks.

(11) Taxi Plan.

(a) Foreign Object Damage Prevention.

(b) NVD Checks.

(12) Weapons Arming.

b. **Airborne Transition**

(1) Take-off.

(a) Position.

(b) Arresting Gear.

(c) Take-off Type.

(d) Calls.

(2) Climb out.

(a) Rendezvous.

(b) Profile.

1. Altitudes.

2. Airspeed.

3. Power settings.

(c) Formation: Look-out/Scan Tasking.

(d) NVD Donning.

(e) Light Package.

c. **En Route**

(1) C2.

(a) Primary Check-In.

(b) Alternate Check-In.

(c) Terminology.

(2) Combat Checks.

(a) Sensor Boresight.

(b) Weapon Boresight.

(c) Expendable Checks.

(d) Environmental Assessment.

(e) Radar altimeter Check.

(3) Routing.

(a) Stack/Hold/Push Points.

(b) Time/Fuel Management.

(c) Emitter/Lights Management.

d. **Air Refueling**

(1) Time.

(2) Track.

(3) Base Altitude/Altitude Blocks.

(4) Tanker Call Sign.

(5) Offloads.

(6) Time on Boom/Cycle Sequence.

(7) Formation Procedures.

(8) Post-aerial refueling.

e. **Attack Phase**

(1) Threat Zones.

(2) Combat Checks.

(3) CAS Brief.

(a) Holding .

1. Profile.

2. Formation.

3. Tasking/Responsibility.

4. Deconfliction.

(b) System Interface.

(c) Cadence.

(d) System Update.

(4) Terminal Attack Control.

(a) Communications.

1. Required Calls.

2. Reasonable Assurance.

(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.

(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/S-2 Push.

(g) Intergrated Air Defense System Penetration.

1. Identification Friend or Foe/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 Break-up.

(5) Landing.

(a) Primary.

(b) Secondary.

(6) Dearm/Safing Procedures.

APPENDIX D
RISK-ESTIMATE DISTANCES

1. General

Risk-estimate distances allow commanders to estimate the risk in terms of percent of friendly casualties that may result from an air strike against the enemy. Risk-estimate distances are based on fragmentation patterns. **Risk-estimate distances are for combat use and are not minimum safe distances for peacetime training. See Joint Munitions Effectiveness Manuals, appropriate Service or Command guidance, or FM 309.32/FMFRP 2-72/ACCP 50-28/USAFEP 50-9/PACAFP 50-28/CINCLANTFLTINST 3330.5 for peacetime restrictions.**

2. Computations

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

3. Relationships Between Weapon Impact and Point of Intersection

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

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

b. **Rockets.** Center rocket.

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

d. **Guns.** Center of pattern.

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

4. Weapon Reliability and Delivery Parameters

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

RISK-ESTIMATE DISTANCES FOR AIRCRAFT-DELIVERED ORDNANCE			
Weapon	*Description*	*10% PI meters*	*0.1% PI meters*
Mk-82 LD [1] contact	500-lb bomb	145	325
Mk-82 LD [1,2] airburst	500-lb bomb	175	390
Mk-82 HD [3] contact	500-lb bomb/retarded	110	290
Mk-82 HD [2,3] airburst	500-lb bomb	135	350
Mk-83 LD [1] contact	1,000-lb bomb	175	385
Mk-83 LD [1,2] airburst	1,000-lb bomb	195	405
Mk-83 HD [3] contact	1,000-lb bomb/retarded	130	330
Mk-83 HD [2,3] airburst	1,000-lb bomb/retarded	160	375
Mk-84 LD [1] contact	2,000-lb bomb	175	430
Mk-84 LD [1,2] airburst	2,000-lb bomb	190	510
Mk-84 HD [3] contact	2,000-lb bomb/retarded	115	350
Mk-84 HD [2,3] airburst	2,000-lb bomb/retarded	140	460
CBU-87 [4], CBU-89 [4]	CEM or GATOR	165	220
CBU-99 [4], 100 [4]	CBU-87/89 w/kit	100	145
Mk20 [4]	Rockeye	100	145
M151, M229, M261 [5]	2.75" Rockets med alt	255	440
	2.75 " Rockets low alt	145	240
Zuni - all warheads [5]	5" Rockets	220	340
M61A1, M197	20 mm gatling	80	125
GAU-12	25 mm gatling	40	50
GPU-5A, M230A1	30 mm gatling/chain	25	40
GAU-8 (A-10)	30 mm gatling	40	65
AC-130	25mm	35	65
	40mm	25	75
	105mm	65	165
GBU-12	500-lb LGB	95	300
GBU-16	1,000-lb LGB	105	350
GBU-10/24	2,000 lb LGB	90	340
GBU-38	500-lb JDAM	95	300
GBU-32	1,000-lb JDAM	105	350
GBU-31	2,000-lb JDAM	90	340
AGM-130	2,000 lb TV guided	90	335
BLU-97	JSOW	Not Available	Not Available
AGM-158A	JASSM	55	235
AGM-65	Maverick (All)	25	95
AGM-114	Hellfire	40	105
BGM 71	TOW Anti-tank	Not Available	Not Available

NOTES:
[1,2] – LD=low drag airburst fusing (DSU-33)
[3] – HD=high drag/air inflatable retarder (AIR)
[4] – Not recommended for use with troops in contact
[5] – Fixed-wing only. Helicopter numbers not available

Figure D-1. Risk-Estimate Distances for Aircraft-Delivered Ordnance

NOTE: Users must fully understand the assumptions used to develop this risk estimate distances. All values were calculated using the General Fullspray Personnel Program from the Joint Technical Coordinating Group for Munitions Effectiveness at Eglin AFB, FL. The classified assumptions and conditions used to develop the aircraft ordnance risk estimate table are available on the Air Land Sea Applications (ALSA) Center's classified website, https://www.acc.langley.af.smil.mil/alsa/jfire.htm. Combining the online assumptions and/or conditions with the risk estimate numbers makes both sets of numbers classified. The risk estimate table in Figure D-1 depicts a "worst possible" scenario.

WARNING: The risk estimate distances listed in Figure D-1 are highly generalized and are valid only for the conditions specified in the assumptions spreadsheet on the ALSA website, https://www.acc.langley.af.smil.mil/alsa/jfire.htm. Any changes to these assumptions may significantly increase the risk estimate distances.

5. Casualty Criterion

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

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

6. Troops in Contact

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

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APPENDIX E
REFERENCES

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

1. JP 1, *Joint Warfare of the Armed Forces of the United States*.

2. JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*.

3. JP 3-0, *Doctrine for Joint Operations*.

4. JP 3-01.4, *Joint Tactics, Techniques, and Procedures for Joint Suppression of Enemy Air Defenses (J-SEAD)*.

5. JP 3-05, *Doctrine for Joint Special Operations*.

6. JP 3-09, *Doctrine for Joint Fire Support*.

7. JP 3-09.1, *Joint Tactics, Techniques, and Procedures for Laser Designation Operations*.

8. JP 3-30, *Command and Control for Joint Air Operations*.

9. JP 3-52, *Doctrine for Joint Airspace Control in the Combat Zone*.

10. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*.

11. AFDD 2, *Organization and Employment of Air and Space Forces*.

12. AFDD 2-1, *Air Warfare*.

13. AFDD 2-1.3, *Counterland*.

14. AFTTP 3-1, Volumes 3, 4, 5, 13, 16, 17, 20, 31, (Tactical Employment of Aircraft).

15. FM 1-02, *Operational Terms and Graphics*.

16. FM 3-0, *Operations*.

17. FM 3-04.100, *Army Aviation Operations*.

18. FM 3-04.111, *Aviation Brigades*.

19. FM 3-04.112, *Attack Helicopter Operations*.

20. FM 3-04.114, *Air Cavalry Squadron and Troop Operations*.

21. FM 3-09, *Fire Support in the Airland Battle*.

22. FM 3-09.3, *Tactics, Techniques, and Procedures for Observed Fire and Fire Support at Battalion Task Force and Below.*

23. FM 3-09.30, *Fire Support for Division Operations*.

24. FM 3-09.40, *Fire Support for Brigade Operations.*

25. FM 3-20.95, *Cavalry Operations*.

26. FM 3-52, *Army Airspace Command and Control in a Combat Zone*.

27. FM 3-97.18; MCRP 3-25B; NWP 6-02.1, and AFTTP(I) 3-2.5, *Multi-Service Operations Brevity Codes.*

28. FM 90-20, MCRP 3-16.8B, NWP 3-09.2, AFTTP(I) 3-2.6, *Multi-Service Procedures for the Joint Application of Fire Power (J-FIRE)*.

29. FM 100-103-2, Marine Corps Warfare Publication (MCWP) 3-25.2, NWP 3-56.2, AFTTP(I) 3-2.17, *Multi-Service Procedures for Theater Air Ground Systems*.

30. MCWP 3-23, *Offensive Air Support*.

31. MCWP 3-23.1, *Close Air Support*.

32. MCWP 3-18.1, *Marine Corps Fire Support System Techniques and Procedures*.

33. MCWP 3-25, *Control of Aircraft and Missiles*.

34. Military Standard 6040, Chairman of the Joint Chiefs of Staff Manual 6120.05, Joint Interoperability Engineering Organization Circ 9152, *United States Message Text Formatting*.

APPENDIX F
ADMINISTRATIVE INSTRUCTIONS

1. User Comments

Users in the field are highly encouraged to submit comments on this publication to: Commander, United States Joint Forces Command, Joint Warfighting Center Code JW100, 116 Lake View Parkway, Suffolk, VA 23435-2697. These comments should address content (accuracy, usefulness, consistency, and organization), writing, and appearance.

2. Authorship

The lead agent for this publication is the US Marine Corps. The Joint Staff doctrine sponsor for this publication is the Director, J-7, Joint Staff.

3. Supersession

This publication supersedes JP 3-09.3, 1 December 1995, *Joint Tactics, Techniques, ad Procedures for Close Air Support*.

4. Change Recommendations

a. Recommendations for urgent changes to this publication should be submitted:

TO: CC MCCDC QUANTICO VA//C427//
INFO: JOINT STAFF WASHINGTON DC//J7-JDETD//

Routine changes should be submitted to the Director for Operational Plans and Joint Force Development (J-7), JDETD, 7000 Joint Staff Pentagon, Washington, DC 20318-7000, with info copies to the USJFCOM JWFC.

b. When a Joint Staff directorate submits a proposal to the Chairman of the Joint Chiefs of Staff 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 Military Services and other organizations are requested to notify the Director, J-7, Joint Staff, when changes to source documents reflected in this publication are initiated.

c. Record of Changes:

CHANGE NUMBER	COPY NUMBER	DATE OF CHANGE	DATE ENTERED	POSTED BY	REMARKS
1	1	2 September 2005	9 September 2005	JEDD	None

5. Distribution

a. Additional copies of this publication can be obtained through Service publication centers listed below (initial contact) or the USJFCOM JWFC in the event that the joint publication is not available from the Service.

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c. Additional copies should be obtained from the Military Service assigned administrative support responsibility by DOD Directive 5100.3, 15 November 1999, *Support of the Headquarters of Unified, Specified, and Subordinate Joint Commands*.

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GLOSSARY

PART I — ABBREVIATIONS AND ACRONYMS

A2C2	Army airspace command and control
AAA	antiaircraft artillery
AAGS	Army air-ground system
ACA	airspace coordination area
ACCE	air component coordination element
ACE	aviation combat element
ACEOI	Automated Communications-Electronics Operating Instructions
ACM	airspace control measure
ACO	airspace control order
ACP	air commander's pointer
ADA	air defense artillery
AFAOC	Air Force air and space operations center
AFARN	Air Force air request net
AFDD	Air Force doctrine document
AFFOR	Air Force forces
AFTTP	Air Force tactics, techniques, and procedures
AGL	above ground level
ALO	air liaison officer
AM	amplitude modulation
AO	air officer
AOA	amphibious objective area
AOF	azimuth of fire
ARFOR	Army forces
ASCS	air support control section
ASOC	air support operations center
ATCS	air traffic control section
ATO	air tasking order
AWACS	Airborne Warning and Control System
BCD	battlefield coordination detachment
BDA	battle damage assessment
BN	battalion
BOS	battlefield operating system
BP	battle position
C2	command and control
C3	command, control, and communications
CAP	crisis action planning
CAS	close air support
CBU	cluster bomb unit
CCIP	continuously computed impact point
CCIR	commander's critical information requirement
CEOI	communications-electronics operating instructions
CFL	coordinated fire line

CID	combat identification
CLT	combat lasing team
COA	course of action
COC	combat operations center
COE	concept of employment
COF	conduct of fire
COLT	combat observation and lasing team
COMAFFOR	commander, Air Force forces
COMMARFOR	commander, Marine Corps forces
COMNAVFOR	commander, Navy forces
CONOPS	concept of operations
CP	contact point
CRC	control and reporting center
DASC	direct air support center
DASC(A)	direct air support center (airborne)
EFST	essential fire support task
ELINT	electronic intelligence
EMCON	emission control
EO	electro-optical
EW	electronic warfare
FAC	forward air controller
FAC(A)	forward air controller (airborne)
FARP	forward arming and refueling point
FDC	fire direction center
FFA	free-fire area
FFCC	force fires coordination center
FIST	fire support team
FLIR	forward-looking infrared
FLOT	forward line of own troops
FM	field manual
FOB	forward operating base
FP	firing point
FPF	final protective fire
FSC	fire support coordinator
FSCC	fire support coordination center
FSCL	fire support coordination line
FSCM	fire support coordinating measure
FSE	fire support element
FSEM	fire support execution matrix
FSO	fire support officer
G-3	operations staff officer
GCE	ground combat element
GCP	ground commander's pointer
GLINT	gated laser intensifier

GLTD	ground laser target designator
GPS	global positioning system
GTL	gun target line
HA	holding area
HDC	helicopter direction center
HF	high frequency
HHQ	higher headquarters
HIDACZ	high-density airspace control zone
HPTL	high-payoff target list
HQ	headquarters
HR	helicopter request
HUMINT	human intelligence
INFLTREP	inflight report
INS	inertial navigation system
IP	initial point
IR	infrared
ISR	intelligence, surveillance, and reconnaissance
J-6	command, control, communications, and computer systems directorate of a joint staff
JAAT	joint air attack team
JAOC	joint air operations center
JCEOI	joint communications-electronics operating instructions
JFACC	joint force air component commander
JFC	joint force commander
JFLCC	joint force land component commander
JFSOCC	joint force special operations component commander
JIPB	joint intelligence preparation of the battlespace
JOA	joint operations area
JP	joint publication
JSOAC	joint special operations air component
JSOACC	joint special operations air component commander
JSTARS	Joint Surveillance Target Attack Radar System
JTAC	joint terminal attack controller
JTAR	joint tactical air strike request
JTTP	joint tactics, techniques, and procedures
km	kilometer
LF	landing force
LGB	laser-guided bomb
LGM	laser-guided missile
LGW	laser-guided weapon
LOAC	law of armed conflict
LOAL	lock-on after launch
LOBL	lock-on before launch

LOS	line of sight
LRF	laser range finder
LST	laser spot tracker
LTD	laser target designator
MACCS	Marine air command and control system
MACG	Marine air control group
MAGTF	Marine air-ground task force
MANPADS	man-portable air defense system
MAXORD	maximum ordinate
MCRP	Marine Corps reference publication
MCWP	Marine Corps warfare publication
MEDEVAC	medical evacuation
METT-T	mission, enemy, terrain and weather, troops and support available-time available
MISREP	mission report
MRR	minimum-risk route
MSL	mean sea level
NAI	named area of interest
NATO	North Atlantic Treaty Organization
NCS	net control station
NFA	no-fire area
NGLO	naval gunfire liaison officer
nm	nautical mile
NOE	nap-of-the-earth
NSFS	naval surface fire support
NTACS	Navy tactical air control system
NVD	night vision device
NVG	night vision goggle
NWP	naval warfare publication
O&I	operations and intelligence
OPCON	operational control
OPLAN	operation plan
OPORD	operation order
OSC	on-scene commander
PI	probability of incapacitation
POF	priority of fires
PRF	pulse repetition frequency
R&S	reconnaissance and surveillance
RFL	restrictive fire line
ROE	rules of engagement
ROZ	restricted operations zone
S-3	battalion/brigade operations staff officer

SA	situational awareness
SACC	supporting arms coordination center
SAM	surface-to-air missile
SAR	synthetic aperture radar
SATCOM	satellite communications
SCL	standard conventional load
SEAD	suppression of enemy air defenses
SINCGARS	Single-Channel Ground and Airborne Radio System
SOCCE	special operations command and control element
SOF	special operations forces
SOI	signal operating instructions
SOLE	special operations liaison element
SOP	standing operating procedure
SPINS	special instructions
SSB	single side band
TAC	terminal attack controller
TAC(A)	tactical air coordinator (airborne)
TACC	tactical air control center
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 areas of interest
TAOC	tactical air operations center
TAR	tactical air request
TATC	tactical air traffic control
TGO	terminal guidance operations
TLE	target location error
TOC	tactical operations center
TOT	time on target
TPME	task, purpose, method, and effects
TRAP	tactical recovery of aircraft and personnel (USMC)
TTP	tactics, techniques, and procedures
TTT	time to target
UAV	unmanned aerial vehicle
UHF	ultra-high frequency
USAF	United States Air Force
USMC	United States Marine Corps
USMTF	US message text formatting
USN	United States Navy
VHF	very high frequency
WOC	wing operations center
WP	white phosphorous

PART II — TERMS AND DEFINITIONS

airborne battlefield command and control center. None. (Approved for removal from the next edition of JP 1-02.)

air fire plan. None. (Approved for removal from the next edition of JP 1-02.)

Air Force air and space operations center. The senior agency of the Air Force component commander that provides command and control of Air Force air and space operations and coordinates with other components and Services. Also called AFAOC. (This term and its definition modify the term "air operations center" and its definition and are approved for inclusion in the next edition of JP 1-02.)

air ground operations system. None. (Approved for removal from the next edition of JP 1-02.)

air interdiction. Air operations conducted to destroy, neutralize, or delay the enemy's military potential before it can be brought to bear effectively against friendly forces at such distance from friendly forces that detailed integration of each air mission with the fire and movement of friendly forces is not required. (JP 1-02)

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. An air liaison officer is usually an aeronautically rated officer. Also called ALO. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

airspace control authority. The commander designated to assume overall responsibility for the operation of the airspace control system in the airspace control area. Also called ACA. (JP 1-02)

airspace control order. An order implementing the airspace control plan that provides the details of the approved requests for airspace control measures. It is published either as part of the air tasking order or as a separate document. Also called ACO. (JP 1-02)

airspace control plan. The document approved by the joint force commander that provides specific planning guidance and procedures for the airspace control system for the joint force area of responsibility and/or joint operations area. Also called ACP. (JP 1-02)

airspace coordination area. A three-dimensional block of airspace in a target area, established by the appropriate ground commander, in which friendly aircraft are reasonably safe from friendly surface fires. The airspace coordination area may be formal or informal. Also called ACA. (JP 1-02)

air superiority. That degree of dominance in the air battle of one force over another that permits the conduct of operations by the former and its related land, sea, and air forces at a given time and place without prohibitive interference by the opposing force. (JP 1-02)

air support operations center. The principal air control agency of the theater air control system responsible for the direction and control of air operations directly supporting the ground combat element. It processes and coordinates requests for immediate air support and coordinates air missions requiring integration with other supporting arms and ground forces. It normally collocates with the Army tactical headquarters senior fire support coordination center within the ground combat element. Also called ASOC. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

area air defense commander. Within a unified command, subordinate unified command, or joint task force, the commander will assign overall responsibility for air defense to a single commander. Normally this will be the component commander with the preponderance of air defense capability and the command, control, and communication capability to plan and execute integrated air defense operations. Representation from the other components involved will be provided, as appropriate, to the area air defense commander's headquarters. Also called AADC. (JP 1-02)

Army air-ground system. The Army system which provides for interface between Army and tactical air support agencies of other Services in the planning, evaluating, processing, and coordinating of air support requirements and operations. It is composed of appropriate staff members, including G-2 air and G-3 air personnel, and necessary communication equipment. Also called AAGS. (JP 1-02)

attack heading. 1. The interceptor heading during the attack phase that will achieve the desired track-crossing angle. 2. The assigned magnetic compass heading to be flown by aircraft during the delivery phase of an air strike. (JP 1-02)

battle damage assessment. The timely and accurate estimate of damage resulting from the application of military force, either lethal or non-lethal, against a predetermined objective. Battle damage assessment can be applied to the employment of all types of weapon systems (air, ground, naval, and special forces weapon systems) throughout the range of military operations. Battle damage assessment is primarily an intelligence responsibility with required inputs and coordination from the operators. Battle damage assessment is composed of physical damage assessment, functional damage assessment, and target system assessment. Also called BDA. (JP 1-02)

boundary. A line that delineates surface areas for the purpose of facilitating coordination and deconfliction of operations between adjacent units, formations, or areas. (JP 1-02)

close air support. Air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces. Also called CAS. (JP 1-02)

command and control. The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in

planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. Also called C2. (JP 1-02)

concept of operations. A verbal or graphic statement, in broad outline, of a commander's assumptions or intent in regard to an operation or series of operations. The concept of operations frequently is embodied in campaign plans and operation plans; in the latter case, particularly when the plans cover a series of connected operations to be carried out simultaneously or in succession. The concept is designed to give an overall picture of the operation. It is included primarily for additional clarity of purpose. Also called commander's concept or CONOPS. (JP 1-02)

continue. Term used by a qualified terminal attack controller, who has assumed control of an attacking aircraft. Grants clearance to continue present maneuver; does not imply a change in clearance to engage or expend ordnance. (This term and its definition are applicable only in the context of this publication and cannot be referenced outside this publication.)

coordinating altitude. A procedural airspace control method to separate fixed- and rotary-wing aircraft by determining an altitude below which fixed-wing aircraft will normally not fly and above which rotary-wing aircraft normally will not fly. The coordinating altitude is normally specified in the airspace control plan and may include a buffer zone for small altitude deviations. (JP 1-02)

direct air support center. The principal air control agency of the US Marine air command and control system responsible for the direction and control of air operations directly supporting the ground combat element. It processes and coordinates requests for immediate air support and coordinates air missions requiring integration with ground forces and other supporting arms. It normally collocates with the senior fire support coordination center within the ground combat element and is subordinate to the tactical air command center. Also called DASC. (JP 1-02)

direct air support center (airborne). An airborne aircraft equipped with the necessary staff personnel, communications, and operations facilities to function as a direct air support center. Also called DASC-A. (JP 1-02)

direct fire. Fire delivered on a target using the target itself as a point of aim for either the weapon or the director. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

direct support. A mission requiring a force to support another specific force and authorizing it to answer directly to the supported force's request for assistance. Also called DS. (JP 1-02)

electronic warfare. Any military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. Also called EW. The three major subdivisions within electronic warfare are: electronic attack, electronic protection, and electronic warfare support. a. electronic attack. That division of electronic warfare involving the use of electromagnetic energy, directed energy, or antiradiation weapons to attack personnel, facilities, or equipment with the intent of degrading,

neutralizing, or destroying enemy combat capability and is considered a form of fires. Also called EA. EA includes: 1) actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum, such as jamming and electromagnetic deception, and 2) employment of weapons that use either electromagnetic or directed energy as their primary destructive mechanism (lasers, radio frequency weapons, particle beams). b. electronic protection. That division of electronic warfare involving passive and active means taken to protect personnel, facilities, and equipment from any effects of friendly or enemy employment of electronic warfare that degrade, neutralize, or destroy friendly combat capability. Also called EP. c. electronic warfare support. That division of electronic warfare involving actions tasked by, or under direct control of, an operational commander to search for, intercept, identify, and locate or localize sources of intentional and unintentional radiated electromagnetic energy for the purpose of immediate threat recognition, targeting, planning and conduct of future operations. Thus, electronic warfare support provides information required for decisions involving electronic warfare operations and other tactical actions such as threat avoidance, targeting, and homing. Also called ES. Electronic warfare support data can be used to produce signals intelligence, provide targeting for electronic or destructive attack, and produce measurement and signature intelligence. (JP 1-02)

emission control. The selective and controlled use of electromagnetic, acoustic, or other emitters to optimize command and control capabilities while minimizing, for operations security: a. detection by enemy sensors; b. mutual interference among friendly systems; and/or c. enemy interference with the ability to execute a military deception plan. Also called EMCON. (JP 1-02)

fires. The effects of lethal or nonlethal weapons. (JP 1-02)

fire support. Fires that directly support land, maritime, amphibious, and special operations forces to engage enemy forces, combat formations, and facilities in pursuit of tactical and operational objectives. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

fire support coordinating measure. A measure employed by land or amphibious commanders to facilitate the rapid engagement of targets and simultaneously provide safeguards for friendly forces. Also called FSCM. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

fire support coordination. The planning and executing of fire so that targets are adequately covered by a suitable weapon or group of weapons. (JP 1-02)

fire support coordination center. A single location in which are centralized communications facilities and personnel incident to the coordination of all forms of fire support. Also called FSCC. (JP 1-02)

fire support coordination line. A fire support coordinating measure that is established and adjusted by appropriate land or amphibious force commanders within their boundaries in consultation with superior, subordinate, supporting, and affected commanders. Fire support coordination lines (FSCLs) facilitate the expeditious attack of surface targets of opportunity beyond the coordinating measure. An FSCL does not divide an area of operations by

defining a boundary between close and deep operations or a zone for close air support. The FSCL applies to all fires of air, land, and sea-based weapons systems using any type of ammunition. Forces attacking targets beyond an FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid fratricide. Supporting elements attacking targets beyond the FSCL must ensure that the attack will not produce adverse attacks on, or to the rear of, the line. Short of an FSCL, all air-to-ground and surface-to-surface attack operations are controlled by the appropriate land or amphibious force commander. The FSCL should follow well-defined terrain features. Coordination of attacks beyond the FSCL is especially critical to commanders of air, land, and special operations forces. In exceptional circumstances, the inability to conduct this coordination will not preclude the attack of targets beyond the FSCL. However, failure to do so may increase the risk of fratricide and could waste limited resources. Also called FSCL. (JP 1-02)

fire support team. A team provided by the field artillery component to each maneuver company and troop 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. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

forward air controller. An officer (aviator/pilot) member of the tactical air control party who, from a forward ground or airborne position, controls aircraft in close air support of ground troops. Also called FAC. (JP 1-02)

forward air controller (airborne). A specifically trained and qualified aviation officer who exercises control from the air of aircraft engaged in close air support of ground troops. The forward air controller (airborne) is normally an airborne extension of the tactical air control party. Also called FAC(A). (JP 1-02)

forward arming and refueling point. A temporary facility — organized, equipped, and deployed by an aviation commander, and normally located in the main battle area closer to the area where operations are being conducted than the aviation unit's combat service area — to provide fuel and ammunition necessary for the employment of aviation maneuver units in combat. The forward arming and refueling point permits combat aircraft to rapidly refuel and rearm simultaneously. Also called FARP. (JP 1-02)

forward edge of the battle area. The foremost limits of a series of areas in which ground combat units are deployed, excluding the areas in which the covering or screening forces are operating, designated to coordinate fire support, the positioning of forces, or the maneuver of units. Also called FEBA. (JP 1-02)

forward line of own troops. A line that indicates the most forward positions of friendly forces in any kind of military operation at a specific time. The forward line of own troops (FLOT) normally identifies the forward location of covering and screening forces. The FLOT may be at, beyond, or short of the forward edge of the battle area. An enemy FLOT indicates the forward-most position of hostile forces. Also called FLOT. (JP 1-02)

forward-looking infrared. An airborne, electro-optical thermal imaging device that detects far-infrared energy, converts the energy into an electronic signal, and provides a visible

image for day or night viewing. Also called FLIR. (JP 1-02)

forward operating base. An airfield used to support tactical operations without establishing full support facilities. The base may be used for an extended time period. Support by a main operating base will be required to provide backup support for a forward operating base. Also called FOB. (JP 1-02)

free-fire area. A specific area into which any weapon system may fire without additional coordination with the establishing headquarters. (JP 1-02)

general support. 1. That support which is given to the supported force as a whole and not to any particular subdivision thereof. 2. A tactical artillery mission. Also called GS. (JP 1-02)

high-density airspace control zone. Airspace designated in an airspace control plan or airspace control order, in which there is a concentrated employment of numerous and varied weapons and airspace users. A high-density airspace control zone has defined dimensions which usually coincide with geographical features or navigational aids. Access to a high-density airspace control zone is normally controlled by the maneuver commander. The maneuver commander can also direct a more restrictive weapons status within the high-density airspace control zone. Also called HIDACZ. (JP 1-02)

high-payoff target. A target whose loss to the enemy will significantly contribute to the success of the friendly course of action. High-payoff targets are those high-value targets that must be acquired and successfully attacked for the success of the friendly commander's mission. Also called HPT. (JP 1-02)

high-value target. A target the enemy commander requires for the successful completion of the mission. The loss of high-value targets would be expected to seriously degrade important enemy functions throughout the friendly commander's area of interest. Also called HVT. (JP 1-02)

immediate air support. Air support to meet specific requests which arise during the course of a battle and which by their nature cannot be planned in advance. (JP 1-02)

immediate mission request. A request for an air strike on a target that, by its nature, could not be identified sufficiently in advance to permit detailed mission coordination and planning. (JP 1-02)

infrared pointer. A low power laser device operating in the near infrared light spectrum that is visible with light amplifying night vision devices. Also called IR pointer. (JP 1-02)

interdiction. An action to divert, disrupt, delay, or destroy the enemy's surface military potential before it can be used effectively against friendly forces. (JP 1-02)

joint air attack team. A combination of attack and/or scout rotary-wing aircraft and fixed-wing close air support aircraft operating together to locate and attack high-priority targets and other targets of opportunity. The joint air attack team normally operates as a coordinated effort supported by fire support, air defense artillery, naval surface fire support, intelligence,

surveillance, and reconnaissance systems, electronic warfare systems, and ground maneuver forces against enemy forces. Joint terminal attack controllers may perform duties as directed by the air mission commander in support of the ground commander's scheme of maneuver. Also called JAAT. (Approved for inclusion in the next edition of JP 1-02.)

joint air operations. Air operations performed with air capabilities/forces made available by components in support of the joint force commander's operation or campaign objectives, or in support of other components of the joint force. (JP 1-02)

joint air operations center. A jointly staffed facility established for planning, directing, and executing joint air operations in support of the joint force commander's operation or campaign objectives. Also called JAOC. (JP 1-02)

joint fires. Fires produced during the employment of forces from two or more components in coordinated action toward a common objective. (JP 1-02)

joint fires element. An optional staff element that provides recommendations to the operations directorate to accomplish fires planning and synchronization. Also called JFE. (JP 1-02)

joint fire support. Joint fires that assist land, maritime, amphibious, and special operations forces to move, maneuver, and control territory, populations, and key waters. (JP 1-02)

joint force air component commander. The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for making recommendations on the proper employment of assigned, attached, and/or made available for tasking air forces; planning and coordinating air operations; or accomplishing such operational missions as may be assigned. The joint force air component commander is given the authority necessary to accomplish missions and tasks assigned by the establishing commander. Also called JFACC. (JP 1-02)

joint force commander. A general term applied to a combatant commander, subunified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a joint force. Also called JFC. (JP 1-02)

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. A qualified and current joint terminal attack controller will be recognized across the Department of Defense as capable and authorized to perform terminal attack control. Also called JTAC. (Approved for inclusion in the next edition of JP 1-02.)

Marine air command and control system. A system that provides the aviation combat element commander with the means to command, coordinate, and control all air operations within an assigned sector and to coordinate air operations with other Services. It is composed of command and control agencies with communications-electronics equipment that incorporates a capability from manual through semiautomatic control. Also called MACCS. (JP 1-02)

naval surface fire support. Fire provided by Navy surface gun and missile systems in support of a unit or units. Also called NSFS. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

night vision device. Any electro-optical device that is used to detect visible and infrared energy and provide a visible image. Night vision goggles, forward-looking infrared, thermal sights, and low light level television are night vision devices. Also called NVD. (JP 1-02)

night vision goggle(s). An electro-optical image intensifying device that detects visible and near-infrared energy, intensifies the energy, and provides a visible image for night viewing. Night vision goggles can be either hand-held or helmet-mounted. Also called NVG. (JP 1-02)

no-fire area. An area designated by the appropriate commander into which fires or their effects are prohibited. Also called NFA. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

preplanned air support. Air support in accordance with a program, planned in advance of operations. (JP 1-02)

preplanned mission request. A request for an air strike on a target that can be anticipated sufficiently in advance to permit detailed mission coordination and planning. (JP 1-02)

procedure word. A word or phrase limited to radio telephone procedure used to facilitate communication by conveying information in a condensed standard form. Also called proword. (JP 1-02)

restrictive fire area. An area in which specific restrictions are imposed and into which fires that exceed those restrictions will not be delivered without coordination with the establishing headquarters. Also called RFA. (JP 1-02)

restrictive fire line. A line established between converging friendly surface forces that prohibits fires or their effects across that line. Also called RFL. (JP 1-02)

rules of engagement. Directives issued by competent military authority that delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered. Also called ROE. (JP 1-02)

supporting arms coordination center. A single location on board an amphibious command ship in which all communication facilities incident to the coordination of fire support of the artillery, air, and naval gunfire are centralized. This is the naval counterpart to the fire support coordination center utilized by the landing force. Also called SACC. (JP 1-02)

suppression of enemy air defenses. That activity which neutralizes, destroys, or temporarily degrades surface-based enemy air defenses by destructive and/or disruptive means. Also called SEAD. (JP 1-02)

surface-to-air weapon. A surface-launched weapon for use against airborne targets. Examples include missiles, rockets, and air defense guns. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

synchronized clock. A technique of timing the delivery of fires by placing all units on a common time. The synchronized clock uses a specific hour and minute based on either local or universal time. Local time is established using the local time zone. (JP 1-02)

tactical air command center. The principal US Marine Corps air command and control agency from which air operations and air defense warning functions are directed. It is the senior agency of the US Marine air command and control system that serves as the operational command post of the aviation combat element commander. It provides the facility from which the aviation combat element commander and his battle staff plan, supervise, coordinate, and execute all current and future air operations in support of the Marine air-ground task force. The tactical air command center can provide integration, coordination, and direction of joint and combined air operations. Also called Marine TACC. (Approved for inclusion in the next edition of JP 1-02.)

tactical air control center. The principal air operations installation (ship-based) from which all aircraft and air warning functions of tactical air operations are controlled. Also called Navy TACC. (JP 1-02)

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. (Approved for inclusion in the next edition of JP 1-02.)

tactical air coordinator (airborne). An officer who coordinates, from an aircraft, the actions of other aircraft engaged in air support of ground or sea forces. Also called TAC(A). (JP 1-02)

tactical air direction center. An air operations installation under the overall control of the Navy tactical air control center (afloat)/Marine Corps tactical air command center, from which aircraft and air warning service functions of tactical air operations in support of amphibious operations are directed. Also called TADC. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

tactical air operations center. The principal air control agency of the US Marine air command and control system responsible for airspace control and management. It provides real time surveillance, direction, positive control, and navigational assistance for friendly aircraft. It performs real time direction and control of all antiair warfare operations, to include manned interceptors and surface-to-air weapons. It is subordinate to the tactical air command center. Also called TAOC. (JP 1-02)

targeting. The process of selecting and prioritizing targets and matching the appropriate response to them, taking account of operational requirements and capabilities. (JP 1-02)

target reference point. A predetermined point of reference, normally a permanent structure or terrain feature, that can be used when describing a target location. (This term and its definition are applicable only in the context of this publication and cannot be referenced outside this publication).

terminal attack control. The authority to control the maneuver of and grant weapons release clearance to attacking aircraft. (Approved for inclusion in the next edition of JP 1-02.)

terminal control. 1. The authority to direct aircraft to maneuver into a position to deliver ordnance, passengers, or cargo to a specific location or target. Terminal control is a type of air control. 2. Any electronic, mechanical, or visual control given to aircraft to facilitate target acquisition and resolution. See also terminal guidance. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

terminal guidance. 1. The guidance applied to a guided missile between midcourse guidance and arrival in the vicinity of the target. 2. Electronic, mechanical, visual, or other assistance given an aircraft pilot to facilitate arrival at, operation within or over, landing upon, or departure from an air landing or airdrop facility. 3. Any electronic, mechanical, voice or visual communication that provides approaching aircraft or weapons additional information regarding a specific location or target. Terminal guidance is not a type of air control. Those providing terminal guidance do not have weapons release authority, or authority to direct the maneuver of aircraft. See also terminal control. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

thermal crossover. The natural phenomenon that normally occurs twice daily when temperature conditions are such that there is a loss of contrast between two adjacent objects on infrared imagery. (JP 1-02)

time on target. 1. Time at which aircraft are scheduled to attack/photograph the target. 2. The actual time at which aircraft attack/photograph the target. 3. The time at which a nuclear detonation as planned at a specified desired ground zero. Also called TOT. (This term and its definition modify the existing term and its definition and are approved for inclusion in the next edition of JP 1-02.)

time to target. The number of minutes and seconds to elapse before aircraft ordnance impacts on target. Also called TTT. (JP 1-02)

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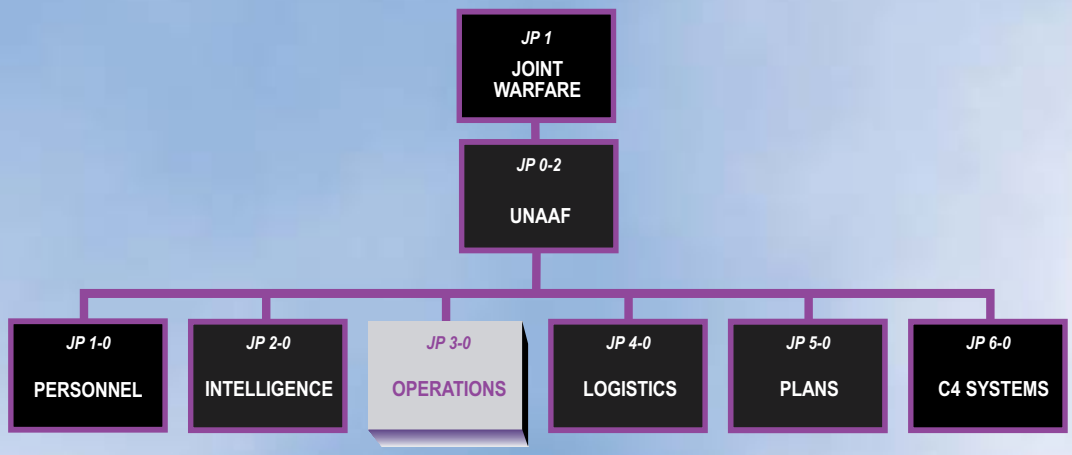
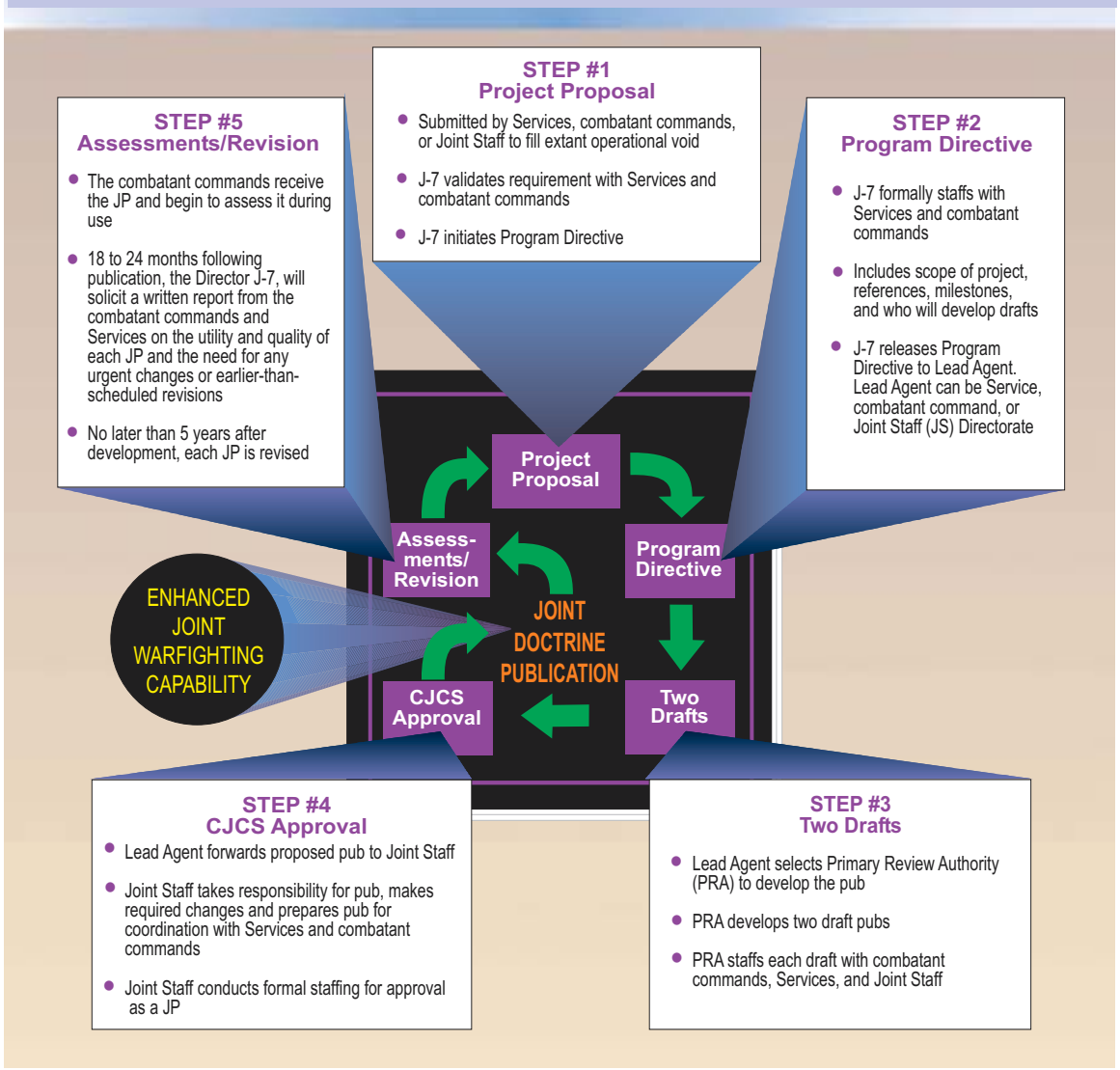


All joint doctrine and tactics, techniques, and procedures are organized into a comprehensive hierarchy as shown in the chart above. **Joint Publication (JP) 3-09.3** is in the **Operations** series of joint doctrine publications. The diagram below illustrates an overview of the development process:



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