Joint Publication 3-09.3

Close Air Support

08 July 2009

PREFACE

1. Scope

This publication provides joint doctrine for planning and executing close air support.

2. Purpose

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

3. Application

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

b. The guidance in this publication is authoritative; as such, this doctrine will be followed except when, in the judgment of the commander, exceptional circumstances dictate otherwise. If conflicts arise between the contents of this publication and the contents of Service publications, this publication will take precedence unless the 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:

B.E. GROOMS
Rear Admiral, USN
Vice Director, Joint Staff

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SUMMARY OF CHANGES
JOINT PUBLICATION 3-09.3
DATED 03 SEPTEMBER 2003

- **Title changed from "Joint Tactics, Techniques, and Procedures for Close Air Support" to "Close Air Support."**
- **Adds the term "forward air controller (airborne) (FAC(A))" to all references of "joint terminal attack controller (JTAC)" thereby creating "JTAC/ FAC(A)" reference throughout the publication.**
- **Defines the terms "unmanned aircraft (UA)" and "unmanned aerial system (UAS)" per the Joint UAS Center of Excellence (JCOE).**
- **Uses the acronym "TAC" for "terminal attack control" throughout the publication.**
- **Replaces the term "fire support element (FSE)" with "fires cell (FC)."**
- **Changes acronym for "Air Force air and space operations center" from "AF AOC" to "AOC."**
- **Explains terminal guidance operations (TGO) and its relation to CAS.**
- **Redefines the term "troops in contact (TIC)."**
- **Adds detailed discussion pertaining to target location error (TLE) and guidance for application in CAS targeting and approval.**
- **Adds specific examples for passage of final attack headings / restrictions.**
- **Corrections made to correct altitudes to feet in reference to mean-sea level (MSL) in the fire separation game plan discussions.**
- **Provides guidance for using visual cues during Type 2 and Type 3 control.**
- **Establishes when changes to the type of terminal attack control may be made.**
- **Clarifies tactical air coordinator (airborne) (TAC(A)) duties and planning responsibilities.**
- **Provides FAC(A) integration and planning considerations.**
- **Clarifies inertial aided munitions (IAM) procedures.**

- **Adds guidance and procedural amplification in multiple places for use of ground based laser and infrared marking devices used during terminal attack control.**
- **Provides digital information systems and video down-link (VDL) considerations.**
- **Clarifies bomb on coordinate (BOC) and bomb on target (BOT) procedures.**
- **Clarifies responsibility for fratricide when conducting non-JTAC controlled attacks.**
- **Expands and updates "talk-on" procedures and considerations, to include a new reference figure.**
- **Explains the differences between close air support (CAS) and close combat attack (CCA).**
- **Updates discussion of fire support coordination measures (FSCMs) and the fire support coordination line (FSCL).**
- **Provides unmanned aerial system (UAS) integration and UAS CAS tactics.**
- **Updates bomber CAS considerations.**

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- **Describes Planning and Requesting Close Air Support**
- **Discusses Preparations for Close Air Support**
- **Outlines Execution of Close Air Support**

Overview

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

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

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 CAS capabilities into the concept of operations (CONOPS).

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 **forward air controller (airborne)** (FAC[A]) is a specifically trained and qualified aviation officer who exercises control from the air of aircraft and indirect fires engaged in close air support of ground troops. A certified and qualified JTAC or FAC[A] will be recognized across the Department of Defense as capable and authorized to perform terminal attack control (TAC).

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 operational area. **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, air tasking order (ATO), airspace control order, and special instructions provide the framework for integrating joint air operation's CAS into commander's CONOPS.

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

All participants in the CAS employment process are responsible for the effective and safe planning and execution of CAS.

Casualties to friendly forces caused by friendly fire, are an unwanted consequence of warfare. Items such as **detailed mission planning**, **standardized procedure**s 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/air officer** and **air liaison officer coordination**, and **sound clearance of fires procedures** can **significantly reduce the likelihood of fratricide**.

Command and Control Relationships

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, using host component organic C2 architecture. **The JFACC tasks capabilities/forces are made available for joint tasking through the joint air operations center and appropriate Service component C2 systems.**

The **theater air control system (TACS)** is the commander, Air Force forces' mechanism for commanding and controlling component air and space power. The commander, Air Force forces' focal point for tasking and exercising OPCON over Air Force forces is the Air Force air and space operations center, which is the senior element of the TACS.

When appropriate, Army Air-Ground System (AAGS) may be clearly related to and interconnected with the United States Air Force TACS. Together, these systems are known as "TACS/AAGS."

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

TAC 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**, tactical air direction center, and helicopter direction center. The Navy tactical air control center is the primary air control agency within the operational area from which all air operations supporting the amphibious task force are controlled.

The **Marine air command and control system** consists of various air C2 agencies designed to provide the Marine air-ground task force aviation combat element commander with the ability to monitor, supervise, and influence the application of Marine aviation's six functions (antiair warfare, offensive air support, electronic warfare, air reconnaissance, control of aircraft and missiles, and assault support). The commander, Marine Corps forces focal point for tasking and exercising OPCON over Marine Corps air assets is the **Marine tactical air control center**.

Principal organizations and personnel that support coordination of CAS for special operations forces are the special operations liaison element, the special operations C2 element, and

Theater special operations are normally under the control of the joint force special operations component commander. Control of special operations forces air is normally exercised by a joint special operations air component, if designated by the joint force special operations component commander. If a joint special operations air component has not been designated, then

joint terminal attack controller qualified special operations forces personnel.

the special operations forces air is controlled by its Service component within the joint force special operations command.

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 countermeasures and emission control, and through the interoperable communications nets of the components. There are numerous others within the C2 systems that could be used in extreme situations. These nets are designed to provide communications redundancy.

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

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

Planning and Requesting Close Air Support

CAS planners actively participate with the ground commander to provide CAS-related inputs to the plan or operation order.

Orders are the means by which the commander expresses to his subordinates his objectives, intent, and decisive points, focusing on the results the commander expects to achieve — his vision of the end state of an operation. Planners must understand the commander's objectives for CAS and the utilization of CAS to best support the overall mission objective(s).

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

The CAS decision-making process is a continuous three-phase cycle (planning, preparation, and execution) that has been tailored for joint fire support and focused specifically on CAS. Planners must understand the commander's objectives for CAS and the utilization of CAS to best support the overall mission objective(s).

The five steps in the CAS planning phase are:

Step 1: Receipt of Mission/Prepare for Mission Analysis.

Step 2: Mission Analysis.

Step 3: Course of Action (COA) Development.

Step 4: COA Analysis/War Game.

Step 5: Orders Production.

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

CAS has several planning considerations. They include:

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

CAS can support offensive, defensive, and stability operations.

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

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

Terrain can affect communications and visual line of sight for identifying the target and/or aircraft. Ceiling and visibility may affect the decision to employ low, medium, or high altitude tactics. Darkness and weather can impose several limitations on CAS employment.

Time considerations include time necessary to plan the mission and ATO cycle "cut off" times for preplanned requests.

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 by diverting preplanned missions or with on-call missions. Those CAS requirements foreseen early enough to be included in the first ATO distribution are submitted as preplanned

air support requests for CAS. Only those air support requests submitted in sufficient time to be included in the joint air tasking cycle planning phases and supported on the ATO are considered preplanned requests. Immediate requests arise from situations that develop outside the ATO planning cycle. Because these requirements cannot be identified early on, tailored ordnance loads, sensors, or platforms 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, the following: rehearsals, precombat/communication checks, and movement.

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.

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

The air officer/air liaison officer ensures tactical air control party movement is in accordance with the maneuver unit's observation plan. Most tactical air control party 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 controller s and combat operations center/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: JTAC/operations center coordination and CAS target engagement.

Key issues such as battle tracking, target nomination, airspace deconfliction and coordination, synchronization, weapons release authority, tactical risk assessment, types of TAC, and which JTAC/FAC(A)

will provide TAC must be clearly understood. **Only through effective coordination can the CAS "team" achieve the supported commander's objectives for CAS successfully.**

While theaters or specific commands may have unique requirements, JTACs, FAC(A)s, CAS aircrews, and fire supporters should be familiar with the standard formats used in passing key information between CAS participants. This begins with CAS aircraft check-in procedures, providing situation updates, and includes following standard tactics, techniques, and procedures during final attack control.

There are three types of TAC (Types 1, 2, and 3).

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

Type 2 control is used when the JTAC requires control of individual attacks and **any or all** of the conditions exist: JTAC is unable to visually acquire the attacking aircraft at weapons release, JTAC is unable to visually acquire the target, and/or the attacking aircraft is unable to acquire the mark/target prior to weapons release.

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, and **any or all** of the conditions exist: JTAC is unable to visually acquire the attacking aircraft at weapons release; JTAC is unable to visually acquire the target; and/or the attacking aircraft is unable to acquire the mark/target prior to weapons release.

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

CAS operations in limited visibility and adverse weather CAS demands a higher level of proficiency that 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.

Laser guided weapons, inertially-aided munitions, and Global Positioning System-based systems can assist in target acquisition and weapons guidance during CAS.

CONCLUSION

CAS is an element of joint fire support. Although simple in concept, **CAS requires detailed planning, coordination, and training for effective and safe execution.** While the focus of this publication is on CAS operations, these tactics, techniques, and procedures may be used for non-CAS missions that require TAC but do not require detailed integration with the fire and movement of ground force assets.

This publication provides joint doctrine for planning and executing close air support.

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."

Excerpt from Case Studies in the Development of Close Air Support,
I.B. Holley, JR., B.F. Cooley, Office of Air Force History, 1990

1. Introduction

a. Close air support (CAS) is an element of joint fire support. **Although simple in concept, CAS requires detailed planning, coordination, and training for effective and safe execution.** 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 target priority, effects, and timing of CAS fires within the boundaries of the land, maritime, SOF, or amphibious force operational areas.

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

2. Close Air Support Defined

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

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

c. **CAS can be conducted at any place and time friendly forces are in close proximity to enemy forces.** The word "close" does not imply a specific distance; rather, it is situational. **The requirement for detailed integration** because of proximity, fires,

or movement **is the determining factor.** At times, CAS may be the best means to exploit tactical opportunities in the offense or defense. CAS provides fires to destroy, disrupt, suppress, fix, harass, neutralize, or delay enemy forces.

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

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 certified and qualified JTAC or forward air controller (airborne) (FAC[A]) will be recognized across the Department of Defense as capable and authorized to perform TAC. In CAS operations, TAC is the authority to control the maneuver of and grant weapons release clearance to attacking aircraft.

f. **Forward Air Controller (Airborne).** A FAC(A) is a specifically trained and qualified aviation officer who exercises control from the air of aircraft and indirect fires engaged in CAS of ground troops. The FAC(A) provides coordination and terminal attack control for CAS missions as well as locating and marking ground targets.

(1) The FAC(A) mission is normally accomplished by a FW (fighter or attack) or RW (attack) aircraft operating either as a single-ship or two ship (section in Navy/Marine Corps vernacular). The United States Air Force (USAF) employs both A-10s and F-16s in the FAC(A) role. The United States Marine Corps (USMC) employs FA-18A/C/D and AV-8B aircraft as fixed wing FAC(A) platforms. RW FAC(A) is provided by Marine Corps AH-1W/Z and UH-1N/Y helicopters. The FA-18F performs the FAC(A) mission for the Navy.

(2) FAC(A) aircraft will usually carry unique equipment and munitions to aid in its role. Such equipment and munitions include white phosphorus (WP) rockets, red phosphorus and high explosive (HE) incendiary rounds as gun ammunition. These munitions aid the FAC(A) in the marking of targets for CAS aircraft. For night missions, most FW and RW FAC(A) platforms can carry overt or covert illumination rockets, with the OA-10, FA-18A+/C/D and AV-8B also carrying/employing LUU-series flares (LUU 2/19). In combat, FAC(A)s will typically be loaded with advanced targeting pods (ATPs) such as Sniper and/or Litening and can aid in finding and fixing potential targets. As ATP availability is currently sparse, legacy pods may be used for peacetime training missions. ATPs will typically have increased resolution over older pods, an infrared (IR) pointer for night employment, laser spot search (LSS)/track capability, and the ability to transmit full motion video (FMV)/video downlink (VDL) to the ground-based VDL systems. ATPs aid the FAC(A) with target coordinate generation for the JTAC. Target location error (TLE) for FAC(A) derived coordinates will vary based on platform, software suite, sensors employed, and aircraft position in relation to the target, but is generally Category (CAT) III or better (less than 100 feet [ft]/30 meters of TLE).

(3) FAC(A)s are capable of performing radio relay, reconnaissance, indirect fires call-for-fire, asset coordination and deconfliction, battle damage assessment (BDA), target marking, designation and coordinate generation, coordinate suppression of enemy air defenses (SEAD) and TAC.

g. 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 are, and will likely continue to be, instances where terminal attack control will be requested by personnel/units that do not have JTACs present. In these instances, JTACs, FAC(A)s, and/or CAS aircrews should attempt to assist these personnel/units to the greatest extent possible to bring fires to bear in support of their combat operations.

See Chapter V, "Execution," *subparagraph 2i,* "CAS Execution with Non-JTAC Personnel."

Joint terminal attack controllers on the ground coordinate and issue clearance for air delivered fires.

3. Use of Close Air Support

CAS is used to attack the enemy in support of the commander's CONOPS, in a variety of environmental conditions, during day or night, and to augment other supporting fires. The **speed, range, and maneuverability of aircrafts 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 operational area.** 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 target priority, effects, and timing of CAS fires within an

operational area and optimally make decisions with the advice and guidance of specially trained personnel.

a. **Battlefield Utility. CAS provides commanders with flexible and responsive fire support.** Using CAS, **commanders can take full advantage of battlefield opportunities** by massing firepower to maintain the momentum of an offensive action or reduce operational and tactical 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 CONOPS.

(2) Enemy disposition, composition, and strength.

(3) Capabilities and limitations of available aircraft and available ordnance (e.g., on station time, on board precision targeting, precision ordnance circular error (CE), (CE50/90) net explosive weight).

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

(5) Rules of engagement (ROE).

(6) Special instructions (SPINS).

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

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

(9) Apportionment decision and allocation of CAS sorties.

(10) Collateral damage estimate.

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 details such as target type, mission, enemy, air defenses, terrain and weather, available armament, and response time. Other considerations include attack geometry, proximity of friendly forces, potential for collateral damage, capability of available sensors, and other fire support available. Aircrews retain primary responsibility

for developing weaponeering recommendations, while the JTAC/FAC(A) focuses on target effects. Additionally, JTAC/FAC(A)s and CAS aircrew must expeditiously obtain and report BDA information. Commanders, JTAC/FAC(A)s and CAS 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 operational area. **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 SPINS provide the framework for integrating joint air operation's CAS into commander's CONOPS.

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

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

a. Attack helicopters, FW aircraft, and unmanned aircraft (UA) have capabilities that are complementary, **especially when employed in concert.** FW aircraft have **a wide variety of munitions and excellent capability to conduct CAS in diverse terrain.** Helicopters offer the advantage of an increased loiter time and nap of the earth operations. Some UA may have very long on-station times and offer increased communications connectivity and reachback capability to ground and command and control (C2) personnel.

b. Commanders and planners typically measure **FW aircraft employment in sorties.** A sortie is a flight by one aircraft. **Normally, CAS fighter/attack aircraft fly in groups of two to four aircraft.** Bombers normally fly as single aircraft or 2-ship formations. 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 aircraft sorties during hours of darkness and under low-threat conditions.

c. **Army attack and reconnaissance aviation units** are organic to combat aviation brigades. Army helicopter units normally receive mission-type orders and will operate independently or in support of a ground maneuver element as part of the Army combined

arms team. **The Army does not consider its attack helicopters a CAS system,** although they can conduct attacks employing CAS TTP when operating in support of other forces. **The preferred employment method is as an integral unit**, operating in support 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)** maintains a small fleet of special operations aircraft, both FW and RW. These aircraft are normally used to support and conduct special operations. Non-SOF aircraft will often be called upon to support SOF.

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

6. Unmanned Aircraft Close Air Support Employment

a. UA offer the ground commander additional joint fire support assets that complement RW attack helicopters and FW CAS aircraft. Some UA have very long on-station times and offer increased communications connectivity and reach back capability to ground C2 personnel. UA normally fly single ship and at slow speed so they cannot be rapidly repositioned in response to changing situations. In the simplest scenario of UA integration into CAS, a JTAC uses UA video to build situational awareness (SA) of the target area and to locate targets that are in defilade or masked from view on the ground. Once a target has been found, the JTAC can use the video to talk a CAS aircraft onto the target and give corrections to follow-on CAS aircraft. In a more complex scenario, the JTAC can use a UA laser target designator (LTD) to designate a target for laser guided munitions from CAS aircraft onto targets. If the UA is armed, its weapons payload may be employed.

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

aircraft system (UAS) element and the supported unit are critical to effective mission planning and execution.

For further information on UAS employment, refer to FM 3-04.15, NTTP 3-55.14, AFTTP(I) 3-2.64, UAS Multi-Service Tactics, Techniques, and Procedures for the Tactical Employment of Unmanned Aircraft Systems.

7. Conditions for Effective Close Air Support

The conditions for effective CAS are: thoroughly trained personnel with well developed skills, effective planning and integration, effective C2, air superiority (especially SEAD), target marking and/or acquisition, streamlined and flexible procedures, and appropriate ordnance. Although not a requirement for CAS employment, favorable environmental conditions improve CAS effectiveness (see Figure I-1).

a. **Effective Training and Proficiency. CAS 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 conditions in the operational environment.

b. **Planning and Integration.** Effective CAS relies on thorough, coherent planning and detailed integration of air support into ground operations. The ability to mass joint fire support at a decisive point and to provide the supporting fires needed to achieve the commander's objectives is made possible through detailed integration with ground

Figure I-1. Conditions for Effective Close Air Support

forces. From a planner's perspective the preferred use of a CAS asset is to have it preplanned 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.

c. **Command and Control.** CAS requires an integrated, flexible C2 structure to identify requirements, request support, prioritize competing requirements, task units, move CAS forces to the target area, provide threat warning updates, and enhance combat identification (CID) procedures. Accordingly, C2 requires dependable and interoperable communications between aircrews, air control agencies, JTACs, ground forces, requesting commanders, and fire support agencies. The goal of C2 is integration through the balanced use of airspace and fire support coordination measures (FSCMs) so as to integrate and employ assets effectively with minimal delay in the support provided to ground forces.

For further guidance on airspace coordinating measures (ACMs), see Joint Publication (JP) 3-52, Joint Airspace Control. *For further guidance on FSCMs, see JP 3-09,* Joint Fire Support.

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.** The commander employing CAS can improve its effectiveness by providing timely and accurate target marks. Target marking builds SA, identifies specific targets in an array, reduces the possibility of fratricide and collateral damage, 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, CAS procedures must also be flexible enough to change targets, tactics, or weapons rapidly. 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) Placing CAS assets (aircraft and aircrews) at forward operating bases (FOBs) or forward operating locations near the operational area.

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

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

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

Responsive close air support provided by aircraft overhead or operating from a forward operating base allows a commander to exploit fleeting battlefield opportunities.

g. **Appropriate Ordnance.** To create the desired effects for CAS, planners, JTACs,

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

and aircrews must match the weapons and fuze settings to the target. For example, cluster and general purpose munitions are effective against area targets such as troops and vehicles in the open, but not against hardened targets, 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, if it will create the weapon effects desired, the probability for collateral damage, and the possible impact on the unit's current or subsequent mission.

h. **Environmental Conditions.** Favorable environmental conditions improve aircrew effectiveness regardless of aircraft or weapon capability. Tactical decision aids (e.g., target acquisition weather software, night vision device (NVD) planning software, IR target/scene simulation software, and integrated weather analysis aid) assist planners and operators by providing target and background detection data. **Before CAS missions are executed minimum weather conditions must be considered.** Targets located solely by radar or geographic coordinates may not offer the aircrew or JTAC precise enough information to ensure positive target identification (ID) and avoidance of fratricide. Environmental conditions may also limit the operations of one type of platform without affecting another. For example, RW aircraft can often operate effectively under low ceilings that might render FW aircraft CAS ineffective, while FW aircraft can operate above blowing surface dust that might keep helicopters grounded. Environmental conditions significantly impact the ability to use target marking devices as well and must be considered for effective CAS missions.

8. Responsibilities

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

b. **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. These commanders are responsible for ensuring that their assets are capable of executing CAS missions within Service roles and as directed by the JFC.**

9. Minimizing Fratricide

a. **General.** Casualties to friendly forces caused by friendly fire, are an unwanted consequence of warfare. **This publication's TTP are key to reducing the risk and potential of fratricide and increasing the safety and effectiveness of CAS.**

b. **Causes.** Although occasionally the result of malfunctioning weapons, **fratricide has often been the result of confusion on the battlefield.** Causes include misidentification of targets, inaccurate target locations or descriptions, target locations incorrectly transmitted or received, and loss of SA by JTACs, CAS aircrews, requestors, battle staff, or commanders. Items such as detailed mission planning, standardized procedures for 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 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 identify friendly units, enemy forces, and civilians correctly prior to targeting, clearing fires, and weapons release. CID is the process of attaining an accurate characterization of detected objects in the operational environment sufficient to support an engagement decision. Depending on the situation and the 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 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, C2, and SA 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** scenarios to simulate situations joint forces will encounter in the operational environment in order to develop the skill sets and familiarity required for success.

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CHAPTER II
COMMAND AND CONTROL

"Command and control is the means by which a joint force commander synchronizes and/or integrates joint force activities in order to achieve unity of command."

Joint Publication 1, Doctrine for the Armed Forces of the United States of America

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 USAF theater air control system (TACS), Army air-ground system (AAGS), Navy tactical air control system (NTACS), Marine air command and control system (MACCS), and special operations air-ground system (SOAGS). When all elements of the TACS, AAGS, MACCS, NTACS, and SOAGS integrate, the entire system is labeled the theater air-ground system (TAGS).

2. Close Air Support for Joint Force Operations

a. **If a command relationship is established between elements of two components, the supporting component uses the CAS C2 system of the supported component.** For example, if an Army brigade is OPCON to a MAGTF, the Army brigade submits CAS requests through the brigade fires cell (FC) to the Marine Corps force fires coordination center (FFCC) or fire support coordination center (FSCC) in the MAGTF's combat operations center (COC). The CAS request is handled the same as any other CAS request in the MACCS system.

b. **If a command relationship is not established between elements commanders (and the commander does not have sufficient organic CAS available), 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.

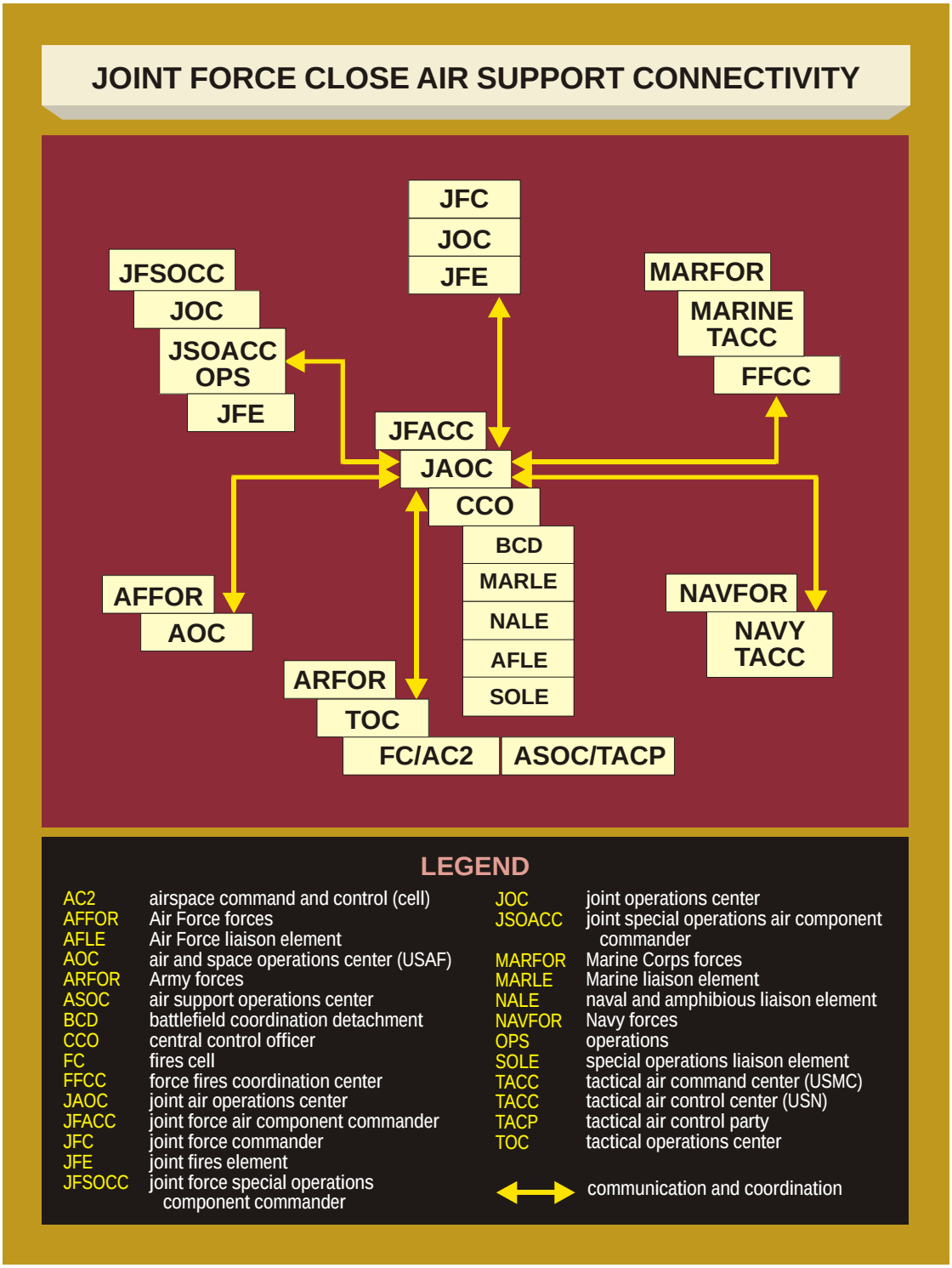

Figure II-1. Joint Force Close Air Support Connectivity

c. **Terminal Guidance Operations (TGO).** Terminal guidance is different than TAC. TGO are those actions that provide electronic, mechanical, voice, or visual communications that provide approaching aircraft and/or weapons additional information regarding a specific target location. Various ground elements or aircrews conducting a

COMPONENT AIR COMMAND AND CONTROL AGENCIES FOR CLOSE AIR SUPPORT

COMPONENT / AGENCY	United States Air Force	United States Army	United States Navy	United States Marine Corps	Special Operations Forces
TAGS ELEMENT	Theater Air Control System	Army Air-Ground System	Navy Tactical Air Control System	Marine Air Command and Control System	Special Operations Air-Ground System
AIR CONTROL CENTER	Air Force Air and Space Operations Center	Airspace Command and Control Cell	Tactical Air Control Center/ Tactical Air Direction Center	Tactical Air Command Center/ Tactical Air Direction Center	Joint Special Operations Air Component
				Tactical Air Coordinator (Airborne)	
	Control and Reporting Center		Fleet Air Warfare Coordinator	Tactical Air Operations Center	Special Operations Command and Control Element
LIAISONS TO THE JFACC	Air Force Liaison Element	Battlefield Coordination Detachment	Naval and Amphibious Liaison Element	Marine Liaison Element	Special Operations Liaison Element
AIR SUPPORT CONTROL AGENCY	Air Support Operations Center		Air Support Coordination Section	Direct Air Support Center	Joint Special Operations Air Component
	Tactical Air Coordinator (Airborne)		Tactical Air Coordinator (Airborne)	Tactical Air Coordinator (Airborne)	
FIRE SUPPORT COORDINATING ELEMENT		Fires Cell	Supporting Arms Coordination Center	Direct Air Support Center	Joint Fires Element
TACTICAL AIR SUPPORT CONTROL AGENCY	Tactical Air Control Party				
TERMINAL ATTACK ELEMENT	Forward Air Controller (Airborne)		Forward Air Controller (Airborne)	Forward Air Controller (Airborne)	
	Joint Terminal Attack Controller			Forward Air Controller/ Joint Terminal Attack Controller	Joint Terminal Attack Controller

LEGEND

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

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

wide variety of missions can search for, identify, and provide the location of targets using systems like Global Positioning System (GPS), laser designators/range finders, aircraft targeting pods, etc. Unless qualified as a JTAC or FAC(A), **personnel conducting TGO do not have the authority to control the maneuver of or grant weapons release to attacking aircraft.** These functions must be done by appropriate C2 authorities or JTAC/FAC(A).

Note. Terminal guidance is guidance applied to a weapon between midcourse guidance and arrival in the vicinity of the target and may be a function of CAS, interdiction, or other missions.

For further guidance on terminal guidance operations, refer to JP 3-09, Joint Fire Support.

3. Air Force/Army Command and Control

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

(1) **Air Force Air and Space Operations Center. The AOC is the COMAFFOR's** senior agency that provides C2 of Air Force air and space operations and coordinates with other components and Services. It develops an air operations plan to meet the JFC's guidance. It allocates resources and tasks forces through ATOs. When the COMAFFOR is also the JFACC, he will augment the AOC with elements from other components to create a JAOC. When the AOC becomes a JAOC, the Air Force air request net (AFARN) becomes the joint air request net (JARN).

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 may establish an ACCE to interface and provide liaison with the joint force land component commander (JFLCC), other component commanders, or other Service commanders (e.g., commander, Army forces or commander, Navy forces [COMNAVFOR]). When attached to the JFLCC, 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 responsibilities include exchanging current intelligence, operational data, and support requirements, and coordinating the integration of AFFOR requirements for ACMs, joint FSCMs, and CAS. Generally, JFLCC needs or requirements dictate ACCE team composition with typical functional expertise including: 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 senior liaison element and can also perform many air support planning functions.

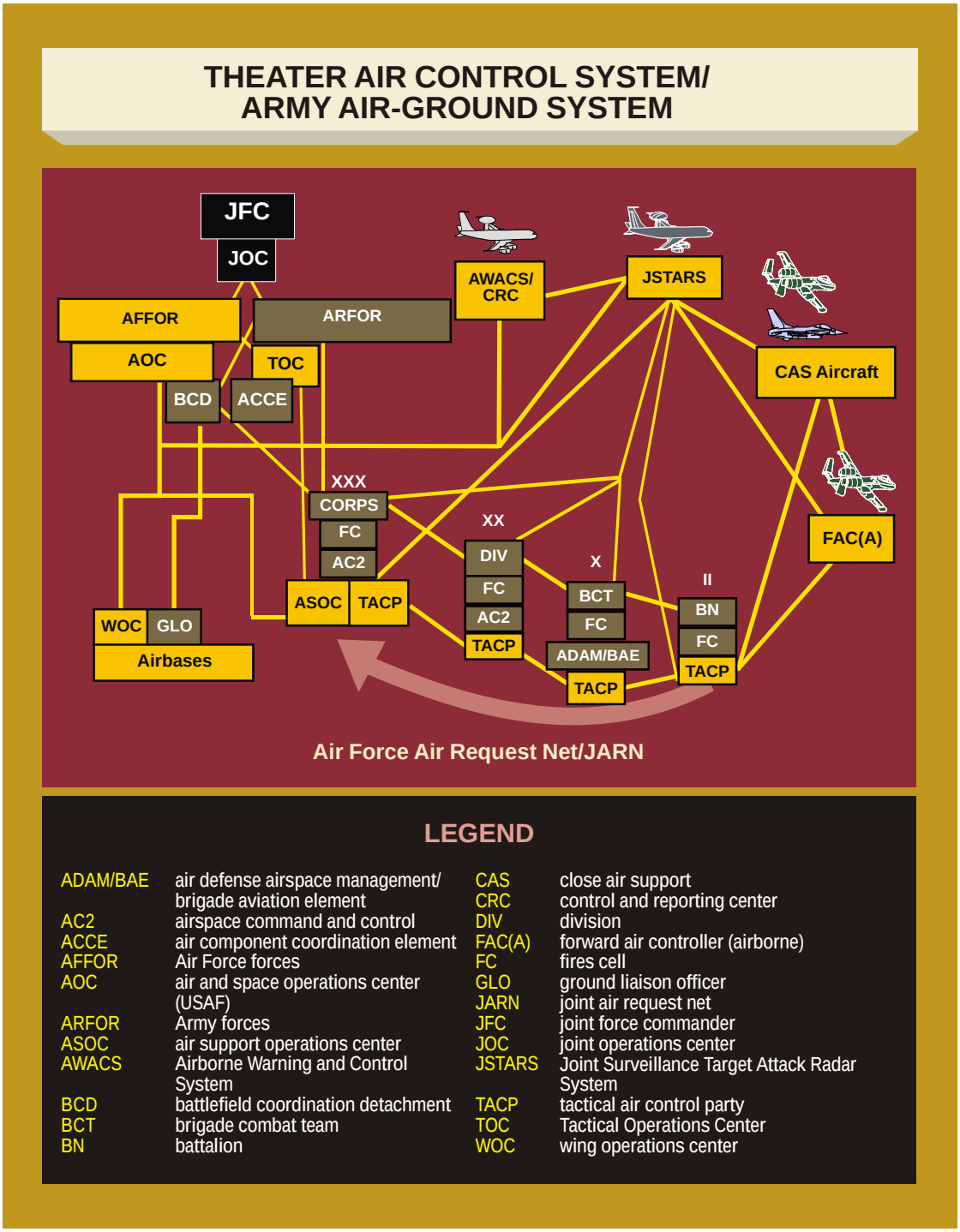

Figure II-3. Theater Air Control System/Army Air-Ground System

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

(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).

(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. When airborne, the E-3 AWACS provides the COMAFFOR with a decentralized execution capability.

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

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

(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. Normally collocated with the Army tactical headquarters (HQ) senior FSCC within the ground combat element (GCE), **the ASOC coordinates and directs air support for Army or joint force land component operations.** An ASOC may be collocated with a field Army or a division engaged in independent operations. The COMAFFOR may grant the ASOC control (launch or divert authority) of missions designated to it on the ATO.

(b) **Function. The ASOC** is directly subordinate to the AOC and is responsible for the coordination and control of air component missions in its assigned

area requiring integration with other supporting arms and ground forces. The ASOC processes immediate CAS requests received over the JARN, coordinates execution of preplanned and immediate CAS and normally exercises tactical control of joint forces made available for tasking. Once the ground element approves immediate requests, the ASOC tasks on-call missions or diverts – with ground element approval – scheduled missions. 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 AOC or JAOC to launch or divert CAS missions.

b. **Army Air-Ground System.** The AAGS (see Figure II-3) 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 BCD is an Army liaison provided by the Army component or force commander to the COMAFFOR for duties with the AOC or to the JFACC for duties in the JAOC based on the scenario. The BCD processes Army requests for air support and monitors and interprets the land battle situation. This interface includes exchanging current intelligence and operational data, support requirements, coordinating the integration of Army forces requirements for ACMs, FSCMs, and theater airlift. The BCD is not an FC; however, it can perform many fire support functions.

(2) **Tactical Operations Center.** At each level above the company (to corps) 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) **FC and ASOC/TACP Interface. The FC is the link for the CAS mission area between the Army unit and the ASOC/TACP.** The FC is responsible for fire support planning, coordination, integration, and synchronization of fires delivered on surface targets by all fire-support assets under the control, or in support, of the unit. As part of this responsibility, the FC **coordinates the airspace usage** with the unit airspace C2 (AC2) element collocated with the FC. The FC 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 (FSCOORD-Army; FSC-USMC) and Army or Marine Corps component operations staff officer (Army division or higher staff, Marine Corps brigade or higher staff) (G-3)/ battalion or brigade operations staff officer (Army; Marine Corps battalion or regiment) (S-3). If Navy or Marine Corps

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

CAS is available, the air and naval gunfire liaison company may provide the division, brigade, and BN FCs 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 (USAF). The TACP is the principal Air Force liaison unit collocated with Army maneuver units from BN through corps.** The TACP has two primary missions: advise ground commanders on the capabilities and limitations of air operations, and provide the primary terminal attack control of CAS. TACPs coordinate ACMs and deconflict the aircraft with Army fire support. TACPs are organized into expeditionary air support operations groups or squadrons that are aligned with their respective Army corps, division, or brigade HQ. TACPs may employ JTACs at the company/team level. The following are members of a TACP:

(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. An ALO is usually an aeronautically rated officer and is an expert in the capabilities and limitations of air operations. The ALO plans and executes CAS in accordance with the ground commander's guidance and intent. At BN level, the senior member of the TACP is called a battalion air liaison officer (BALO). A BALO is a specially trained and experienced noncommissioned officer or officer.

(b) **Joint Terminal Attack Controller.** The JTAC is the forward Army ground commander's qualified (certified) Service member, who, from a forward position, directs the action of combat aircraft engaged in CAS and other air operations in the ground commander's operational area. JTACs provide the ground commander recommendations on the use of CAS and its integration with ground maneuver. The JTAC must:

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

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

3. Know the commanders intent and applicable ROE.

4. Validate targets of opportunity.

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

6. Submit immediate requests for CAS.

7. Control CAS with supported commander's approval.

8. Deconflict aircraft and fires from CAS sorties.

9. Provide initial BDA report.

(2) **Forward Air Controller (Airborne).** An airborne extension of the TACP, a FAC(A) is a specifically trained and qualified aviation officer who exercises control from the air of aircraft engaged in CAS of ground troops. The FAC(A) provides coordination, deconfliction, and terminal attack control for CAS missions as well as locating, and marking ground targets.

(3) **Tactical Air Coordinator (Airborne). In the TACS/AAGS TAC(A) provides communications relay** between the TACP and attack aircraft, as well as other agencies of the TACS, in the absence of JSTARS, or a FAC(A). The TAC(A) also expedites CAS aircraft-to-JTAC handoff 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) **Terminal Attack Control Team.** Two-person team consisting of a qualified JTAC and a combat-mission-ready TACP apprentice. TAC teams are not aligned to any specific Army unit.

(5) **Fire Support Team (FIST). The mission of the FIST is to provide fire support for the maneuver company.** The company fire support officer (FSO) supervises the FIST and advises the commander on the capabilities, limitations, and employment of all fire support assets available to support the operation. 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 and infantry platoons. FIST personnel provide expert targeting information that other CAS personnel can use.

(6) **Joint Fires Observer (JFO).** A JFO is a trained and certified Service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 CAS, and perform TGO. **The JFO adds joint warfighting capability but cannot provide terminal attack control during CAS operations.** JFOs provide the capability to exploit those opportunities that exist in the operational environment where a trained observer could be used to efficiently support air delivered fires, surface-to-surface fires, and facilitate targeting. **The JFO is not an additional person provided to a team but rather an existing team member who has received the supplemental proper training and certification.** The following joint mission tasks have been identified for certification and qualification as a JFO:

(a) Engage targets with ground surface-to-surface fires.

(b) Engage targets with naval surface fires.

(c) Engage targets with air-to-ground fires.

(d) Perform TGO.

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

d. **Figure II-4 depicts** Air Force and Army air C2 agencies and communications

UNITED STATES AIR FORCE/UNITED STATES ARMY COMMUNICATIONS NETS

NET	FREQUENCY	AOC	ASOC	CRC	WOC	FAC(A)	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 Admini-stration Net	HF VHF/Frequency Modulation		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.

LEGEND

A/C	aircraft	CRC	control and reporting center
AOC	air and space operations center (USAF)	FAC(A)	forward air controller (airborne)
ASOC	air support operations center	JSTARS	Joint Surveillance Target Attack Radar System
AWACS	Airborne Warning and Control System	TACP	tactical air control party
CAS	close air support	WOC	wing operations center (USAF)

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

nets. **This information is provided for supporting components to determine control agencies and frequency band connectivity for CAS.**

4. Navy Command and Control

The NTACS is the principal air control system afloat. It is comprised of the United States Navy (USN) tactical air control center (Navy TACC), tactical air direction center (TADC), and helicopter direction center (HDC). The COMNAVFOR's focal point for tasking and exercising OPCON over Navy air forces is the Navy TACC. Figure II-5 shows typical Navy/Marine Corps CAS connectivity.

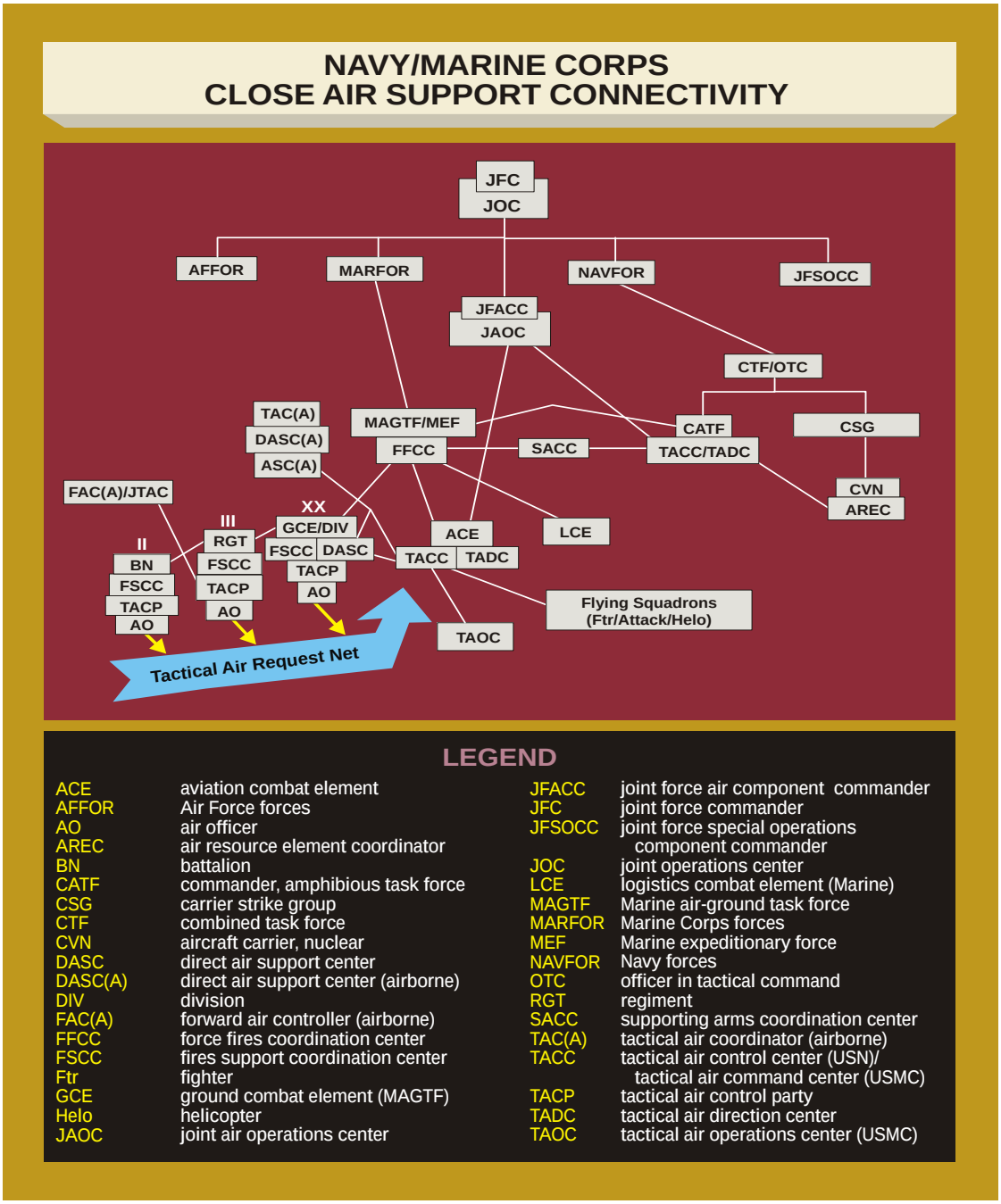

Figure II-5. Navy/Marine Corps Close Air Support Connectivity

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

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

(2) **Air Support Control Section (ASCS).** The ASCS is designed to coordinate and control overall CAS employment. The primary task of the ASCS is to provide fast reaction to CAS requests from the LF. The ASCS coordinates with the SACC to integrate CAS and other supporting arms; 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 either the Navy TACC or Marine tactical air command center (Marine TACC), smaller in area of control, seen during advance force or sector operations. Once the Navy passes control of aviation assets ashore to the commander, LF, the Marine TADC becomes the Marine TACC, and the Navy TACC reverts to a Navy TADC.

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 onboard 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 SACC maintains radio contact on tactical air request (TAR) nets with TACP to coordinate CAS requests. The SACC is the naval counterpart to the LF's FSCC. The SACC is generally in control until the LF is firmly established ashore, at which time some or all coordination may be shifted to the FSCC ashore.

e. The naval and amphibious liaison element and Marine Corps liaison element are available to the 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 (antiair warfare, offensive air support, EW, air reconnaissance, control of aircraft and missiles, and assault support). 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 control. The commander, Marine Corps forces (COMMARFOR's) focal point for tasking and exercising OPCON over Marine Corps air assets is the Marine TACC.

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

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

(2) **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.

(3) **Tactical Air Operations Center (TAOC).** The TAOC is subordinate to the Marine TACC and performs three primary functions within the MACCS. These functions include air surveillance, air direction, and air control. As the MAGTF's primary air surveillance agency, the TAOC uses its organic radars and tactical data links to create a recognized air picture within its assigned sector. That air picture, which is shared through various data links to a wide variety of C2 systems, is managed through detailed coordination with higher and adjacent MAGTF and joint surveillance platforms. The TAOC can also perform a variety of delegated air direction functions, including coordination and deconfliction of airspace, tanker management, antiair warfare asset management, and coordination and control of fires in the deep area. The TAOC utilizes positive and procedural air control to ensure mission-tasked aircraft and itinerant aircraft are routed and deconflicted.

(4) **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 TACC. The DASC processes immediate air support requests (AIRSUPREQs), coordinates the execution of preplanned and immediate CAS, directs assigned and itinerant aircraft, and controls UA transiting through DASC-controlled airspace. When delegated authority, the DASC adjusts preplanned schedules, diverts airborne assets, and launches aircraft, as required. The

DASC's configuration is flexible and can be task-organized to meet a variety of requirements. The DASC normally collocates with the senior FSCC. When there are multiple GCEs, the DASC may collocate with the MAGTF's FFCC. Synchronization between the DASC and the FFCC/FSCC is vital to the effective coordination of direct air support missions and the employment of other supporting arms. An airborne DASC can also be operated from KC-130 aircraft providing the functions of the DASC on a limited scale.

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

(b) **Forward Air Controller.** In the Marine Corps, the FAC is a naval aviator certified as a JTAC who coordinates, integrates, and directs actions of combat aircraft engaged in support of ground combat operations. This control aids target ID and greatly reduces the potential for fratricide. Primary duties of the FAC include:

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

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

3. Locate targets of opportunity.

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

5. Request CAS.

6. Control CAS.

7. Deconflict aircraft and fires from CAS sorties.

8. Perform BDA.

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

(5) **Airborne CAS Assets.** Two airborne assets that provide airborne control and coordination for CAS missions are the FAC(A) and the TAC(A).

(a) **Forward Air Controller (Airborne).** A specifically trained and qualified naval aviator 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, who can conduct TAC.

(b) **Tactical Air Coordinator (Airborne).** The TAC(A) is a naval aviator who coordinates the action of combat aircraft engaged in close support of land or maritime forces. He serves as an on site airborne extension of the DASC. The DASC or Marine TACC determines the TAC(A)'s authority over aircraft operating within his assigned area. MACCS TAC(A) responsibilities are to avert conflicts among aircraft and to coordinate the employment of air assets with other supporting arms. In fulfilling this responsibility, the TAC(A) coordinates as necessary with TACPs, FSCCs, FAC(A)s, assault support coordinators (airborne), fire direction centers of artillery and NSFS, and CAS assets.

(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. 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.

(7) **Air Naval Gunfire Liaison Company (ANGLICO).** ANGLICO is a BN level command which provides MAGTF commanders a liaison capability, with foreign area expertise, to plan, coordinate, employ, and conduct terminal control of fires in support of joint, allied, and coalition forces. Each echelon of the ANGLICO command structure is capable of providing the same support to joint, allied, and coalition forces that the TACP provides to Marine units with the addition of more robust fire support coordination capabilities. ANGLICO support is normally broken down as follows:

(a) Company Headquarters – Division. Approximately 50 personnel to coordinate ANGLICO operations and support in the supported division's operational area.

(b) Brigade Platoon – Brigade/Regiment. Normally led by an artillery officer with a staff including an AO and naval gunfire liaison officer (NGLO), normally also designated as a JTAC. Three brigade platoons per ANGLICO.

(c) Supporting Arms Liaison Team (SALT) – Battalion. Ten man team normally led by a FAC/AO. Capable of providing a 24 hour FSCC for a limited amount of time. The SALT chief is also a designated JTAC. Two SALTs per brigade platoon.

(d) Firepower Control Team (FCT) – Company. Four to five man team led by a ground combat officer designated as a JTAC. Two FCTs per SALT.

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. Figure II-6 depicts Navy and Marine Corps air C2 agencies and the amphibious tactical air control system communications network.

b. Under the commander, amphibious task force, the Navy TACC, typically onboard the amphibious 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 TACC receives control of all LF air operations, the Navy TACC becomes a TADC supporting the land-based air control agency.

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

AMPHIBIOUS TACTICAL AIR CONTROL SYSTEM COMMUNICATIONS NETWORK

NET	FREQUENCY	TACC USN	TACC USMC	TADC	TAOC	DASC	MAG	TACP	A/C
Tactical Air Request/ Helicopter Request Net	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.

"N" Indicates participation by Naval Tactical Air Control System agencies.

"#" Indicates participation when directed, or as required.

LEGEND

A/C	aircraft	TACP	tactical air control party
DASC	direct air support center	TADC	tactical air direction center
MAG	Marine aircraft group	TAOC	tactical air operations center
TACC	tactical air control center (USN) tactical air command center (USMC)	USMC	United States Marine Corps
		USN	United States Navy

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

7. Special Operations Command and Control

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

a. **Special Operations Liaison Element.** A SOLE is a team provided by the JFSOCC that is attached to the JFACC to coordinate, deconflict, and integrate special operations air and surface operations with conventional air operations. The SOLE is the focal point in the JAOC for all AIRSUPREQs for SOF, to include CAS.

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

d. **JTAC Qualified Special Operations Forces.** SOF from all four Service components have individuals that are JTAC qualified who, from a forward position, direct the action of combat aircraft engaged in CAS and other offensive operations. SOF terminal attack control training encompasses a wide array of day and night control TTP, but emphasizes night IR, laser, and beacon equipment.

e. **Forward Air Controller (Airborne).** A specifically trained and qualified SOF aviator who exercises control from the air of aircraft engaged in CAS in support of ground troops. The FAC(A) is normally an airborne extension of the JTAC.

8. Multinational Operations Command and Control

There is no single C2 structure for CAS operations when engaged in multinational operations. US joint doctrine remains the basis for CAS operations in all cases. In cases when the US has ratified multinational procedures, i.e., North Atlantic Treaty Organization (NATO) doctrine, those ratified procedures will apply.

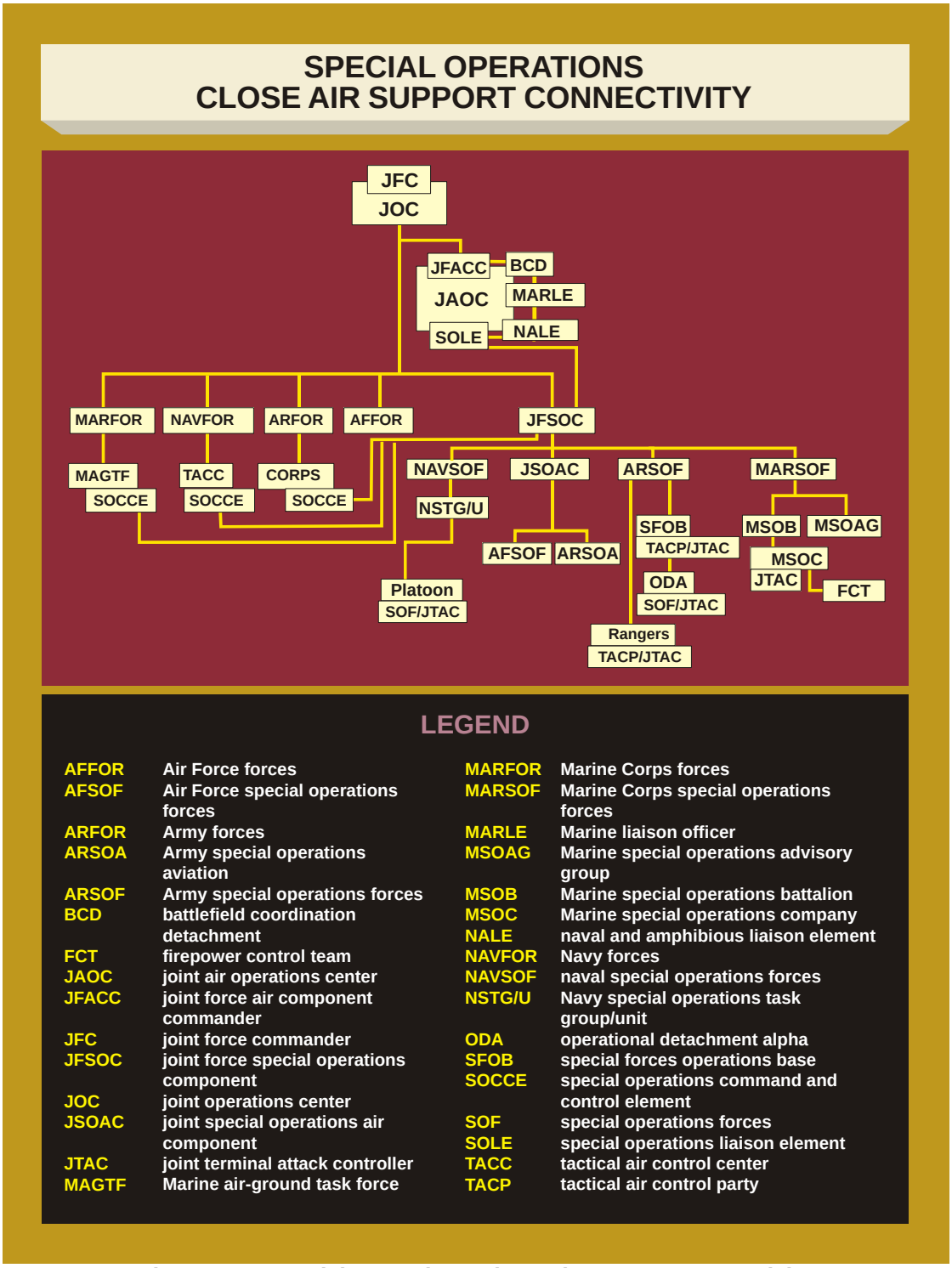

Figure II-7. Special Operations Close Air Support Connectivity

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

b. **Secure Voice/Frequency-Agile Communications.** The preferred means of communication during CAS missions is either using secure voice or frequency-agile radio systems (e.g., HAVE QUICK, single-channel ground and airborne radio system [SINCGARS]). Data link should also be used to transmit information whenever possible. However, **do not allow the nonavailability of these methods to hinder the application of CAS**, especially in emergency situations or in the case of fleeting targets.

c. **Countermeasures. Enemy communications jamming, monitoring, and imitative deception interfere with the air C2 system and can jeopardize the use of CAS.** Proper radio procedures are critical. **There are a number of techniques to counter jamming and deception.** They include natural terrain masking, burn through, brevity, chattermarks, frequency-agile radios, secure communications, authentication, and visual signals. No single technique is completely effective by itself. The tactical environment, available communications equipment, and mission determine the proper technique.

d. **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/FAC(A) and CAS assets.** 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, **all participants 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 communications system

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 the JTACs** they will need to contact during the course of their missions. They will also need identification, friend or foe (IFF) 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-4 and II-6 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, FCs, 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).** Various human sources, such as scouts, advanced liaison, multinational force LNOs, reconnaissance elements, and other human operations or intelligence gathering entities use this net to pass routine operational and intelligence information. The O&I net connects observers with their corresponding C2 nodes. Additionally, this net may be used to determine if specific triggers for CAS have been met in order to synchronize CAS with ground fire and maneuver. TACPs may access this net to report or obtain forward operational environment information or facilitate terminal attack control.

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

(f) **Air Force Air Request Net.** The AFARN is the link between the ASOC and subordinate TACPs for request and coordination of immediate air support. If operating as a joint force, the name of this net may be changed to JARN. 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. The AFARN uses HF/SSB and/or SATCOM. Digital is the preferred method for transmitting/receiving AIRSUPREQs 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 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. Due to the extremely time sensitive information passed on this net, the tactical air direction (TAD) net assigned to the JTAC or FAC(A) should be reserved for TAC only.

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

(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. If able, 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.

(m) **Secure internet relay chat (IRC).** Provides a means of communication between intelligence activities, selected aircraft, ASOC, and IRC equipped TACPs.

(n) **Data-link nets** provide digital communications, increased SA, targeting, and de-confliction. JAOC joint interface control officer is responsible for establishing the network architecture in the operations task link.

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

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

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

(c) **USMC Artillery Conduct of Fire 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 inflight 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 AOA or area of operations with a high-density airspace control zone (HIDACZ) inbound to and outbound from USN ships. It is a backup net available to coordinate RW CAS.

(h) **Squadron Common Net.** 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 JTACs. 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 Navy TACC/Marine TACC, TADC, and DASC to brief CAS aircraft on target information or assignment to the FAC or FAC(A). Multiple TAD nets are required and are utilized by various air control agencies afloat and ashore. This net is primarily secure UHF, with a secondary VHF capability available in some cases. Due to the extremely time sensitive information passed on this net, the TAD net assigned to the FAC or FAC(A) should be reserved for TAC only.

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

(n) **Naval Gunfire Ground Spot Net.** 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 NGLO and the shore fire control party.

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

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

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

10. Intelligence, Surveillance, and Reconnaissance

a. **Joint intelligence preparation of the operational environment (JIPOE) is a systematic approach used by intelligence personnel** to analyze the adversary and other relevant aspects of the operational environment. While intelligence personnel focus on the adversary in relation to the operational environment, cross-functional joint staff planners at the combatant command and Service component level use the JIPOE process and JIPOE products as well, developing and assessing their impact on friendly plans and operations. As a whole, this coordinated effort defines the operational environment, describe the impact of the operational environment on adversary and friendly courses of action (COAs), evaluate the capabilities of adversary forces operating in the operational environment, and determine and describe potential adversary COAs and civilian activities that might impact military operations.

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

b. **Intelligence preparation for CAS at all levels in the CAS process is largely dependent on mission and planning time available.** Optimum ISR support to CAS begins early in the planning process to include JIPOE and the targeting process. While it is impossible to account for every conceivable possibility, this early integration can assist in better target selection, 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 operational environment in terms of military objectives; air, land, and maritime avenues of approach; and the effects of weather and geography on personnel, CAS operations and weapons systems. The tactical level evaluation for CAS should concentrate on standard order of battle factors such as composition, strength, morale, tactics, and training status of specific tactical units that can interfere with mission accomplishment.

c. **Human Intelligence (HUMINT).** There are many sources of HUMINT. Teams like the TACP, FACs, combat observation, and lasing teams (COLTs), LNOs, reconnaissance teams, SOF, and FISTs may have the most current disposition of the enemy. All have the capability to relay critical information such as post attack BDA that will aid in the effectiveness of CAS. CAS aircrews are often in a position to provide and pass critical reconnaissance information.

d. **CAS Related ISR Systems**

(1) **Unmanned aircraft systems** 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 UASs include real time video, real-time signals intelligence (SIGINT), and synthetic aperture radar (SAR) data. When utilized, UA must be integrated and deconflicted with CAS aircraft and surface fires within the operational area.

(2) **Joint Surveillance Target Attack 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 AOC/ASOC or TACC. CAS end-users (such as individual JTACs) may request near-real time voice tell and SALT (size, activity, location, and time) reports or JSTARS radar information via radio, tactical datalink, or internet chat.

(3) A variety of ISR platforms (i.e., **USAF RC-135 RIVET JOINT, U-2, C-130, USN EP-3 Aries, US Army RC-12 Guardrail) provide classified communications intelligence and electronic intelligence (ELINT) information** which may be used independently or cross-cued with other ISR platforms to augment or complete the overall intelligence picture. The U-2 carries imagery intelligence sensors which can be cross-cued by its own SIGINT payload and/or those of other assets.

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

For more information, see FM 3-09.32, MCRP 3-16.6A, NTTP 3-09.2, AFTTP(I) 3-2.6 JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower.

(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 and National Intelligence Support to Military Operations.

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

CHAPTER III
PLANNING AND REQUESTING

"Planning is everything — Plans are nothing."

Field Marshal Helmuth Graf von Moltke (1800-1891)

1. Introduction

This chapter outlines a CAS-related decision-making process that can be applied to contingency planning and crisis action planning (CAP), identifies specific CAS-related staff responsibilities, outlines basic CAS planning considerations, and identifies procedures for requesting CAS and CAS-related air support. Focus will be at the brigade level and below with the concept of a joint fires team consisting of TACP personnel and the FC/FSCC. The FC is the US Army 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 headquarters (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, combat search and rescue forces, joint security area (JSA) forces, etc., that may not have the formal staff agencies discussed in the chapter.

2. Contingency 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.

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

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.

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

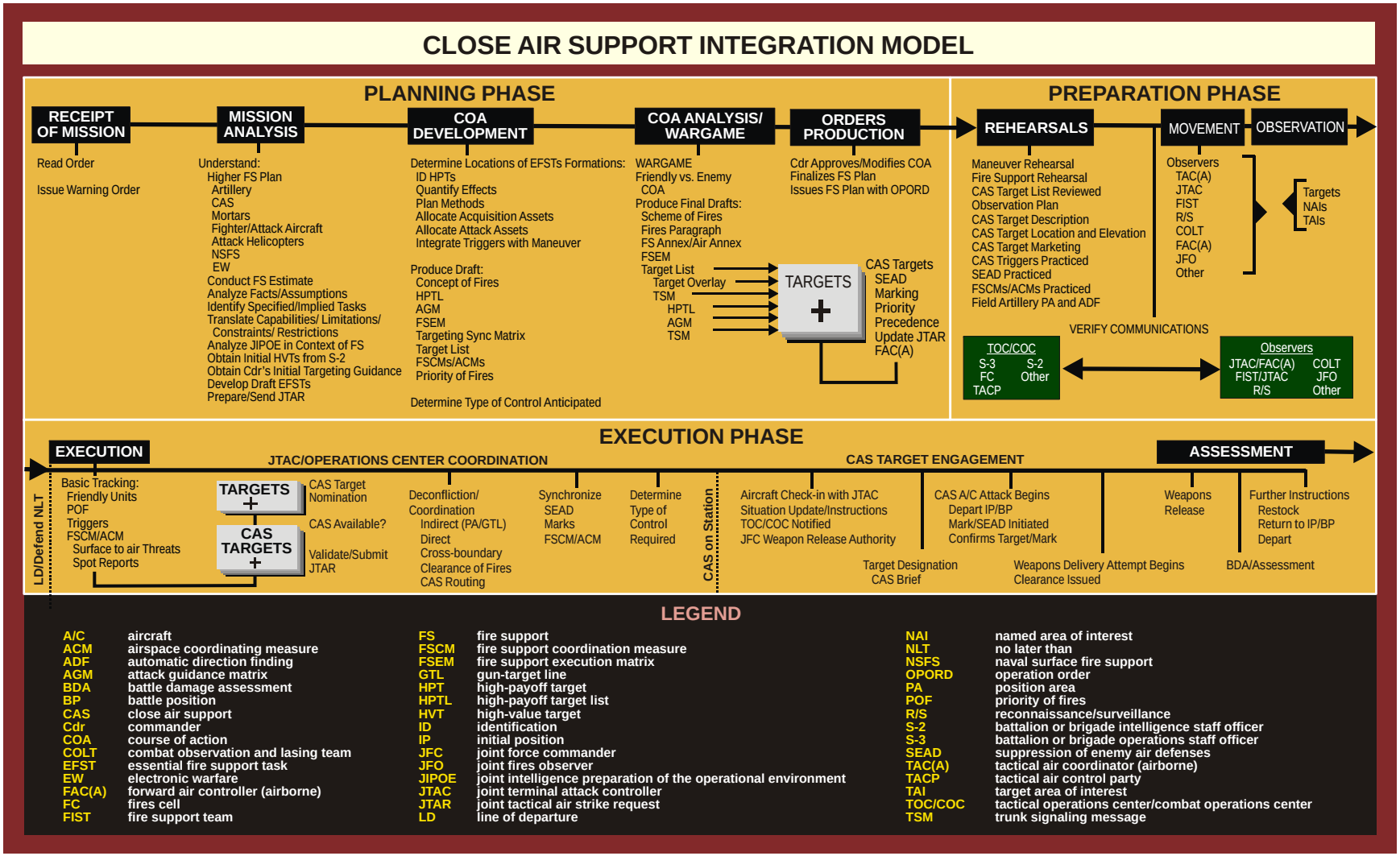

Figure III-1. Close Air Support Integration Model

4. Close Air Support in the Decision-making Process

The CAS decision-making process, as indicated in Figure III-1, is a continuous three-phase cycle that has been tailored for joint fire support and focused specifically on CAS. The CAS decision-making process assists the commander and staff in developing the CAS portion of 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. This chapter focuses on planning (see Figure III-2). Chapter IV, "Preparation," and Chapter V, "Execution," cover the subsequent phases in detail. For the purpose of this publication, the fire support staff officers, AOs/ALOs, and the BN or brigade S-3/G-3 air are **CAS planners**. CAS planners actively participate with the ground commander to provide

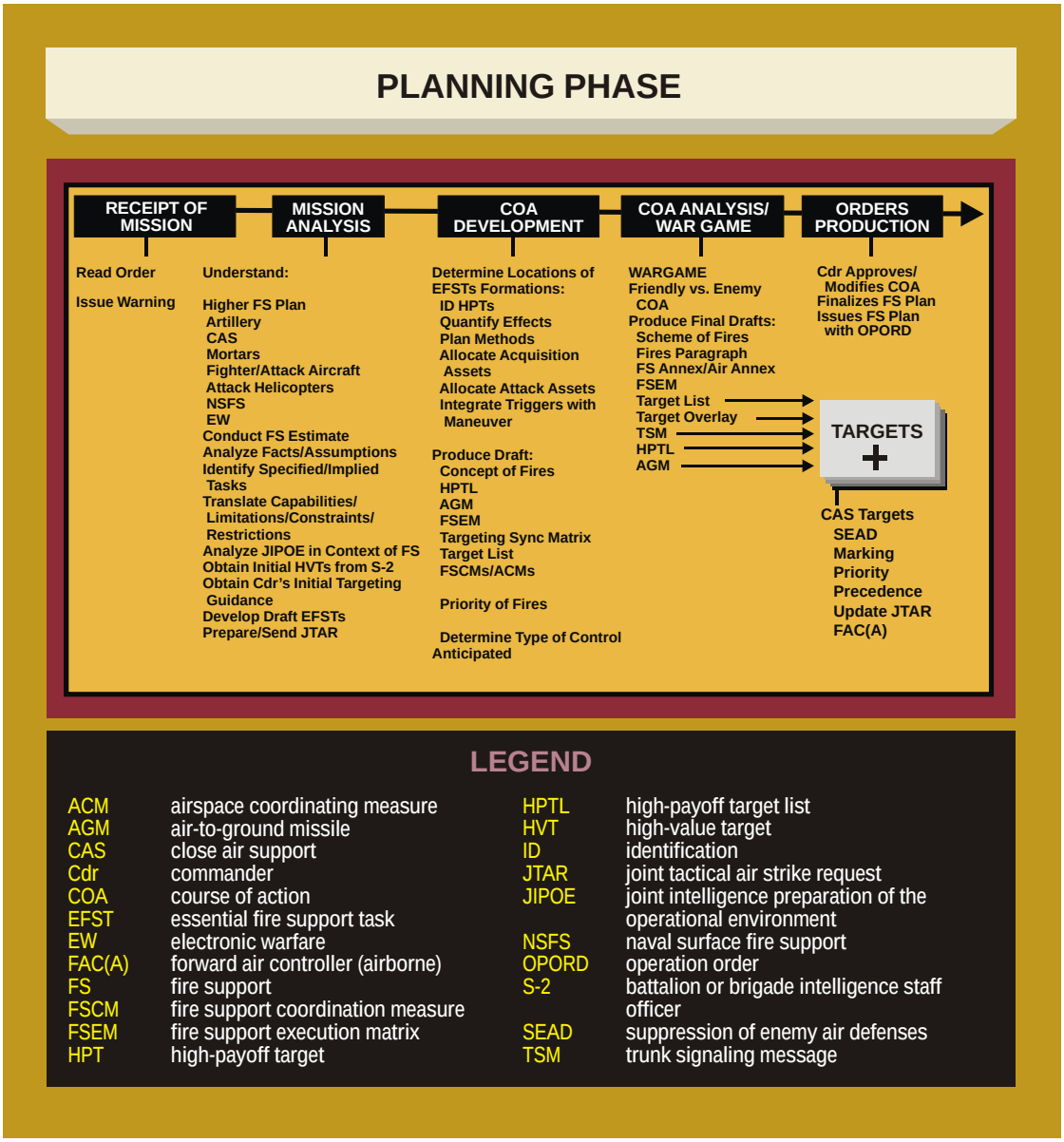

Figure III-2. Planning Phase

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 objectives, intent, and decisive points, 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. FC/FSCC members and AOs/ALOs should pay particular attention to the CAS-related portion of HHQ orders. Planners must understand the commander's objectives for CAS and the utilization of CAS to best support the overall mission objective(s).

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

(1) **Step 1: Receipt of Mission/Prepare for Mission Analysis.** As integral parts of the planning team, the action officers and ALOs should "gather the tools" and be prepared to provide pertinent information from the following to the ground force commander's staff:

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

(b) ATO

(c) ACO

(d) SPINS

(e) OPORD

(f) Standard operating procedure (SOP)

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

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

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

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

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

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

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

(g) Assist in developing the mission statement.

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

1. HHQ priorities of fires.

2. Facts and assumptions.

3. Weight of effort decisions.

(i) Provide the following products:

1. AO/ALO estimate.

2. Available CAS assets.

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

4. Warning order(s) to subordinate units.

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

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

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

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

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

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

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

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

(k) **Preplanned Air Support Request.** Once CAS planners have analyzed the mission and are familiar with CAS requirements, initial CAS requests should be drafted and submitted. See Appendix A, "Joint Tactical Air Strike Request." Further refinements to these initial requests can be forwarded as details become available. Adherence to ATO cycle time constraints is critical.

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

(b) 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.

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

(d) Array initial forces to determine CAS requirements.

(e) Develop fire support/ACMs.

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

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

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

(i) **Key Considerations.** During COA development (for each COA), CAS planners 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, JFOs, and/or FAC(A)s be able to provide critical battlefield information? How will this information be relayed to the maneuver unit?

3. Enemy Situation. Where 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 operational area? Does the CAS overlay reflect artillery positioning areas and azimuths of fire (AOFs)? Does the plan promote simultaneous engagement of targets by CAS and surface fires? Has the CAS overlay been shared with all battlefield operating system elements? Where will JTACs/JFOs be positioned on the battlefield? What ACMs and FSCMs are needed to support the COA?

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

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

1. Specific TACP portions of the following plans:

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

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

   c. Communications plan.

2. Evaluation of overall TACP capabilities/limitations:

a. Personnel.

b. Equipment.

3. Consideration of the most effective TAC procedures.

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

5. Current geospatial products and overlays.

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

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

(b) Conduct an initial tactical risk assessment for each COA. (See Chapter V, "Execution," for tactical risk assessment.)

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

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

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

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

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

(f) Gather war gaming tools.

1. Updated ATO/SPINS information.

2. Decision-making matrices/devices.

3. Briefing cards/CAS briefs.

4. Standard conventional load listings.

5. Aircraft and weapons capabilities information.

(g) List all friendly forces.

1. CAS aircraft.

2. FAC(A).

3. Airborne C2.

4. Ground forces, including fire support assets.

5. JTACs.

6. JFOs/other observers/ISR assets.

7. Other aviation and support assets.

(h) List assumptions.

1. Aircraft operating altitudes.

2. Enemy surface to air threat posture.

3. CAS tactics.

4. JTAC procedures in effect.

5. How terrain and weather affects CAS.

(i) List known critical events and decision points.

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

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

3. ACM/FSCM requirements.

4. SEAD/marking round requirements.

(j) Determine evaluation criteria.

1. Timeliness.

2. Accuracy.

3. Flexibility.

4. Mass.

5. Desired effects.

(k) Select the war game method.

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

2. Map.

3. Radio.

4. Other.

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

1. Event logs.

2. Timetables.

3. Reaction times, etc.

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

(n) **Fires Paragraph.** CAS and other fire support planners begin to refine the fires paragraph to the OPORD by further developing specific tasks, purpose, methods, and desired effects of 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 of Fires.** Attempts to quantify the successful accomplishment of the task. Examples:

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

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

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

(5) **Step 5: Orders Production.** The staff prepares the order or plan to implement the selected COA and provides a clear, concise CONOPS, a scheme of maneuver, and concept of fires. Orders and plans provide all necessary information that subordinates require for execution, but without unnecessary constraints that would inhibit subordinate initiative. TACPs should produce the CAS specific appendix to the fire support annex as required. An example of a fire support annex is contained in FM 3-09.42, *Fire Support for the Brigade Combat Team (BCT)*.

(a) **Fire Support Annex.** Fire support and CAS planners will also produce a fire support annex. This annex is necessary to expand upon the fire support information in paragraph 3 of the OPORD. A fire support execution matrix (FSEM) may also be

developed as part of or used in place of a standard fire support annex. Regardless of format, further expansion of fire support information includes:

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

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

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

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

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

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 how CAS can aid in achieving 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 TAC.

b. **Intelligence Officer.** The intelligence officer is the principal staff officer for all matters concerning military intelligence and counterintelligence. In this capacity, the intelligence officer provides current and timely CAS targeting information as well as projected enemy actions. The intelligence officer serves as the focal point for ISR

systems that feed real time or near real time battlefield intelligence. The intelligence officer is the source of targeting data (e.g., subordination or suspected maneuver unit identification, measurable target locations, collateral damage risks) and other JIPOE information.

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

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

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

f. **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. AOs/ALOs should work closely with other members of the staff such as the FSC to ensure the smooth and effective integration of CAS into the planning process. The AO/ALO is responsible for the specific planning tasks as indicated in each step of the CAS planning process.

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

6. Close Air Support Planning Considerations

This section addresses basic planning considerations associated with the METT-T format. 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 operational area.

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

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

(2) **Close Combat Operations.** A commander generally assigns most of his available CAS to the unit he has designated as his main effort. **CAS aircraft and fire support assets mass 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) **Joint Security Area Operations.** CAS is effective for countering enemy penetrations. The responsiveness and firepower of CAS greatly augment the combat power of forces including those in a JSA. The potential for fratricide, however, is high in a JSA because of the larger number of support personnel and activities located there. CAS aircrews and JTACs must take special care to identify friendly forces and ensure that they are not subject to direct attack or weapons effects from CAS ordnance delivered against enemy forces operating in friendly JSAs.

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

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

(a) **Movement to Contact.** CAS can be employed to support maneuver forces providing forward and flank security. Once contact is made, employing CAS aircraft at the initial point (IP) of contact can overwhelm and force the enemy to prematurely deploy 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 destroy the combat effectiveness of the fleeing enemy force as the enemy becomes demoralized and cohesion and control disintegrate. Because the objective of the pursuit is destruction of the enemy, **CAS can keep direct pressure on the enemy to prevent them from reorganizing or reconstituting.**

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

(a) **Support Maneuver.** Complement maneuver forces and integrate with surface-delivered fires as part of a combined arms spoiling 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 Stability Operations.** The employment of CAS during stability operations is significantly different from CAS employed during major operations. CAS in stability operations is limited in scale and scope. This is primarily due to the restrictive nature of stability operations which often results in more restrictive ROE. However, when CAS is effectively employed in stability operations it can prove to be decisive. The use of precision-guided munitions (PGMs) by CAS aircraft is often preferred by JFCs when supporting ground operations intended to destroy high-payoff targets in urban environments. PGMs allow the commander to limit collateral damage while creating the desired effects and mitigating adverse effects. CAS in support of stability operations depends heavily on detailed and timely intelligence, detailed coordination with maneuver commander's plan, appropriate munitions, and JTAC with "eyes on" the intended target. JFCs and their staffs should consider the use of CAS carefully during stability operations. Other roles for CAS in stability operations include: a flexible and timely forward aerial observation platform, limited defensive capability for

troops in contact, a show of force deterrence option, route and ground convoy security, and an aerial quick reaction force. CAS can also provide the JFC with 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 IP location will enhance aircraft survivability by reducing exposure and altering attack direction.

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

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. JSTARS can support a brigade-sized operation with battle management when no ASOC/DASC is available. The DASC(A) can serve as an alternate ASOC/DASC for battle management of immediate CAS operations.

2. **Tactical Air Coordinator (Airborne).** Normally performed by JSTARS, a FAC(A), or a Marine TAC(A), at the discretion of the controlling agency, **the TAC(A) provides an extension** for the ASOC/DASC with the goal of extending the ASOC/DASC's range and ability to send and receive tactical information. The TAC(A) acts as a **communications relay** between the JTAC and attack aircraft as well as other agencies of the TAGS. It also expedites CAS aircraft-to-JTAC hand-off during "heavy traffic" CAS operations by providing information to CAS assets such as AO updates and 9-lines, as well as establishing deconfliction.

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

(b) **Ground C2 Assets.** Ground C2 assets must be integrated to enhance the plan. These assets are critical and warrant specific consideration by HHQ. What is the specific role and function of each? Have provisions been made to ensure adequate communications for C2 of all attack assets? As a minimum, review the following:

1. **TACP/JTAC.** While corps through brigade TACPs function primarily as liaisons, BN TACPs and company JTACs have the primary responsibility of TAC. 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? Which units will the TACP support?

2. **COLT** may aid the JTAC by acquiring or lasing targets. If the JTAC plans to use a COLT, then he must be able to communicate and coordinate with the team during target marking or TGO.

3. **Direct Air Support Center/Air Support Operations Center.** The USMC DASC or USAF ASOC functions as the primary control agency of the MACCS or TACS 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 operational area. The DASC/ASOC is the NCS for immediate AIRSUPREQs and monitors aircraft check-in/checkout. Use the Department of Defense Form in Appendix A, "Joint Tactical Air Strike Request," to ensure the DASC/ASOC has all the following

pertinent information concerning the mission (targets, threats, friendlies, artillery, clearance, ordnance, restrictions [TTFACOR]) for transmittal to supporting aircrews:

a. Situation update.

b. Target-enemy situation.

c. Threat activity.

d. Friendly.

e. Artillery.

f. Clearance authority.

g. Ordnance requested.

h. Restrictions/remarks.

i. Localized SEAD efforts (suppression/EW).

j. Hazards (weather/terrain/obstructions).

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

(3) **CAS Aircraft Weapons and Capabilities.** FW and RW aircraft, their weapons and capabilities can be found in the FM 3-09.32, MCRP 3-16.6A, NTTP 3-09.2, AFTTP(I) 3-2.6 *JFIRE Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower* publication. CAS planners should select those combinations of munitions and aircraft offering the required accuracy, firepower, and flexibility. To create the desired level of destruction, neutralization, or suppression of enemy CAS targets, the weapons load, arming, and fuze settings must be tailored for the desired

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

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

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

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

(4) **Mountainous Environments.** Mountainous terrain may force the enemy to concentrate 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, 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 limited LOS. Use FAC(A)/TAC(A) or airborne C2 platforms as relay stations.

(7) **CAS in Urban Environments.** 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 FW and RW 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 (gridded reference graphics [GRGs]) 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 consequences of collateral damage in the form of fratricide, damage or destruction of unintended persons or objects, should be a consideration. Detailed planning of weapons and delivery tactics will minimize the risk to friendly forces, civilians, and adjacent buildings/structures. Consider combining FW and RW platform capabilities in an urban environment. FW can often target/designate within urban areas more easily due to the ability to loiter high above many threat envelopes. Once the FW aircraft has identified and confirmed the target with the JTAC, it can designate the target with a laser to guide precise, low-yield PGMs fired from a RW attack asset holding in a relatively safe battle position (BP).

(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 C, “Planning Considerations for Close Air Support Using Night Vision Devices and Infrared (Laser) 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.

(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 SA 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 and IR pointer 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, GPS and/or inertially-aided munitions (IAMs), and joint helmet-mounted cueing systems (JHMCSs).

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, thermal crossover, and 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. In order to perform a radar delivery, the target or offset aimpoint(s) must be radar significant.

4. IAMs. Weapons can be delivered at night or through the weather at a set of coordinates by properly equipped aircraft. The effectiveness of an IAM depends upon the tactical situation (type of target, desired weapons effects, target movement, etc.) and the accuracy, or TLE of the target coordinates (to include elevation). In addition, CAS planners, JTACs, and aircrew must ensure that the World Geodetic System 1984 (WGS-84) coordinate datum plane is used by both controller and weapon delivery platform when employing IAMs. Datum planes should be verified prior to deployment/mission as part of deployment/mission checklist and coordinated or confirmed with the ASOC/DASC and/or higher echelons. **Significant errors can result if different datums or excessive TLEs are used. These errors increase the risk of fratricide as the distance to friendly troops decreases to within the TLE.**

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

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

f. **Time Considerations**

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

(2) **Joint Air Tasking Cycle.** The specific theater or joint operations area (JOA) will have established ATO cycle "cut off" times for preplanned 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 SOPs.

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

g. **Legal Considerations.** Review and adhere to the law of armed conflict when considering collateral damage risk to civilians, civilian structures, and properties associated with CAS attacks. This may dictate the use of precision-guided or low-yield 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 missions 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/FAC(A)s should first evaluate different mission profiles, in order to minimize the aircraft's exposure to the threat envelope from known or suspected antiair threats. If aircraft cannot avoid enemy air defenses, aircraft vulnerability must be balanced against the risk of exposing SEAD delivery systems to determine if SEAD is appropriate for that CAS mission. Before requesting CAS that would require SEAD support, fire support personnel must first consider whether mortars, artillery, or NSFS can range the target and achieve the desired results. Effective SEAD depends on accurate intelligence on the position and type of enemy weapons. SEAD is most effective against fixed threats such as antiaircraft sites and ADA batteries. SEAD is least effective against individual man-portable air defense systems (MANPADSs) and highly mobile threats due to the difficulty of accurately targeting these systems. The FSC, working with the JTAC and forward observer, may coordinate surface-delivered SEAD with target marking.

b. **CAS Target Marking.** JTACs/FAC(A)s should mark targets whenever necessary. 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/FAC(A). This is known as a "talk on" to target. The JTAC/FAC(A) marking his position with devices such as strobe lights, mirrors, or air panels may aid this narrative. Care must be taken to not highlight friendly ground forces positions to the enemy. JTACs/FAC(A)s

should strive to provide redundant marks when deemed necessary in case the primary mark fails, is late, or is inaccurate during the terminal phase of an attack. Examples of redundant mark combinations are laser/smoke, IR pointer/tracer, and smoke/talk-on. The target mark can be provided by:

(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. These systems will usually deliver smoke, WP, or ground burst illumination rounds to mark targets.

(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, heavy machine guns, or rockets fired from RW aircraft.

(3) Laser designators.

(4) FAC(A) aircraft (e.g., laser designation, IR marker, rocket, and/or illumination device). It is important to note that prior to providing a mark, the FAC(A) must still receive authorization from a JTAC or ground commander.

(5) IR Pointers. When used in conjunction with NVDs, Airborne or ground IR pointers may be used to verify target location.

c. **Fire Support Coordination Measures.** Within their operational areas, land and maritime commanders employ permissive and restrictive FSCMs to expedite attack of targets; protect forces, populations, critical infrastructure, and sites of religious or cultural significance; clear joint fires; deconflict joint fire support operations; and establish conditions for future operations. Along with other control measures, FSCMs and their associated procedures help ensure that joint fire support does not jeopardize troop safety, interfere with other attack means, or disrupt operations of adjacent subordinate units. Maneuver commanders position and adjust control measures consistent with the location of friendly forces, the concept of the operation, anticipated enemy actions, and in consultation with superior, subordinate, supporting, and affected commanders. The primary purpose of permissive measures is to facilitate the attack of targets. Permissive measures facilitate reducing or eliminating coordination requirements for the engagement of targets with conventional means. Restrictive measures impose requirements for specific coordination before engagement of targets. Figure III-3 depicts common FSCMs.

For further details of fire support coordination measures, refer to JP 3-09, Joint Fire Support.

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

Figure III-3. Fire Support Coordination Measures

(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.

(b) **Fire Support Coordination Line (FSCL).** FSCLs facilitate the expeditious engagement of targets of opportunity beyond the coordinating measure. An FSCL does not divide an area of operations. The FSCL applies to all fires of air, land, and sea-based weapon systems using any type of munition against surface targets. An FSCL is established and adjusted by the appropriate land or amphibious force

commanders within their boundaries in consultation with superior, subordinate, supporting, and affected commanders. The FSCL is a term oriented to air-land operations and is normally located only on land, however in certain situations, such as littoral areas, the FSCL may affect both land and sea areas. If possible, the FSCL should follow well-defined terrain features to assist identification from the air. In amphibious operations, the FSCL is normally established by the commander, landing force after coordination with the CATF. Changes to the FSCL require notification of all affected forces within the AO and must allow sufficient time for these forces and/or components to incorporate the FSCL change. Current technology and collaboration tools between the elements of the joint force determine the times required for changing the FSCL. The JFC should establish a time standard in his guidance for shifting FSCLs. Whenever possible, restrictive measures are employed by commanders to enhance the protection of friendly forces operating beyond the FSCL — measures such as restrictive fire areas (RFAs) and no-fire areas (NFAs). Use of an FSCL is not mandatory. Forces engaging targets beyond an FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid fratricide, both in the air and on the land. In exceptional circumstances, the inability to conduct this coordination will not preclude the engagement of targets beyond the FSCL. However, failure to do so may increase the risk of fratricide and waste resources. Short of an FSCL, all air-to-ground and surface-to-surface engagement operations are controlled by the appropriate land or amphibious force commander. This control is exercised through the operations staff or with predesignated procedures. The FSCL is not a boundary — the synchronization of operations on either side of the FSCL is the responsibility of the establishing commander out to the limits of the land or amphibious force boundary. The establishment of an FSCL does not create a free fire area (FFA) beyond the FSCL. When targets are engaged beyond an FSCL, supporting element's engagements must not produce adverse effects on or to the rear of the line. Engagements beyond the FSCL must be consistent with the establishing commander's priorities, timing, and desired effects and deconflicted whenever possible with the supported HQ.

(c) **Battlefield Coordination Line (BCL).** A BCL is a USMC supplementary FSCM, established based on METT-T, which facilitates the expeditious attack of surface targets of opportunity between the measure (the BCL) and the FSCL.

(d) **FFA.** An FFA is a specific designated area into which any weapon system may fire without additional coordination with the establishing HQ. It is used to expedite joint fires and to facilitate emergency jettison of aircraft munitions.

(e) **Kill Box.** A kill box is a three-dimensional area used to facilitate the integration of joint fires. For current kill box operations, refer to theater-specific SOP. When established, the primary purpose of a kill box is to allow lethal attack against surface targets without further coordination with the establishing commander and without terminal attack control. When used to integrate air-to-surface and surface-to-surface indirect fires, the kill box will have appropriate restrictions.

For further guidance on kill boxes, refer to JP 3-09, Joint Fire Support *and FM 3-09.34, MCRP 3-25H, NTTP 3-09.2.1, AFTTP(I) 3-2.59,* Multi-Service Tactics, Techniques, and Procedures for Kill Box Employment.

(2) **Restrictive Measures.** Restrictive measures restrict the use of supporting arms for various reasons: safeguard friendly forces; protect religious sites; and deconfliction of fires.

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

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

2. When an enemy force within the NFA engages a friendly force and the engaged commander determines there is a requirement for immediate protection and responds with the minimal force needed to defend the force.

(b) **Restrictive Fire Area (RFA).** An 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).** The RFL is a line established between converging friendly forces — one or both may be moving — that prohibits joint fires or the effects of joint fires across the line without coordination with the affected force. The purpose of the line is to prevent fratricide and duplication of engagements by converging friendly forces.

(d) **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.

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

(f) **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 (GTL).

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

formal ACMs (see Figure III-4). 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, *Joint Airspace Control*, for a detailed definition of joint ACMs, which include:

(1) **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 ACA is the primary ACM which reflects the coordination of airspace for use by air support and indirect joint fires. There are two types of ACAs: formal and informal.

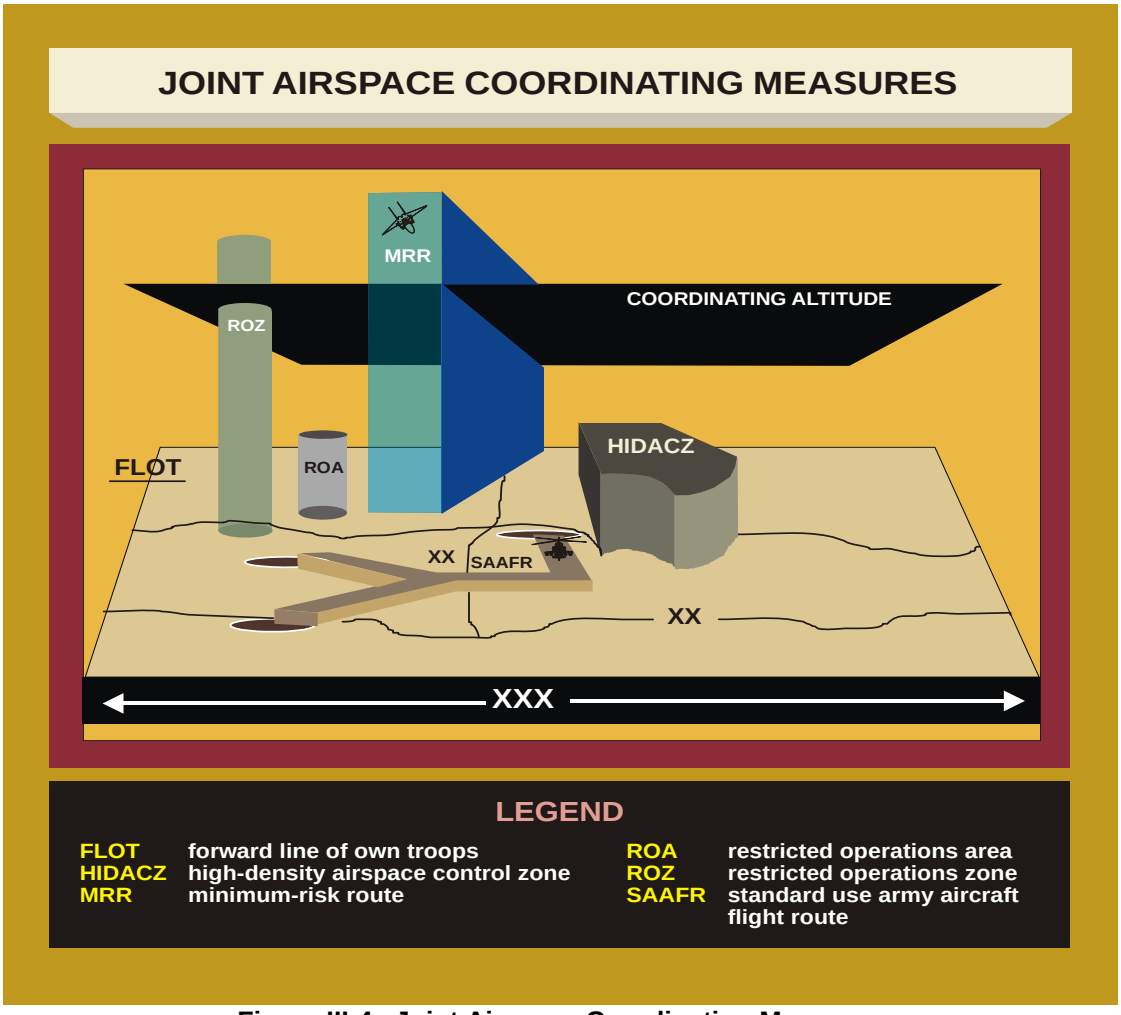

Figure III-4. Joint Airspace Coordinating Measures

(a) **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 fire direction center (FDC) can determine the trajectory for a specific round or NSFS asset firing at a specific target, each target must be evaluated to ensure the trajectories of the rounds do not penetrate the ACA. The FSC should consult the FDC when deciding the altitude of an ACA to determine if that altitude would allow the majority of targets to be attacked without interference or problems. Formal ACAs are promulgated in the ACO, ATO, or SPINS (see Figure III-5). ACAs, while restrictive for artillery, are permissive for aircraft.

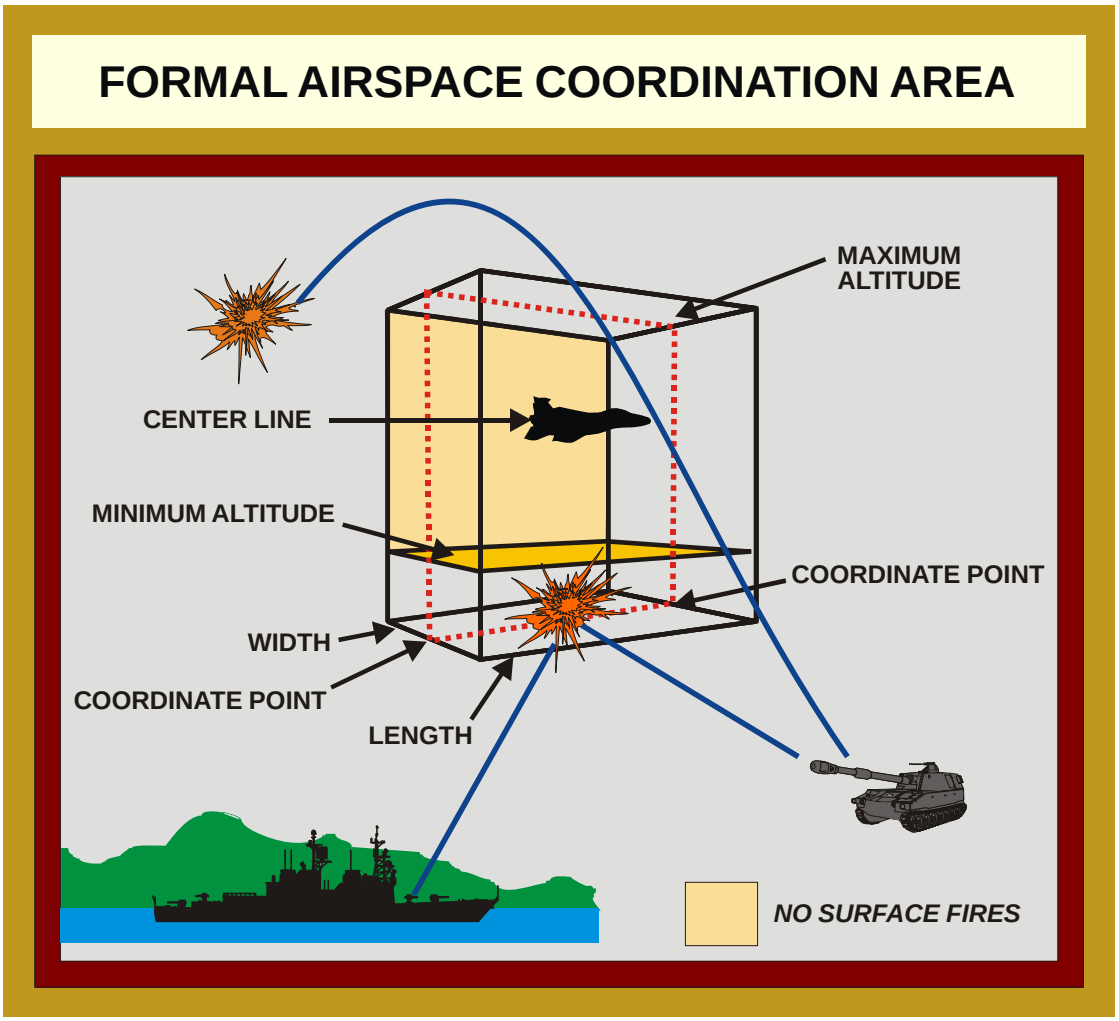

Figure III-5. Formal Airspace Coordination Area

(b) **Informal ACA.** Because of the nature of informal ACAs they are normally very short in duration. 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. An informal ACA is no less important than a formal ACA. Informal ACAs provide flexibility to the changing battlefield situation.

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

(3) **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. If the ground commander's AO needs to develop or recommend ACMs in order to coordinate aircraft in a high density environment, refer to JP 3-32, *Command and Control for Joint Land Operations.*

(4) **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.

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

(6) **Standard Use Army Aircraft Flight Routes (SAAFRs). A SAAFR** is a route 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 by diverting preplanned missions or with on-call missions (see Figure III-6).

a. **Preplanned Requests.** Those CAS requirements foreseen early enough to be included in the first ATO distribution are submitted as preplanned AIRSUPREQs for CAS. As soon as the requirements for CAS are identified during the planning process, planners submit AIRSUPREQs for CAS per the JAOC battle rhythm. Only those AIRSUPREQs submitted in sufficient time to be included in the joint air tasking cycle planning phases and supported on the ATO are considered preplanned requests. Planners can prepare preplanned requests by using Department of Defense Form 1972 (Joint Tactical Air Strike Request) (see Appendix A, "Joint Tactical Air Strike Request"). This form may be digitally transmitted using the Advanced Field Artillery Tactical Data System, or directly into the theater battle management core system. Digital is the preferred method of transmitting/receiving AIRSUPREQs.

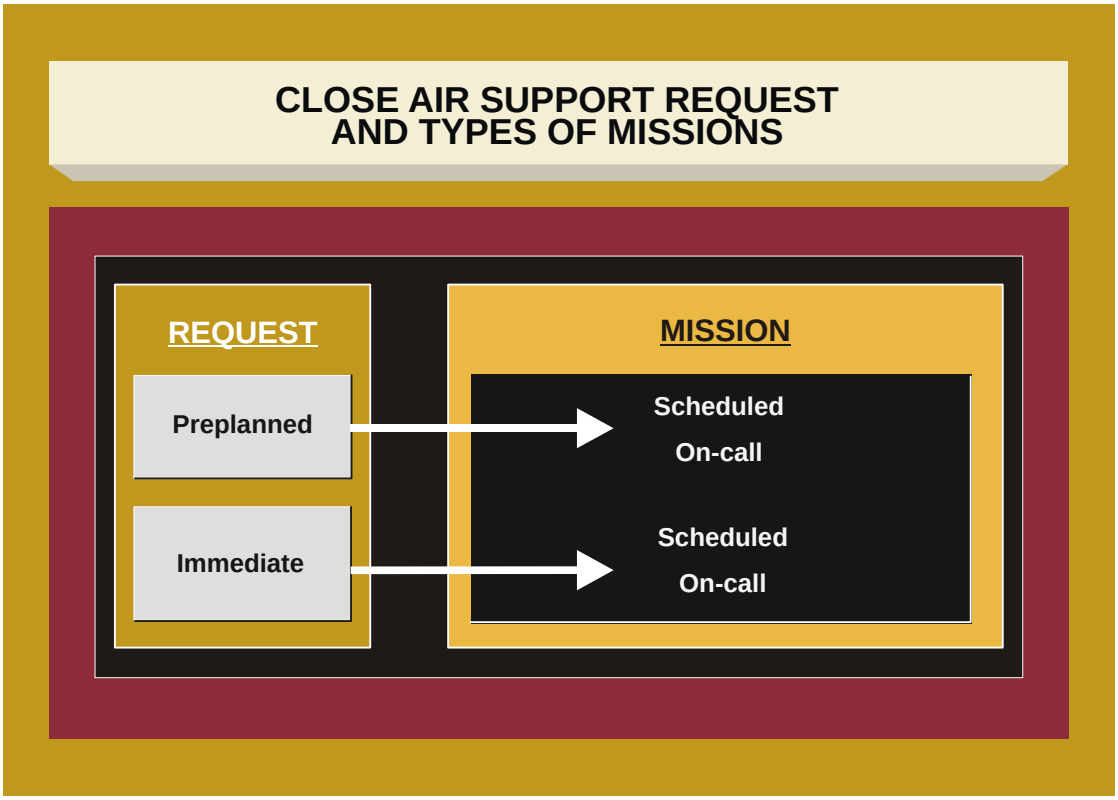

Figure III-6. Close Air Support Request and Types of Missions

(1) **Precedence.** Each preplanned request is assigned precedence by the requestor, which orders the requests in descending order of importance. It is refined at subsequent levels of the request process according to the commander's priorities. Detailed preplanned requests that retain a high precedence through the various echelons of command will likely result in a scheduled mission line on the ATO.

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

(3) **Timeliness.** A high level of detail is not always available prior to the ATO cutoff time. In these cases, preplanned requests can still **identify an anticipated requirement for CAS to be available during a period of time, with the exact time and place to be coordinated as the battle develops**. The requesting commander should provide a time frame, probable target type, and place where the need for CAS is most likely. The important thing to remember for preplanned requests is to get the request in per the JAOC battle rhythm to accommodate the joint air tasking cycle planning phases (phases 1-3). Then, as the situation develops, **update the request with the ASOC/DASC referencing the original request number as needed.**

(4) **Submission.** Planners at each echelon consolidate their requests for CAS and submit them to the next HHQ along with other AIRSUPREQs. 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).

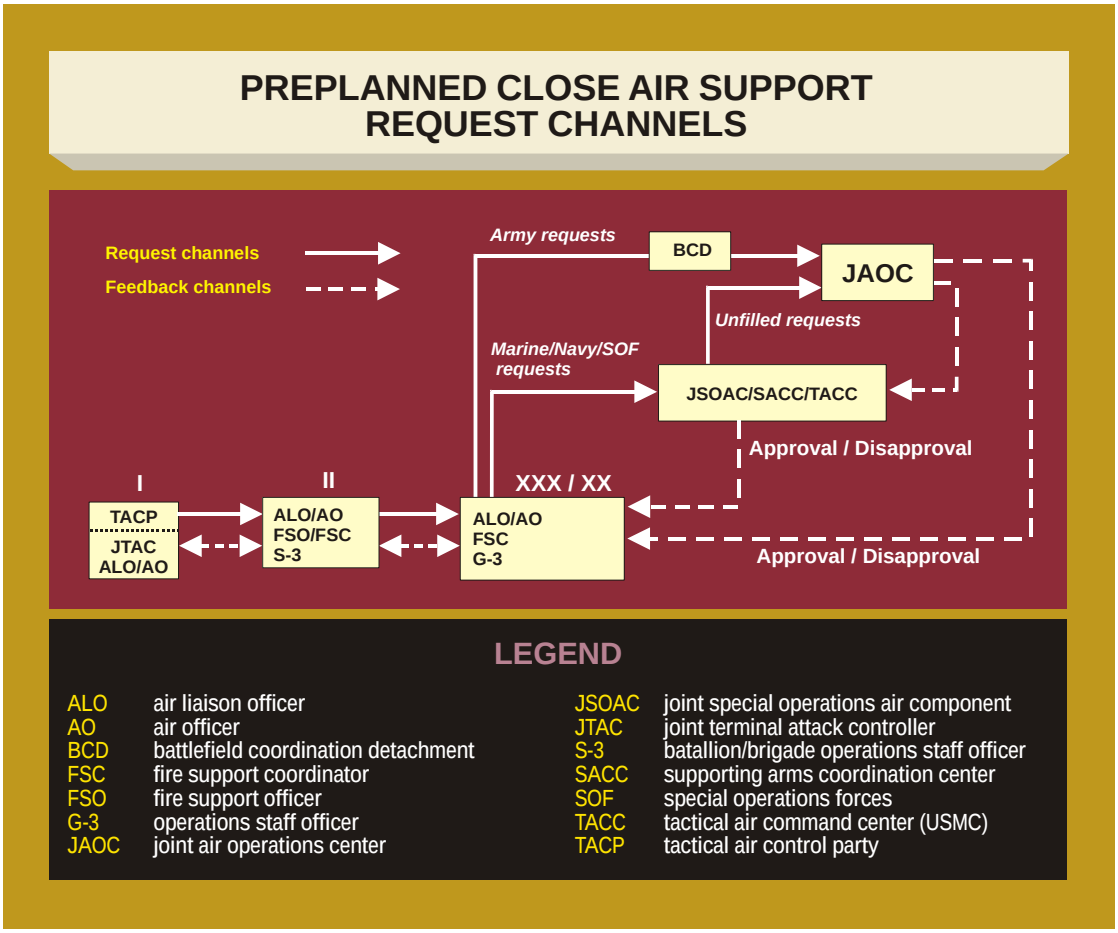

Figure III-7. Preplanned Close Air Support Request Channels

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

b. **Immediate Requests.** Immediate requests arise from situations that develop outside the ATO planning cycle. Because these requirements cannot be identified early on, tailored ordnance loads, sensors, or platforms may not be available for specified targets. To resource an approved immediate request, the senior ground echelon (e.g., corps, division) AO/ALO may advise the G-3 to redirect scheduled CAS missions, to task on-call missions, or to forward the requests to the JAOC. During the execution phase of the ATO, the JFACC staff may need to redirect missions to cover immediate requests for CAS (see Figure III-8).

CAS PLANNING FOR IMMEDIATE REQUESTS

A Brigade Combat Team (BCT) has received reliable intelligence of a possible weapons cache in their operational area. The brigade issues a warning order to one of its battalions to execute a cordon and search in this area in 6 hours. The brigade commander directly establishes this mission as a high priority. The fires cell (FC) begins fire support planning by entering the weapons cache into Advanced Field Artillery Tactical Data System (AFATDS) as a target. AFATDS analyzes the target, based on available resources and commander's guidance, provides weapon-target pairing solutions for both ground multiple launch rocket system (GMLRS) and close air support (CAS). The air liaison officer (ALO) checks the air tasking order (ATO) and recommends that the unit submit an immediate request for airborne alert CAS. This will insure responsive air support, with the right armament for the target, and enable aircrews to have situational awareness of the ground unit's mission. The Commander accepts the recommendation of the ALO and fire support officer (FSO) and the FC submits the air support request (AIRSUPREQ) and the request for GMLRS fires through fire support channels since neither of these assets are in direct support of this brigade. The digital requests in AFATDS are analyzed, approved and forwarded to the appropriate echelon for final approval/decision. The AIRSUPREQ is approved in Army fire support channels at the corps. Once the corps approves the request, it forwards it digitally in AFATDS through the battlefield coordination detachment (BCD) to the Theater Battle Management Core System (TBMCS). (The AFATDS at the BCD is set to automatically forward immediate AIRSUPREQs.) The air support operations center (ASOC) at the corps can now see the request in a TBMCS application called WARP (Web Air Request Processor). The ASOC pairs the digital request in WARP with an appropriate CAS mission from the TBMCS database. The ASOC has been given authority to change ground alert missions supporting their corps to air alert. When they select the SCRAMBLE button in WARP, TBMCS automatically sends a message to the wing operations center that will execute the air mission and send an approved/supported message back to the requesting unit through AFATDS. The result of processing these requests digitally is that targeting data was entered only once, by the requester; fire support processing and approval were accomplished at each Army echelon; and the requester receives digital notification that the requests have been approved and supported by an air mission number. Now when the company commander starts toward the objective, he knows both GMLRS and CAS will be ready to support his unit's mission.

VARIOUS SOURCES

Figure III-8. Immediate Close Air Support Request Process

(1) **Conventional Force Submission. Immediate requests are forwarded to the appropriate command post by the most effective means available, voice or digital** (see Figure III-9). Commanders anticipating contact may submit immediate

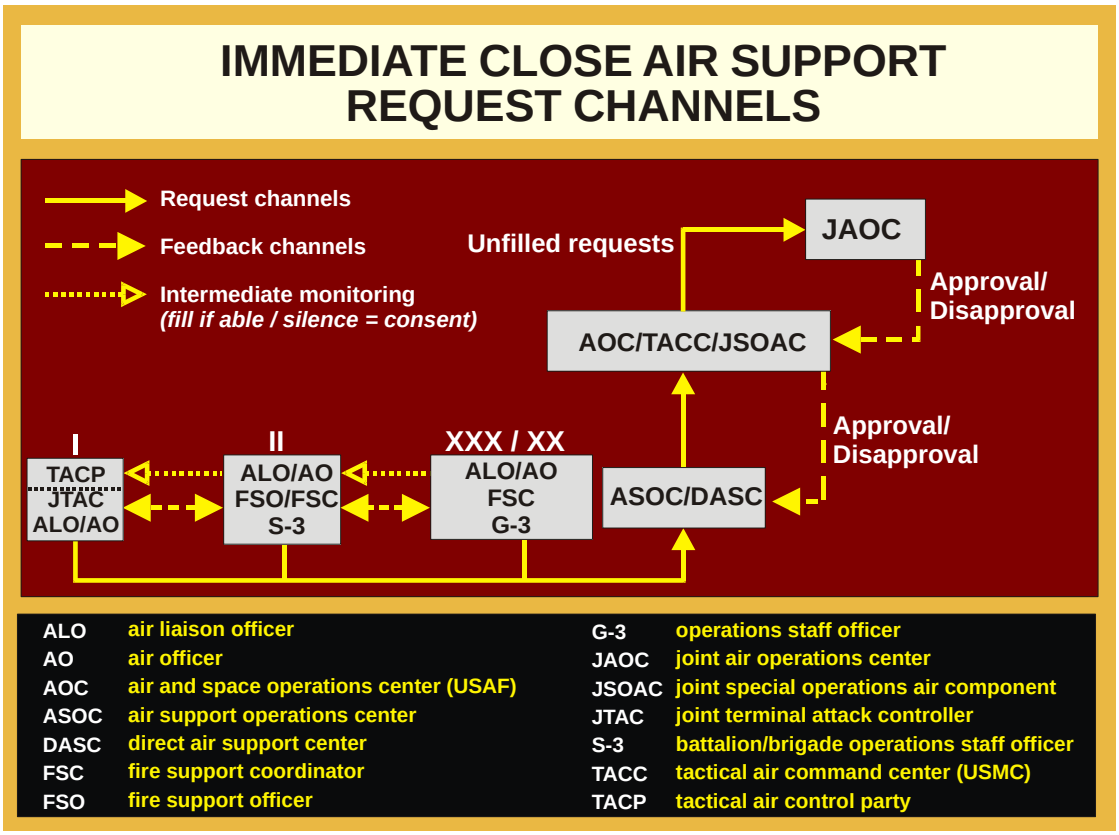

Figure III-9. Immediate Close Air Support Request Channels

requests that will result in on-call missions dedicated to the maneuver force for near-term planning. The most responsive air support for troops in contact may require immediate requests sent directly from the TACP (JTAC, ALO, AO) to the ASOC/DASC using 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 III data of the JTAR back to the requestor. Silence by intermediate HQ implies consent to the request.

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

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

(a) Emergency #1. Targets that require immediate action and supersede all other categories of mission priority.

(b) Priority #2. Targets that require immediate action and supersede routine targets.

(c) Routine #3. Targets of opportunity. Targets which do not demand urgency in execution.

(4) **Situation Update.** When submitting a JTAR, the JTAC or requesting agency will provide a current situation update to the ASOC/DASC. The situation update will consist of:

(a) Situation update number (#).

(b) Target – general enemy situation.

(c) Threat activity.

(d) Friendly situation.

(e) Friendly positions.

(f) Artillery activity.

(g) Clearance authority.

(h) Ordnance requested.

(i) Restrictions/remarks.

(j) Localized SEAD efforts (suppression/EW).

(k) Hazards (weather/terrain/obstructions).

(5) **Request Format.** Use of the JTAR (Department of Defense Form 1972) is used for requesting CAS through the ASOC/DASC. However, digital AIRSUPREQs are the preferred method of requesting air support through fire support channels.

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

(b) Mission data is passed using the JTAR Section III format to the requesting unit. 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.

4. Line 23 Ordnance.

5. Line 25 Estimate TOT.

6. Line 26 Control Point.

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

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

9. Forward Air Controller (Airborne) Planning

a. **Forward Air Controller (Airborne).** A FAC(A) is a specifically trained and qualified aviation officer who exercises control, from the air, of aircraft engaged in support of ground troops. The FAC(A) provides coordination and TAC for CAS missions as well as locating, and marking ground targets. He can serve as an additional controller for the TACP/JTAC, support a maneuver element without a TACP/JTAC, or supplement the capability of a TACP/JTAC. A FAC(A) must be able to coordinate supporting arms in conjunction with CAS missions, such as L-Hour preparatory fires and post-assault fires, without assistance from the TACP/JTAC. The FAC(A) must be capable of executing the desires of the ground commander in day, night, and adverse weather conditions; integrating fires on the battlefield; mitigating fratricide; and conducting detailed planning and integration with the maneuver element.

b. **Pre-Mission Planning**

(1) During mission planning, the TACP/JTAC is responsible for advising the regimental and BN commanders, S-3, and the FSC on the employment and integration of CAS and FAC(A). The AO/ALO is expected to have a working knowledge and understanding of CAS and FAC(A) aircraft capabilities and limitations. A TACP/JTAC should request a FAC(A) if necessary. Possible reasons for requesting a FAC(A) are if the TACP/JTAC is:

(a) Expecting a large number of CAS aircraft in a small amount of time or restrictive airspace.

(b) Operating in restrictive terrain (urban, forested) where a platform with the same perspective as CAS assets for target talk-ons would aid in the efficiency of CAS missions.

(c) Operating with a limited capability to mark targets.

(d) Expecting difficult communications due to terrain and/or high threat environment.

(e) When operational needs require an aviator overhead who is intimately familiar with the ground commander's intent and scheme of maneuver, versed in CAS TTP, to assist in the battle/operation.

(2) For large operations, the TACP/JTAC should not hesitate to request that a FAC(A) travel to the respective operational planning cell in order to aid the TACP/JTAC. Having the expertise of the FAC(A) in the planning process will enhance the effectiveness of airpower by providing planning expertise in aircraft capabilities and requirements, weapons effects, and CAS TTP. These benefits of having a FAC(A) involved in the planning process will translate to increased aircrew SA during execution and enhanced airpower effectiveness. Additionally, the FAC(A) will be able to communicate the ground commander's plan and intent to the other CAS assets involved in the operation collocated with the FAC(A)'s squadron.

(3) The FAC(A) aids in the planning process, not only by being an expert at aircraft/weapons capabilities, target/weapon pairing, and CAS procedures, but also by possessing the knowledge of how and when to plan for SEAD, weather effects, combat search and rescue, and many other essential considerations or factors. Due to manning and the ATO cycle however, it is unlikely that a FAC(A) will be able to be present during the planning stages of every ground operation. The AO/ALO should make a concerted effort to take advantage of a FAC(A)'s expertise in this area via secure e-mail/phone or chat. When a FAC(A) is unable to participate in the planning process via any means, TACP/JTAC members will be responsible for advising the ground commander on FAC(A) employment, and as such must be well versed in FAC(A) integration TTP.

(4) **FAC(A) Responsibilities.** If a FAC(A) is unable to participate in the planning process, it is incumbent upon both the TACP and FAC(A) to coordinate prior to mission execution. Face-to-face briefs are ideal, but at a minimum the FAC(A) and TACP should exchange information electronically prior to mission execution. Transmission to the FAC(A) of the required planning products and information will ensure that they at least have a baseline of knowledge for execution of the FAC(A) mission. Regardless of liaison method, the FAC(A) should be provided the following information in order to clarify the information contained within the operation plan (OPLAN)/OPORD/ATO and any particular requirements of the supported ground unit. A prioritized list of essential information to be passed between the TACP and the FAC(A) includes but is not limited to:

(a) The ground commander's intent.

(b) Ground force scheme of maneuver.

1. Essential tasks that must occur to ensure mission success (specified and implied).

2. Expected friendly locations and marking (ID) plan.

3. Essential friendly coordinating documents (GRG, etc.).

(c) Threat scheme of maneuver.

1. Most likely enemy COA.

2. Most dangerous enemy COA.

3. Known or anticipated threat.

(d) Fire support/targeting plan.

1. Target priorities/precedence.

2. Established FSCMs.

3. Expected target arrays.

4. Asset integration plan.

(e) Communications plan.

1. Terminal control nets.

2. Air request nets.

3. TACP administrative nets.

4. Ground force nets.

5. Code words.

(f) Fire support assets.

1. Established position areas of artillery (PAAs).

2. Tasked ATO assets.

a. FW/RW CAS/FAC(A).

b. UAS.

c. Tanker assets.

(g) Airspace plan (established ACMs).

1. Routing plan.

2. Planned contact points (CPs)/initial positions (IPs)/holding areas (HAs)/battle positions (BPs)/ROZs.

(h) Terminal control plan.

1. FAC(A) game plan.

a. JTAC responsibilities.

b. FAC(A) responsibilities.

c. Mission approval process.

2. Marking / guidance plan.

a. SEAD SOP.

b. Laser plan.

3. TACP capabilities.

a. TACP equipment.

b. TACP limitations.

(i) ISR plan.

1. Enemy order of battle and equipment.

2. Enemy signature/recognition.

3. UAS ROZs.

4. ISR integration plan.

(j) Supporting documents/information.

1. Map overlays/graphics.

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

3. Fires SOP.

(5) In turn, the FAC(A) should provide the following information to the TACP:

(a) Time on station.

(b) ATO breakout; assets coming to the operational area as well as operating nearby.

(c) Loiter time.

(d) Initial holding point desired.

(e) Weapons that will be carried.

(f) Communication plan recommendations.

(g) Limitations that would affect the pre-briefed game plan.

(h) System capabilities in the form of type of targeting pod/advanced targeting pod.

(i) FMV capability.

(j) Coordinate generation capability (with associated TLE).

c. Detailed integration and coordination prior to execution will provide the TACP and FAC(A) with a template from which to deviate when unforeseen tactical problems arise during execution. Planners should prepare primary and alternate plans for marking and control enabling a smooth transition if the tactical situation requires a change. Failure to do such detailed integration does not mean the mission will be a failure, only that the FAC(A) and CAS assets involved will be less prepared at check-in and SA will initially be lower. Successful detailed integration and coordination will enhance the potential impact that airpower will have on the battle/operation in support of the ground commander's plan. With this pre-coordination complete, parties need to only provide changes or updates when the FAC(A) checks-in during execution. The following individuals and documents will serve as the base sources of information to aid the FAC(A) and TACP in their planning and liaison:

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

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

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

(c) **Communications.** Verification of the 'COF' and 'air spot' nets, and the call signs of the artillery and mortar units. It is critical to establish this communications link prior to commencing the operation.

(d) **Target Lists.** Preplanned targets, high-value targets, and other targets of interest.

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

(f) **FSCMs.** Verification of all active and planned coordination measures.

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

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

(2) **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, communication nets, target marking capabilities, and means of friendly identification of these units.

5. SOF team locations.

6. ROE restrictions.

(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. Preplanned air support (preplanned scheduled and on-call missions).

5. Air targets.

6. Air target overlays (depicts planned air targets, FSCMs, and unit boundaries).

7. Artillery fire plan.

8. Artillery targets.

9. Initial position area/fire capabilities overlay (depicts initial position areas assigned to artillery units, unit boundaries, and their fire capabilities).

10. Artillery target overlays (depicts artillery targets, groups, series, FSCMs, and unit boundaries).

11. Artillery fire support tables.

12. Naval surface fire plan.

13. Fire support coordination overlay (depicts applicable FSCMs to include unit boundaries).

(d) **Communications-Electronics Section**

1. Communications system assets.

2. Planned nets, including tactical data links from operations task link.

3. Communications-electronics operating 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. ACMs.

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 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 (RW and FW).

3. Control points.

4. Airspace control measures.

5. Expected operational area.

6. Tanker availability/locations/times.

7. Code words.

8. Communications plan.

9. FSCMs.

10. FARP/forward operating base (FOB) locations.

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

10. Tactical Air Coordinator (Airborne) Planning

a. **Introduction.** The TAC(A) is an airborne extension of the ASOC or DASC. The TAC(A)'s authority is determined by the CRC, ASOC, DASC, Navy TACC, or Marine TACC. The TAC(A)'s authority and responsibility can range from simple radio relay all the way to having launch, delay, and divert authority over other assets. In order to be effective, TAC(A)s must conduct detailed planning and integration with all supported units, including aviation, ground, and C2 units. The following section list some of the potential responsibilities of TAC(A)s:

(1) Coordinate offensive air support.

(a) Provide CAS briefs and TOTs.

(b) Provide handoffs to terminal controllers.

(c) Provide and relay situation updates and BDA.

(d) Provide aircraft and fire support coordination.

(e) Process and relay JTARs.

(f) Serve as temporary FAC(A) (if qualified). (Note: TAC[A]s should never perform both missions simultaneously. Realize, it will take a relatively significant amount of time for the TAC[A] to transition to and from the FAC[A] and TAC[A] roles.)

(g) Serve as a deep battle coordinator.

(2) Coordinate and execute C2 of designated assets.

(a) Extend range or enhance communications for the CRC, ASOC, DASC, FSCC, TACP, Navy TACC, Marine TACC, and etc.

(b) Control a section of airspace by procedurally controlling assets into and out of the area.

(c) Deconflict fires and assets.

(d) Execute delegated responsibilities (e.g., launch, delay, divert) in the absence of the appropriate C2 agency.

(3) Coordinate assault support operations.

(a) Coordinate and relay casualty evacuation missions.

(b) Process and relay assault support requests.

(c) Support helicopter-borne operations.

(d) Coordinate reactive SEAD packages and their conduct.

(e) Coordinate surface-to-surface fires.

b. **Pre-Mission Planning.** TAC(A)s are usually geographically separated from the units they are supporting. Despite this fact, TAC(A)s should be included in the mission planning process by receiving OPLANs and coordinating on-station times and other facets of support operations. On-station times must be planned to ensure TAC(A)s can accomplish the mission, and execute within the intent of the supported commander. At a minimum, TAC(A) on-station times should be planned to cover critical portions of missions (if the TAC[A] cannot be airborne for the entire duration of the mission).

(1) **TAC(A) Pre-mission Responsibilities.** TAC(A)s must be familiar with the OPLAN/OPORD, applicable theater/operation SOPs, ATO, and ACEOI. TAC(A) must liaise with the ASOC or DASC, and the supported elements. This liaison can be conducted electronically. However, if it is at all possible, face-to-face coordination should be conducted. The TAC(A) must determine the level of authority the commander is willing to give them. This authority could include the ability to launch or delay alert assets, and the ability to divert or delay airborne assets. The TAC(A) must obtain the following information (at a minimum) from the supported element:

(a) Ground scheme of maneuver.

(b) Ground commander's intent.

(c) FSCMs.

(d) Expected operational areas.

(e) Expected supported unit locations.

(f) Initial positions of JTACs and other fire support observers.

(g) Fire support plan.

(h) Attack guidance matrix or target precedence list.

(i) Fire support assets available.

(j) SEAD plan.

(k) FAC(A) employment plan.

(l) CAS assets available.

(m) CAS asset priority.

(n) FAC(A) assets available.

(o) Tanker assets available.

(p) FARP locations.

(q) Routing.

(r) Control points and IPs.

(s) BPs and HAs.

(t) Communications plan and nets.

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

(2) **Air Officer/Air Liaison Officer.** The AO/ALO is responsible for advising the ground commanders, S-3s and the FSC on the employment and integration of aviation assets. The AO/ALO is expected to have a working knowledge and understanding of CAS, FAC(A), and TAC(A) aircraft capabilities and limitations. The AO/ALO is also expected to understand the ground maneuver force to enhance SA. They should be prepared to advise the supported commander on the employment and capabilities of TAC(A)s in the accomplishment of their specified tasks. The AO/ALO will coordinate with TAC(A) units 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 TAC(A) mission planners:

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

(b) **Specified and Implied Tasking.** This is what the TAC(A) is expected to accomplish.

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

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

(e) **Plan for TAC(A) Use.** Positioning and planned tactics of the TAC(A) should be discussed.

(3) **FC.** The TAC(A) needs to be familiar with how to contact these elements, as well as the plan of how fires are expected to be integrated on the battlefield.

(4) **Operation Order.** A thorough understanding of the OPORD, its annexes and appendices, will provide TAC(A) planners with much of the information required to successfully plan for the mission.

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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).

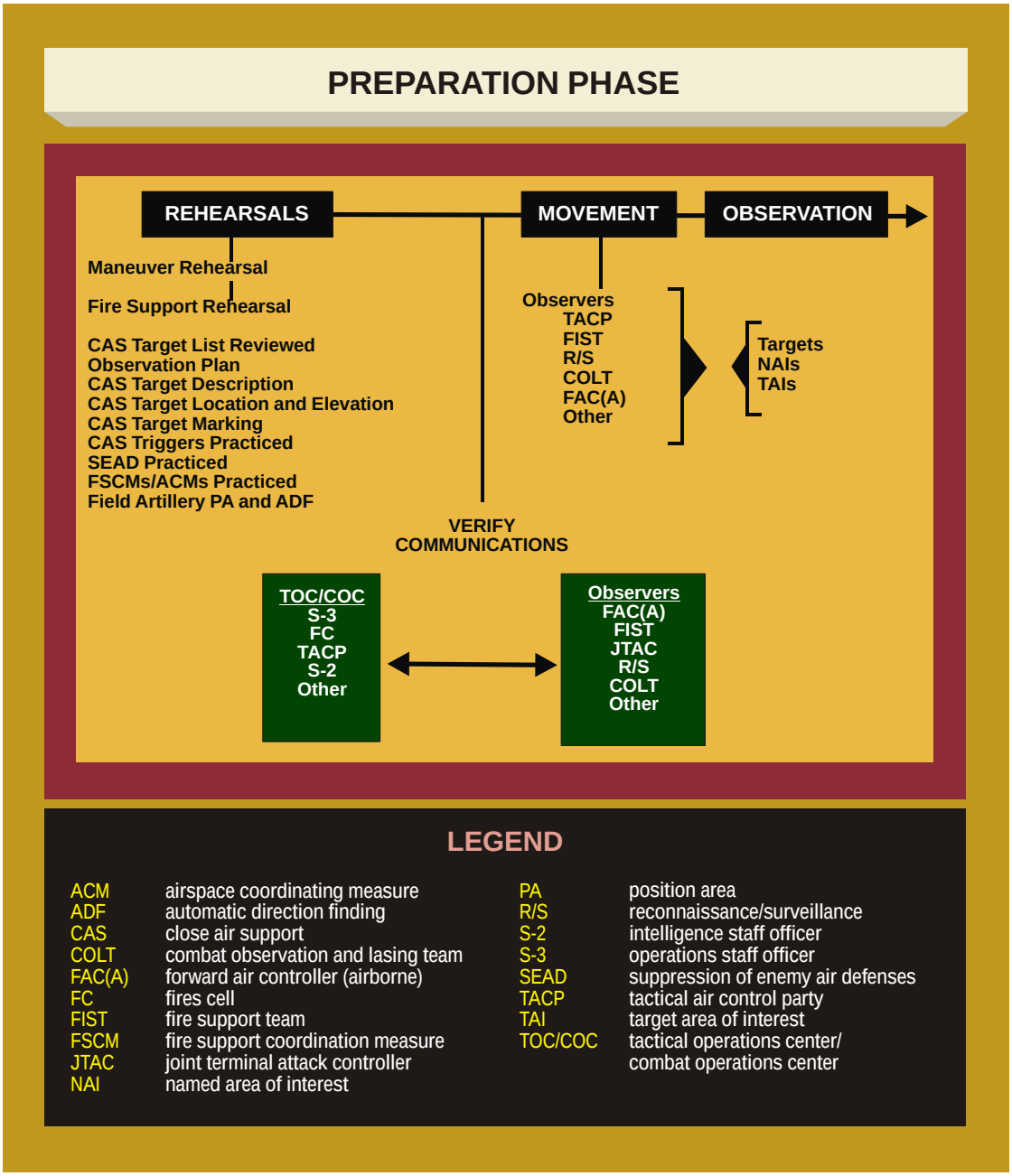

Figure IV-1. Preparation Phase

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 observation plan should be feasible, executable, and tactically sound.** Preparation by the TACP/JTAC, fire support assets, and maneuver staff is critical to the synchronized execution of joint fires.

c. Coordination between echelons and preparation that precedes execution are just as important as plan development. Staff preparation includes assembling and continuously updating estimates, (e.g., continuous JIPOE) with the goal of providing accurate situational updates for commanders. Whether incorporated into a formal process or not, the staff's preparatory activities such as JIPOE, targeting, fire plan refinement, etc., continue throughout preparation and execution.

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

2. Rehearsals

a. **The rehearsal is one of the most overlooked aspects of maneuver and fire support planning.** It provides attendees the opportunity to visualize the battle, ensure total comprehension of the plan, promote responsiveness, and identify areas of confusion, friction or conflict that may have been overlooked. This visual impression helps orient individuals to both the environment and other units during the execution of the operation. Moreover, the repetition of combat tasks during the rehearsal leaves a lasting mental picture of the sequence of key actions within the operation. The extent of the rehearsal is limited by imagination, the tactical situation, time, and resources available. **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. Requests for CAS should clearly describe the desired effects to meet the commander's intent. JAOC planners should then tailor aircraft and weapons loads to create the desired effects. Often, there is no separate "intent for CAS" defined; however, the commander's intent for fires is inclusive for all fires of which CAS is an integral part.

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

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

(b) Triggers for targets and target engagement criteria.

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

(d) Verify SEAD plan.

(e) Communications connectivity.

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

(g) Terminal attack control types to be utilized.

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

1. Availability of FAC(A).

2. Plan for effective use of excess CAS sorties (i.e., use of kill boxes/handoff to another sector or FAC(A)/etc.).

3. BDA/MISREP collection procedures.

(3) After the rehearsal, the participants must be able to effectively communicate the plan to subordinate personnel prior to the beginning of the operation. Specific AO/ALO responsibilities include providing key information concerning all aspects of air support 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 and IPs.

(g) ACMs/FSCMs.

(h) SEAD plan.

(i) Target marks/laser plan.

(j) Friendly marking procedures.

(k) TACP battlefield employment.

(l) TACP battlefield recovery.

(m) TACP communications plan.

(n) Approved/disapproved CAS requests.

(o) Terminal attack control types.

d. **Fire Support Rehearsal.** Fire support rehearsals focus on the execution of 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 FC/FSCC, 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.

For further guidance on coordinate datum planes, refer to CJCSI 3900.01C, Position (Point and Area) Reference Procedures.

(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, JFO, FIST, COLT, ISR, 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, number and type of aircraft available, and SCLs).

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

1. Primary AOF.

2. Positioning areas.

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

(l) FSCMs/ACMs:

1. Schedule or on-order call to shift boundaries and FSCMs.

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, 2, or 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. 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 and equipment.

b. The following pre-combat checklists are a guide to help personnel to prepare for pre-combat inspections. Pre-combat checks can be broken down into the following areas:

(1) **Mission Essential Knowledge.** Ensure personnel in each subordinate element understand the mission, end-state, scheme of maneuver, and fires.

(2) **Mission Essential Equipment.** Ensure all required equipment is operating and accounted for. Recommended items for a JTAC include NVDs, an IR laser pointer, laser rangefinder/designator, IR strobe light, chemlights, gated laser intensifier (GLINT) tape, VS-17 panels, spotting scope, multi-band radio, radar beacon, pyrotechnics (smoke/illumination), access to an M203 grenade launcher with illumination and smoke rounds, compass, mirror, common objective graphics, authentication/crypto materials, and GPS. If any portable tactical targeting systems are to be used, the terminal attack controller should ensure the imagery products associated with these programs are up-to-date. The JTAC must plan for redundant communication and marking tools.

(3) **Mission Essential Coordination.** Ensure distribution of graphics and/or overlays depicting:

(a) Scheme of maneuver.

(b) FSCMs.

(c) ACMs.

(d) NAIs, TAIs.

(e) Decision points and triggers.

(f) Aircraft CPs and IPs.

(g) Helicopter HAs, BPs and/or landing zones.

(h) Countermobility/obstacle plan.

(i) Friendly marking procedures:

1. Day.

2. Night.

(j) Target List, target overlays, and schedules of fire with:

1. POF/priority of CAS.

2. Priority targets.

3. SEAD targets.

4. Preparatory fires.

5. FPFs.

6. Groups and series.

7. Target blocks.

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

4. Communications

a. During the preparation phase, and often in conjunction with the pre-combat inspections, communication links are checked and verified. This ensures that primary and backup voice and digital systems are checked, crypto material is current, time is synchronized, and code words, brevity codes, authenticators, passwords, and call signs are available and current. Ensure systems are fully operational and connectivity is established. Often unit SOPs will delineate connectivity checks (e.g., "...each station will perform a communications check on TAR/HR on the half hour reporting in precedence order"). Additionally, any extra measures such as day/night friendly marking procedures and visual or sound signals are practiced.

b. Check and verify:

(1) Command Nets:

(a) Company.

(b) BN.

(c) Regiment/brigade.

(d) Division command.

(2) Fire Support Nets:

(a) COF.

(b) Mortar COF.

(c) FSC nets.

(d) Air spot.

(3) Air Nets:

(a) TAR/HR.

(b) JARN.

(c) TADs.

(d) TACP local.

(e) TATC.

(f) NSFS ground spot.

(g) NSFS air spot.

(h) Shore fire control party.

(i) Data links and networks.

c. **Cryptographic keys/Call signs/Code words/Prowords/Passwords/Brevity Codes.**

(1) Crypto verified and loaded.

(2) Time synchronized.

(3) Copies or excerpts of call signs available.

(4) Code words and brevity codes for current plan reviewed.

(5) Prowords posted or noted for communicators.

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

(1) IR marker lights/pointers.

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

(3) Air panels.

(a) VS-17 panels.

(b) Thermal panels.

(c) Chemical lights.

(d) GLINT tape.

(4) Pyrotechnics.

(a) Smoke.

(b) Star clusters.

(5) Radar beacons and codes.

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

5. Movement and Positioning

a. **Movement.** The AO/ALO ensures TACP movement is in accordance with the maneuver unit's observation plan. Most TACP operations require movement to forward assembly areas, observation posts, or BPs during the preparation phase of an operation. The maneuver unit OPORD will normally specify formations and techniques of movement. This allows the commander to position his elements where they will optimize the unit's operational area 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 is positioned within the maneuver unit's area where it can optimize its observation capability yet maintain its survivability and communications capability. The maneuver unit commander considers the factors of METT-T when selecting a position.

(2) **Observation.** The selection of an observation position is critical to the ability of the TACP to effectively control CAS. The position permits observation of targets. Landmarks and prominent terrain features should be avoided, as the enemy probably targets them.

(3) **Communications.** TACP's primary means of communication are tactical radios. The TACP is positioned to allow communications with the commander, HHQ (TACP), and the CAS aircraft.

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

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CHAPTER V
EXECUTION

1. Introduction

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

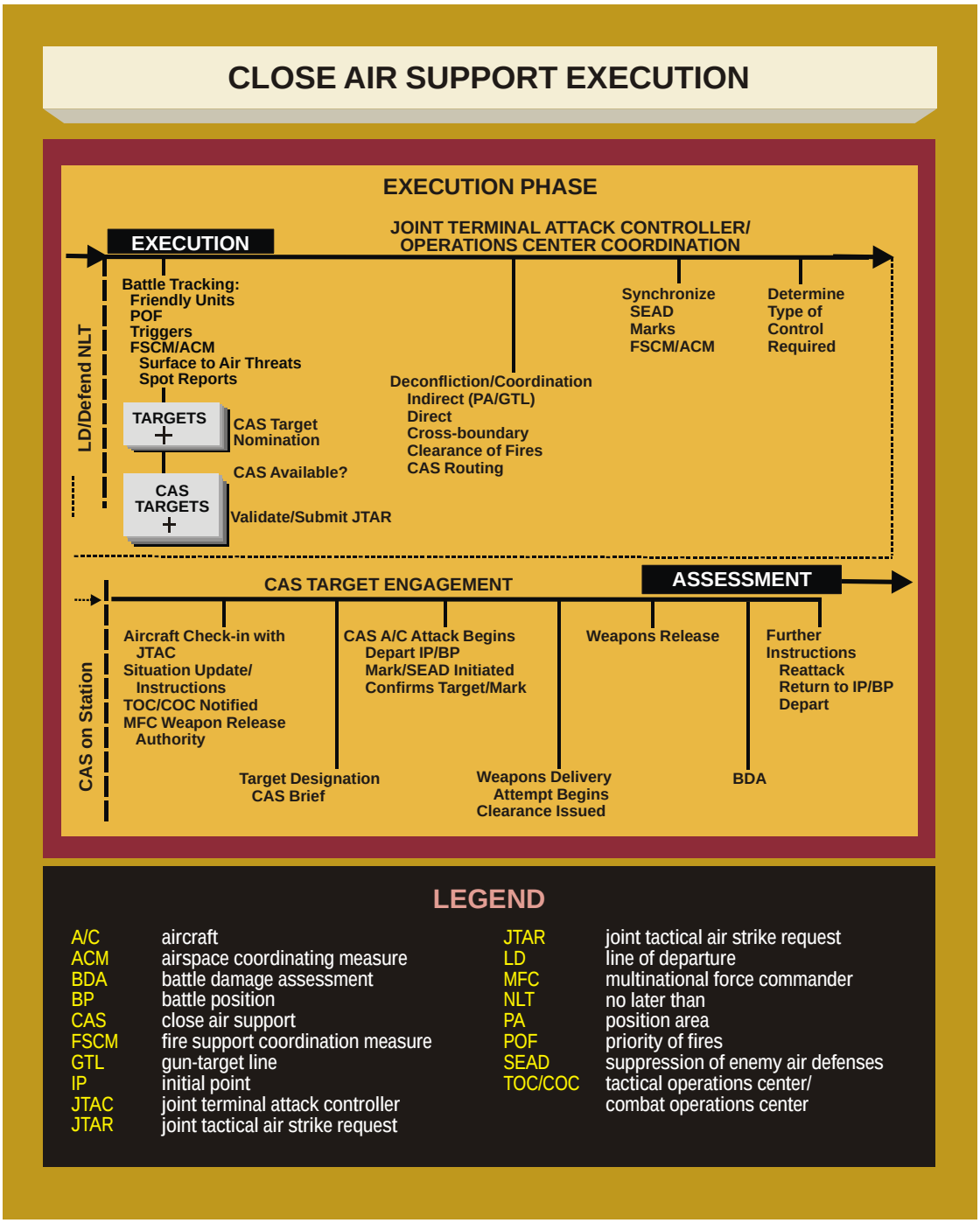


Figure V-1. Close Air Support Execution

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

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 TAC, and which JTAC/FAC(A) will provide TAC must be clearly understood. **Only through effective coordination can the CAS "team" achieve the supported commander's objectives for CAS successfully.**

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

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

(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, immediate target locations/coordinates and associated TLE.

(a) Target coordinates (preplanned and immediate) and associated TLE **only** need to be of sufficient fidelity to create the desired effects on target through efficient battle tracking and effective fire support integration. The level of precision and accuracy required for the target coordinate and TLE will be **tactical scenario** dependent. Time to kill should not be sacrificed in order to generate more coordinate precision

and/or accuracy than is required for successful target prosecution; if the current coordinates, TLE, CAS asset, ordnance, mark plan will create the desired effects on target. Through effective use of the concepts of 'bomb on target (BOT)' and 'bomb on coordinate (BOC),' desired target effects can be created quickly through CAS engagement at the JTAC/FAC(A)'s level. Simultaneously, the target coordinate and TLE must be sufficient to provide an accurate and timely operational picture at the TOC/COC/FSCC. Examples include:

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

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

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

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

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

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

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

1. TLE should only be communicated when it will significantly affect the likelihood of mission success or failure. In general, TLE category is **not required** to either approve a mission or successfully engage a target with CAS. If TLE is to be communicated, it should be done at the time of coordinate generation, based on the real-time assessment of system TLE capabilities.

2. In order to facilitate the communication of targeting accuracy, TLE is characterized in six CATs. The first row presents the categories of TLE which range from best (CAT 1) to worst (CAT 6) and are used to classify the accuracy of any coordinate generating system. See Figure V-2.

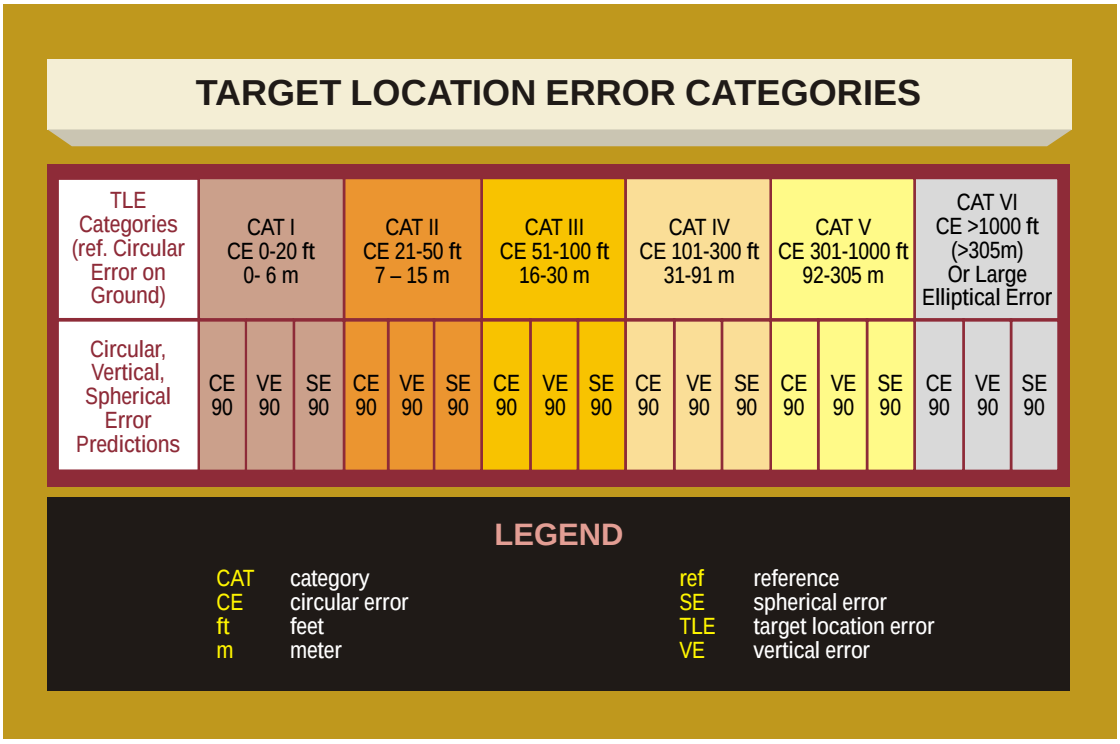


Figure V-2. Target Location Error Categories

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

4. Aim point is a significant factor in the TLE of all coordinate generation systems. As an example, portable tactical imagery targeting software and hardware are capable of CAT 1 coordinates, but a JTAC may not be able to produce a CAT 1 solution for a vehicle parked in a field that is not adequately depicted in his system. Likewise, a FW aircraft/targeting pod combination may be capable of CAT 2 coordinates, but not able to generate a CAT 2 solution for a target/aim point that is not sensor significant such as a bunker, trench line, or emplacement with overhead cover and concealment.

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

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

b. **CAS Target Nomination.** Commanders nominate CAS targets based on previously planned target sets or from spot reports received during execution. The nomination process can occur before or after aircraft arrive at the control point.

c. **CAS Integration. Successful employment of both aircraft operations and surface fires requires careful planning combined with an ability to rapidly coordinate during changing conditions.** However, JTAC/FAC(A)/TAC(A), AC2, and fire support personnel must deconflict airspace to provide a reasonably safe operating space for aircraft to maneuver and attack targets. Airspace integration must also accommodate other airspace users to include UASs, medical evacuation, C2, ISR, and transport aircraft. C2 agencies must ensure transitory aircraft not under a JTAC/FAC(A)'s control is made aware of other aircraft operating in their flight path. CAS aircraft may require specific deconfliction and coordination using time, space, and altitude. **JTACs/FAC(A)s and fire support personnel should select separation techniques that require the least coordination without adversely affecting the ability to safely complete the mission.** Successful integration requires deconfliction methods that facilitate simultaneous multiship/platform CAS and indirect fire operations. To be successful, all participants must be well versed in ACA terminology and have knowledge of all applicable ACAs in use (see Figure V-3).

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

(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

FORMAL AIRSPACE COORDINATION AREA TERMINOLOGY

TERMINOLOGY	DEFINITION
Airspace Coordination Area (ACA) Established but not activated/planned or on-call	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/in effect	ACA is activated/in effect at this time. Aircraft are *approved* to operate in the defined airspace. A time limit may be established. *Fires prohibited through the ACA.*

Figure V-3. Formal Airspace Coordination Area Terminology

such, informal ACAs are normally short-lived and not as widely disseminated as formal ACAs. Aircraft and surface fires may be separated by distance (lateral, altitude, or combination of lateral and altitude) or by time. Although relatively easy to set up, informal ACAs can be more difficult for the FC/FSCC to coordinate. FC/FSCC 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-4). 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 military grid reference system (MGRS), grid line or latitude/longitude reference, terrain features have the added advantages of simplicity and constant visual reference. This is an appropriate technique when aircrews and firing units engage separate targets and aircraft will not cross GTLs.

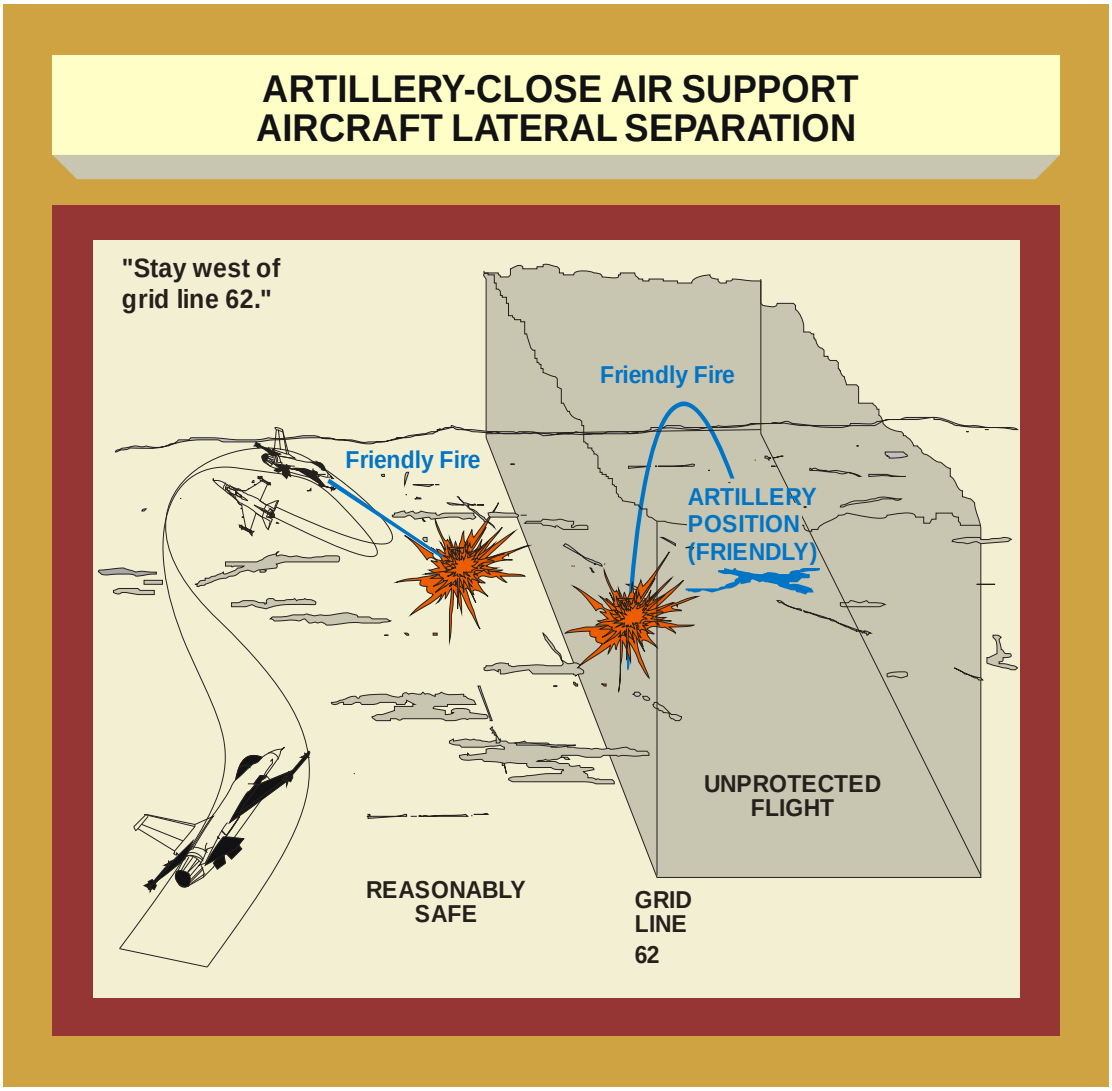


Figure V-4. Artillery-Close Air Support Aircraft Lateral Separation

JTACs/FAC(A)s 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-5). 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. When calculating the safe separation for an aircraft to stay above or below the indirect fire trajectory, the JTAC/FAC(A) and FSC/FSO use tabular firing tables to determine the ordinate (altitude) of the projectile at the location where the aircraft will cross the GTL. This altitude is converted to feet above mean sea level (MSL) and a margin of safety is applied prior to passing the aircraft a “stay above” or “stay below” altitude (for example, “stay above 5,000 ft MSL”). The JTAC and FSC/FSO must coordinate with the firing unit to determine the appropriate entry argument data to use when referencing the firing tables.

(c) **Altitude and Lateral Separation** (see Figure V-6). 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

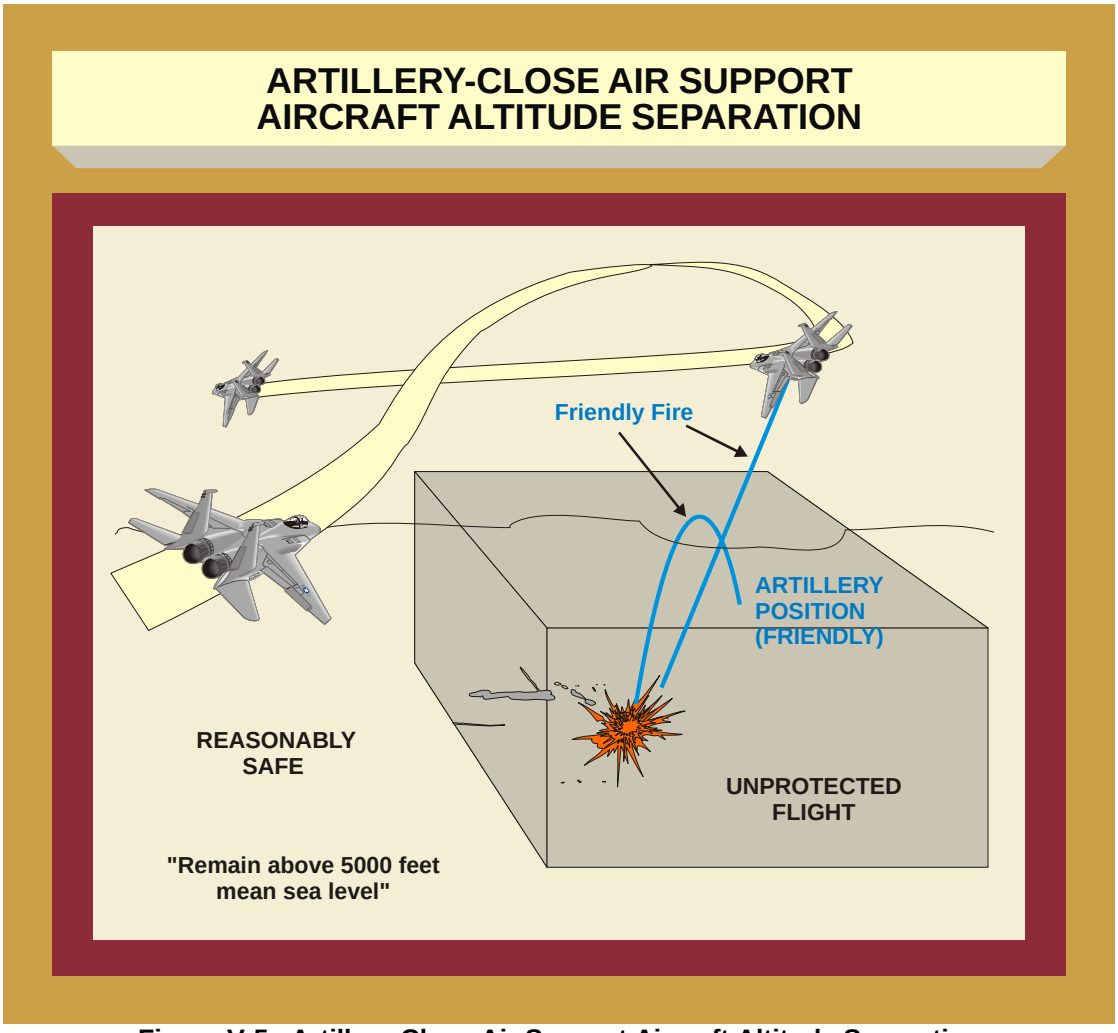


Figure V-5. Artillery-Close Air Support Aircraft Altitude Separation

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 grid line 62 and remain below 3,000 feet MSL." When deconflicting by altitude always specify in feet MSL.

(d) **Time Separation.** Time separation requires the most detailed coordination and may be required when 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 the weapons fragmentation envelope and the likelihood of secondary explosions. All timing for surface fires will be based on the specific aircraft event time (TOT/TTT).

Figure V-6. Artillery-Close Air Support Aircraft Altitude and Lateral Separation

1. **Time on Target.** TOT is a time at which the aircraft bombs are to impact the target and around which supporting surface fires can be coordinated. TOT requires minimum communication 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/FAC(A) may need to ensure all clocks are synchronized by providing a time hack. **GPS time is the standard for US and allied forces** in establishing a common time reference and for setting TOT. Strict adherence to timing by participants is required for aircraft safety. If CAS aircrew are unable to comply with the TOT/TTT, CAS aircrew must inform the terminal controller and should consider requesting an alternate TOT/TTT which can be achieved. Aircrews can update the clock on check-in with air control/fire support coordination agencies. Figure V-7 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, although infrequently used method of time control and is easy to implement when few participants are involved. Sufficient duration for the FSC/FSO to synchronize indirect fires must be considered. Additionally, the JTAC/FAC(A) must consider time required for the aircraft to execute the attack. After the CAS brief, specify the TTT and give the "time hack" (e.g., "TIME TO TARGET 5+00, READY, READY, HACK"). The JTAC or FAC(A) providing final control normally provides the "hack." Aircrew will acknowledge receipt of the time hack.

d. **Coordination.** Once a target has been nominated, the JTAC/FAC(A) and COC/TOC must coordinate the CAS attack with affected maneuver elements. Cross-boundary clearance of fires, friendly ADA, and CAS aircraft ingress/egress routing must be deconflicted and coordinated.

(1) **Cross-Boundary Clearance of Fires.** Boundaries are the basic maneuver control measure used by commanders to designate the geographical area for which a particular unit is tactically responsible. They are restrictive in that no fire support weapons may deliver fires or effects of fires across a boundary unless those fires are coordinated with the affected unit. The FSC/FSO must 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/JTAC/FAC(A) and ADA personnel must coordinate CP/IP usage, target location, type and number of aircraft, altitudes, and times on station. The SPINS and ACO should include MRRs or safe return corridors and associated procedures for aircraft to return from CAS target areas.

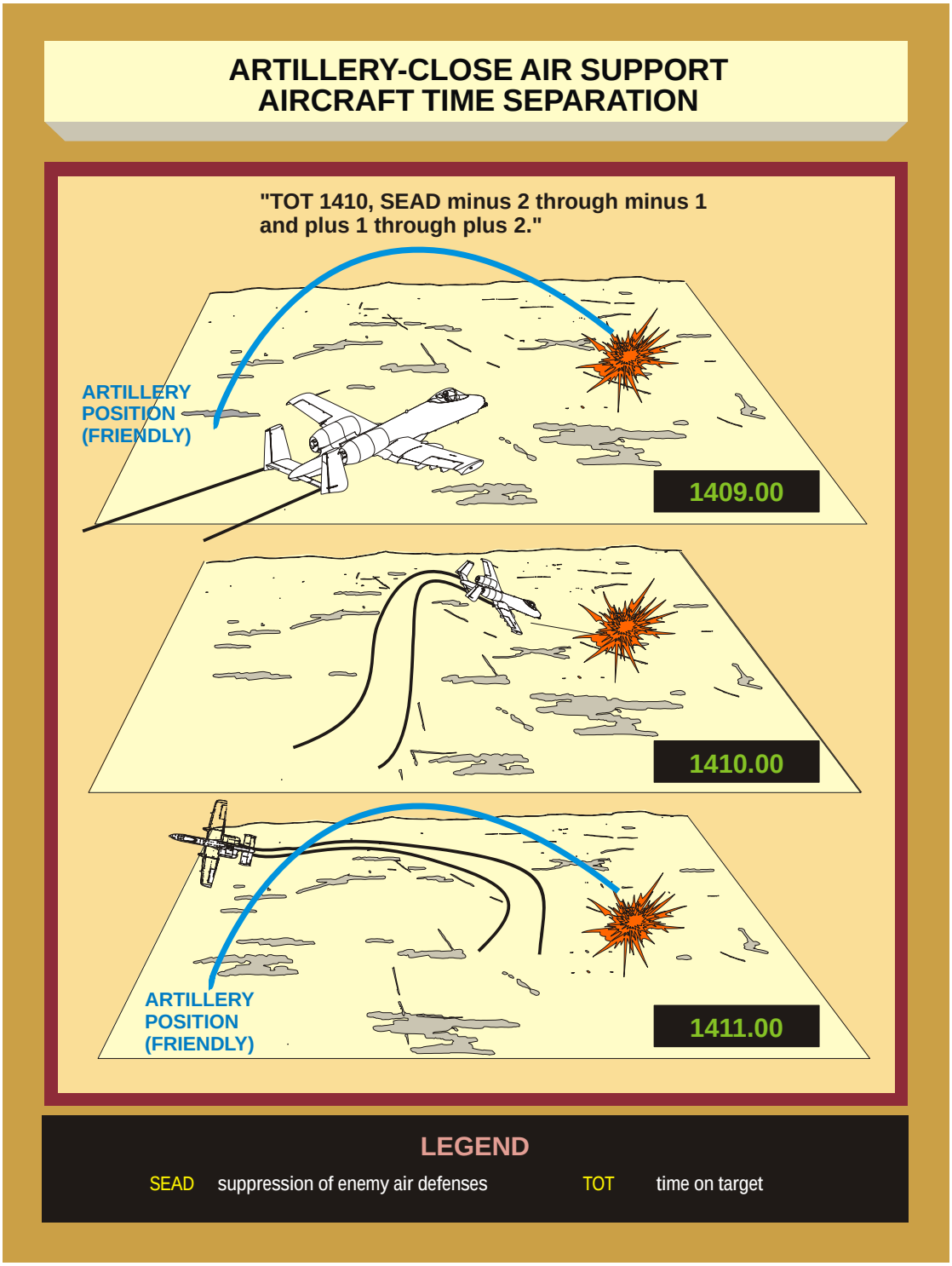


Figure V-7. Artillery-Close Air Support Aircraft Time Separation

(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 final attack heading.

(a) **IP/BP Selection.** The JTAC/FAC(A) selects the IPs/BPs based on enemy capabilities, target orientation, friendly location, weather, aircraft capabilities, and fire support coordination requirements. IPs are normally located from 5 to 15 nautical miles (nm) from the target for FW aircraft and BPs are 1-5 kilometers (km) for RW aircraft. High altitude aircraft may require IPs in excess of 20 nm from the target. When coordinating the use of stand-off weapons, IP ranges may need to be extended to ensure appropriate weapon delivery parameters. In some cases, stand-off CAS platforms may need to apply required terminal deconfliction parameters to the weapon instead of the aircraft. In this case, the aircrew should communicate an appropriate stand-off IP to the JTAC, ensuring that the weapon will remain deconflicted throughout its entire route of flight.

(b) **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-8). JTACs/FAC(A)s use an offset direction to ease fire support coordination, align the aircraft for the attack or egress, or keep aircrews away from known threats. An offset direction aids fire support coordination by restricting aircrews from using airspace on the side of the IP-to-target line where there might be a conflict with a GTL. The offset direction regulates the attack quadrant without assigning a specific attack heading.

(c) **Final Attack Heading.** JTACs/FAC(A)s assign attack headings for several reasons: to increase ground troop safety, aid in aircraft acquisition by the JTAC/FAC(A), aid aircrews in target acquisition, mitigate collateral damage, meet laser safety cone attack restrictions, and facilitate fire support coordination. Controllers may employ final attack headings/windows that allow 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 headings/windows 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. Attack headings also allow RW aircraft to maneuver over terrain or urban sprawl to enhance delivery while remaining survivable. Aircrews and JTACs/FAC(A)s must understand that the attack headings may differ between both the aircraft and weapon. JTACs/FAC(A)s must weigh the advantages of issuing an attack heading with the disadvantages of restricting aircraft tactics. Final attack geometry provided as part of the CAS briefing in the form of headings or directions are by definition ‘Restrictions’ and therefore must be readback. The following are examples of briefed final attack geometry:

1. Magnetic heading: “Final attack heading 230.”

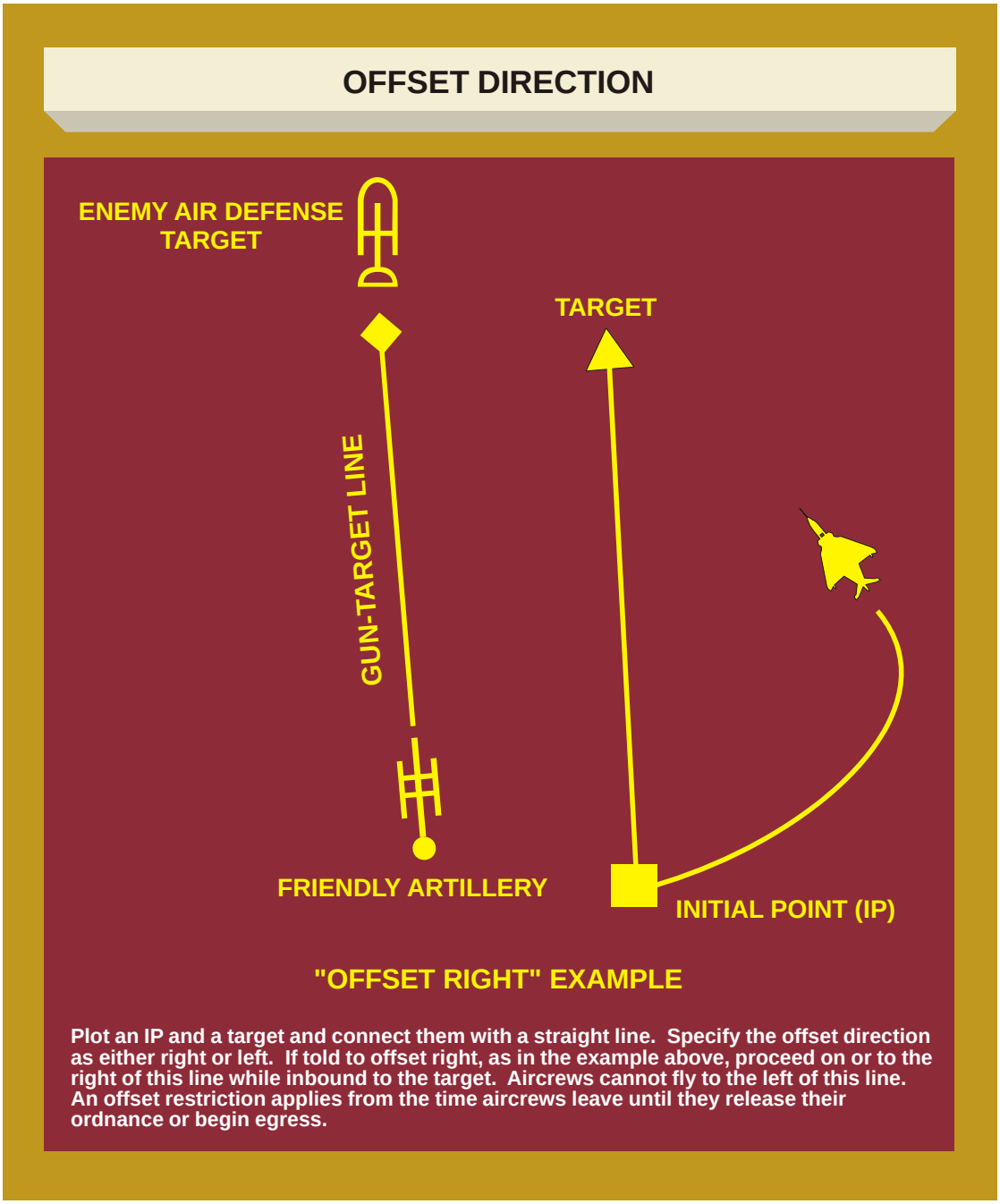


Figure V-8. Offset Direction

2. Magnetic headings with a cone: "Final attack heading 240-300" or "Final attack heading 270 plus or minus 30 degrees."

3. Use of cardinal/sub-cardinal directions: "Razor 51, Broadsword 88, make your attack from northeast to southwest." A JTAC/FAC(A) should be cautious when using this method as no final attack magnetic headings are specified and the attacking aircraft may not be on the exact heading or in the expected sector of airspace for CAS aircraft acquisition or deconfliction. If an exact heading or cone is required, then use of one of the above techniques is recommended.

4. Use of a geographical reference: JTAC/FAC(A) states "Make all attacks parallel to the road."

e. **Synchronization**

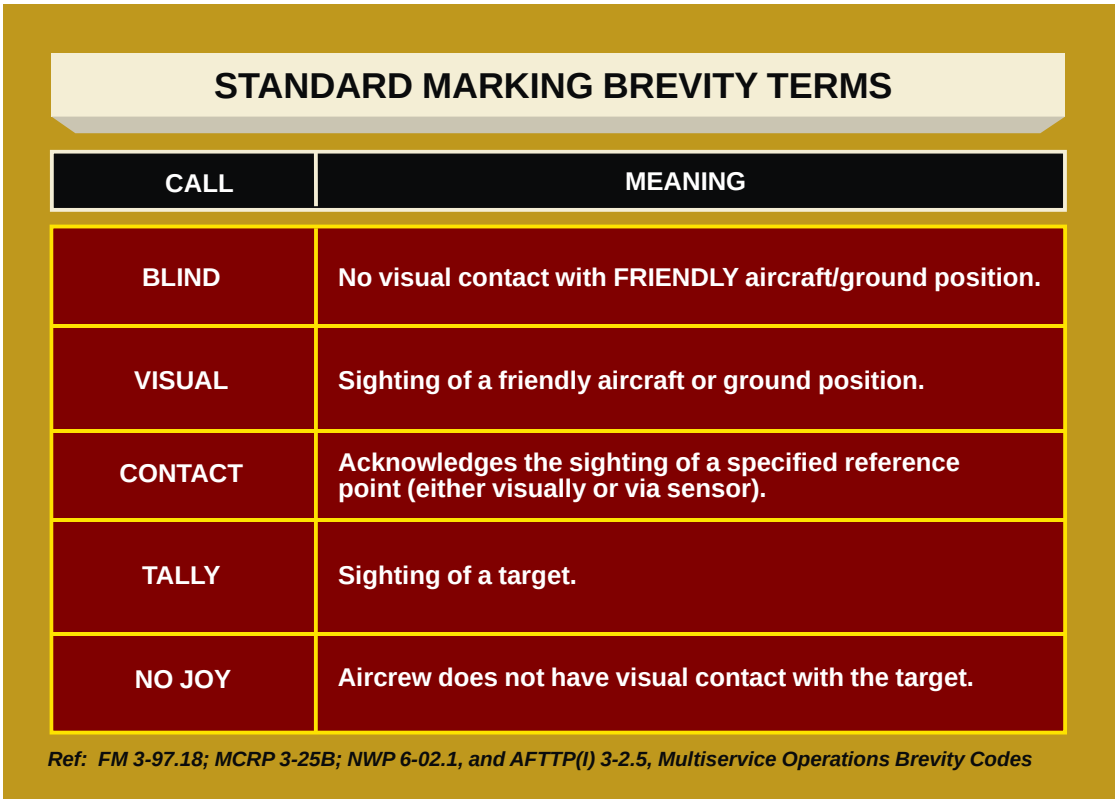
(1) **Simultaneous Employment.** One of the most difficult functions performed by a FC/FSCC is synchronizing CAS with surface fires. The intent is to coordinate the timing of air support, supporting arms, and maneuver to achieve the mass of a combined-arms attack. **The goal is to accomplish this without suspending the use of any of the supporting arms or affecting the scheme of maneuver.** An additional goal is to offer a reasonable measure of protection to aircraft from the effects of friendly surface fires. High altitude/stand off weapons (e.g., joint direct attack munition [JDAM]) offer the capability to deconflict both in range and altitude from other supporting fires.

(2) **A common time reference is essential** to accomplish the high degree of coordination necessary for effective CAS. All participants (aircrew, JTAC, FAC(A), TACC/SACC, DASC/ASOC, FC/FSCC, 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. It is important to note that a fire support mission may take several minutes to coordinate.

(a) **Marks.** A target mark should be provided for CAS aircraft whenever needed. Target marks should be planned to include sufficient time before weapons employment to ensure target acquisition by the CAS aircrew. Redundant marks should be planned and provided whenever possible. 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-9 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. Timing for marking rounds is situationally dependent and must be coordinated prior to commencement of the attack. JTACs/FAC(A)s must calculate weapon times of flight and understand aircrew tactics to ensure marks impact at the appropriate time. This lead time ensures that the marking round is in position early enough and remains visible long enough for the JTAC/FAC(A) to provide final control instructions and for the pilot of the attacking aircraft to acquire the target. Indirect fire marking rounds are most effective when delivered within 100 meters of the CAS target, but those within 300 meters of the CAS target are generally



STANDARD MARKING BREVITY TERMS

CALL	MEANING
BLIND	No visual contact with FRIENDLY aircraft/ground position.
VISUAL	Sighting of a friendly aircraft or ground position.
CONTACT	Acknowledges the sighting of a specified reference point (either visually or via sensor).
TALLY	Sighting of a target.
NO JOY	Aircrew does not have visual contact with the target.

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 Marking Brevity Terms

considered effective enough to direct CAS aircraft. When indirect fire marking rounds are not timely or accurate, JTACs/FAC(A)s should use a backup marking technique or verbal instructions to identify the target to CAS aircrew. If the situation requires precise marks, observers or spotters can adjust marking rounds to ensure that accurate marks are delivered to meet the CAS schedule.

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**. FW and RW aircraft can also mark the target with munitions (guns, rockets, missiles, or bombs).

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 target, laser designation must be selective and timely as lengthy laser emissions may compromise friendly positions. The CAS aircrew can also confuse the laser source with the intended target. When employing lasers to designate/mark, include "LASER", along with the 4-digit laser code in the marks portion of the CAS briefing. The JTAC/FAC(A) will use the laser code passed by aircrew set in any laser-guided weapons (LGW) they briefed during the CAS check-in briefing. In the remarks section of the 9-line, **JTACs/FAC(A)s should also provide the laser target-line in degrees magnetic *from the laser designator operator to the target.*** For laser marks, the aircrew

will provide **a ten second warning** to activate the mark. Use the standard laser brevity terms listed in Figure V-10.

4. **FAC(A) marks.** Some FAC(A) aircraft can mark with WP/high explosive rockets, IR pointer, gun tracers, and/or laser. See FM 3-09.32, MCRP 3-16.6A, NTTP 3-09.2, AFTTP(I) 3-2.6 *JFIRE Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower* for a complete listing of aircraft target marking capabilities.

5. **IR pointers.** JTACs/FAC(A)s may use IR pointers and other IR devices to mark targets at night for aircrews that are using NVDs. Unlike laser designators, IR pointer devices cannot be used to guide munitions. Use IR pointers with

STANDARD LASER BREVITY TERMS

CALL	MEANING
TEN SECONDS	Standby for LASER ON call in approximately 10 seconds.
LASER ON	Start/acknowledge laser designation.
SHIFT (direction)	Shift laser/IR/radar/device energy. 1) Can be used to shift laser energy from a position off the target onto the target. 2) Can be used during multi-aircraft attack to shift laser energy to the next target.
SPOT	Acquisition of laser designation. The aircrew calls when acquiring the laser spot, confirming to the JTAC and the wingman that the aircraft or weapon laser seeker has identified a source of laser energy which may (or may not) be the designated target.
TERMINATE	Stop laser illumination of a target.
DEADEYE	Laser designator system is inoperative.
NEGATIVE LASER	Aircraft has not acquired laser energy.
LASING	The speaker is firing the laser.
STARE (w/laser code and reference point)	Cue the laser spot search/tracker function on the specified laser code in relation to the specified reference point. Reference point may include the following: steerpoint, GEOREF, bearing and range or datalink point.

LEGEND

GEOREF	geographic reference	JTAC	joint terminal attack controller
IR	infrared	LGW	laser-guided weapon

Figure V-10. Standard Laser Brevity Terms

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. When working with IR pointers, use brevity terms. Pilots and JTACs/FAC(A)s must be familiar with these terms to avoid confusion (see Figure V-11).

6. **Combination.** When the tactical situation deems it reasonable, a JTAC/FAC(A) should consider the use of additional marks to augment an IR or laser mark. When ground-based IR pointers or laser designators are employed, JTACs/FAC(A)s and CAS aircrew must use proper communications brevity and procedures to ensure CAS aircrews do not confuse the source of the mark with the target end.

WARNING

Attack aircraft may confuse infrared (IR) pointer or laser energy source with the intended target. When using IR pointers or lasers to mark, include "IR POINTER" or "LASER" in the marks portion of the CAS briefing. Joint terminal attack controllers 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.

7. **Marking Friendlies. Marking friendlies is the least desirable method of enabling a tally on the target. 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/FAC(A)s should first evaluate the option to route the aircraft away from known or suspected antiair threats. If aircraft cannot be routed away from enemy air defenses, aircraft vulnerability must be balanced against the risk of exposing SEAD delivery systems.

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.

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	Circling an IR pointer around an aircraft to help the aircraft identify the friendly ground position.
CONTACT SPARKLE	Call acknowledging the sighting of a specified reference point (either visually or via sensor). After the Sparkle call is made, the close air support aircraft should respond with No Joy or Snake. Once the aircrew see the IR energy and are able to discern between the friendly and target end of the pointer, a "Contact Sparkle" call may be made.
MATCH SPARKLE	Directive term for a second party to overlay an IR mark on an existing mark.

Note: ROPE is not recommended for rotary wing aircraft. The brevity terms listed in this figure amplify the IR communications in FM 1-02.1/MCRP 3-25B/NTTP 6 02.1/AFTTP(I) 3-25, Multi-Service Brevity Codes

Figure V-11. Night Infrared Close Air Support Brevity Terms

2. **Coordination.** **Surface-delivered SEAD** involves planning and coordination by the FC/FSCC and at the maneuver units down to the company level. **Air delivered SEAD and EW** must be coordinated and deconflicted in order to provide necessary support during the time CAS is being conducted. 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/FAC(A) and forward observer, must coordinate surface-delivered SEAD with target marking to minimize confusion.

For additional information on SEAD, see JP 3-01, Countering Air and Missile Threats.

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 JTACs/FAC(A)s to facilitate CAS attacks. Weapons release authority grants JTACs/FAC(A)s the authority to provide the following to attacking aircraft:

(1) **"Cleared Hot"** — Term used by a JTAC/FAC(A) during Types 1 and 2 control, granting weapons release clearance to an aircraft attacking a specific target. An exception to this would be a JTAC/FAC(A) providing a specific "Cleared Hot" clearance for the entire flight/section to attack.

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

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 civilians. Based on the current risk assessment, the supported commander will weigh the benefits and liabilities of authorizing CAS employment. Specific levels of risk should not be associated with each type of TAC. 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) Civilian locations.

(c) Enemy locations.

(6) Threat information.

(a) Threat to ground forces.

(b) Threat to aircraft.

(7) Confidence in targeting information:

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

(b) Stationary or moving.

(c) Ability to mark the target.

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

(8) Ordnance available for attack:

(a) Capabilities.

(b) Limitations.

(c) Restrictions.

(d) Proximity of friendlies/civilians.

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

(10) Risk Estimate Distance

(a) Risk estimate distances allow the supported commander to estimate the potential danger to friendly troops from the CAS attack. They are defined as 10 percent probability of incapacitation (Pi) (i.e., 1 in 10 Pi), and 0.1 percent Pi (i.e., 1 in 1,000 Pi). Different factors such as delivery profile, target elevation, terrain, buildings, trees, etc., can significantly reduce or increase Pi.

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

(b) **Danger Close.** Ordnance delivery inside the 0.1 percent 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/FAC(A), signifying that he accepts the risk inherent in ordnance delivery inside the 0.1 percent Pi distance. When ordnance is a factor in the safety of friendly troops, the aircraft weapon's axis of attack should be parallel to the friendly force's axis or orientation. The intent is to preclude long and/or short deliveries from being a factor to friendly forces.

h. **Types of CAS Terminal Attack Control.** Technological advances in aircraft capabilities, weapons systems, and munitions provide JTACs/FAC(A)s additional tools to maximize effects of fires while mitigating risk of fratricide when employing air power in close proximity to friendly forces. GPS-equipped aircraft and munitions, LRFs/designators, and digital system capabilities are technologies that can be exploited in the CAS mission area. There are three types of TAC (Types 1, 2, and 3). During the fires approval process at the appropriate unit level, the commander considers the situation and issues guidance to the JTAC/FAC(A) based on recommendations from his staff and associated risks identified in the tactical risk assessment. Conditions determine which type of control (1, 2, or 3) is used. These controls should be considered tools that give the terminal attack controller the greatest chance of successfully destroying the target and negating friendly/civilian/collateral damage. The intent is to offer the lowest level supported commander, within the constraints established during risk assessment, the latitude to authorize weapons employment. This may be a task decision that is delegated to the JTAC/FAC(A) under certain conditions. 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 TAC, (e.g., GPS and digital targeting systems used in Type 2 control may be a better mitigation of risk than using Type 1). The three types of control are not ordnance specific. Any change to the type of TAC should be coordinated with the appropriate fires approval agency, as the type of control is part of the approved CAS mission.

(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. Type 1 control is used when the visual acquisition of the attacking aircraft by the JTAC/FAC(A) and the analysis of attacking aircraft geometry is the best means available to reduce 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 TAC may be the method of choice. Due to the use of visual cues to mitigate risk under Type 1 control, JTACs/FAC(A)s should not change the type of control to Type 2 or Type 3 after the CAS attack briefing has been given to CAS aircraft. **Type 1 control procedures** are as follows:

(a) JTAC/FAC(A) will visually acquire the target.

(b) JTAC/FAC(A) will send the CAS briefing (9-line) to attack aircraft.

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

(e) JTAC/FAC(A) will provide a verbal description or talk-on to the mark and/or target and confirm aircraft correctly identifies the mark and/or target.

(f) Aircraft will provide an “IP INBOUND” call if requested.

(g) JTAC/FAC(A) will mark/designate target (as practicable).

(h) Attack aircraft will provide “IN” call indicating entering terminal phase of air-to-ground attack prior to weapons release.

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

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

(k) JTAC/FAC(A) will analyze attacking aircraft geometry to reduce the risk of the attack affecting friendly forces.

(l) JTAC/FAC(A) will provide a “CLEARED HOT” or “ABORT” based on the above procedures being met.

Note: In the case where aircraft acquisition/analysis by the JTAC/FAC(A) is difficult or 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, reports troops in contact, 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 suppression of enemy air defenses.

— Attack aircraft checks in and receives the situation update followed by the close air support briefing.

JTAC: "Dragon 31, this is Icebox 11, this will be a Type 1 control, advise when ready for 9-line."

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

JTAC:

"PLYMOUTH

360 Right

9.1

350

Platoon of infantry dug in

CM 367971

White Phosphorous

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 045, report IP inbound"

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

JTAC: "Read back correct, time on target (TOT) 50"

Attack Aircraft: "Roger, TOT 50"

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

Attack Aircraft: "Dragon 31 initial point (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.**

The JTAC must acquire the target visually or utilize targeting data from a scout, COLT, FIST, JFO, UAS, SOF, CAS aircrew, or other asset with accurate real-time targeting information. Type 2 control requires control of individual attacks. The JTAC/FAC(A) may be able to visually acquire the attacking aircraft. While not required, if the tactical situation allows, the JTAC/FAC(A) should make every effort to visually acquire the aircraft and assess attack geometry under Type 2 control, in order to provide an additional measure of safety, enhance SA, and be able to abort the attack if necessary. Likewise, the attacking aircraft may be able to visually acquire the target/mark prior to weapons release, but it is not required. Examples of when Type 2 control may be applicable are night, adverse weather, and high altitude or standoff weapons employment. Considerations for employing Type 2 control include:

- **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 excessive miss distances.**
- **Weapon time of flight will be a factor relative to movement of enemy targets and friendly forces when employing standoff weapons. Detailed planning and preparation by both the joint terminal attack controller/forward air controller (air) 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/FAC(A) visually acquires the target or acquires targeting data from a scout, COLT, FIST, JFO, UAS, SOF, CAS aircrew, or other assets with accurate real-time targeting information.

(b) JTAC/FAC(A) will send a CAS briefing (9-line) to attack aircraft.

(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, and etc.

(d) Aircraft will read back Line 4, Line 6, and any restrictions provided by the JTAC/FAC(A). Aircrews will confirm that the readback is from the elevation and target location programmed into navigation/attack systems followed by restrictions. For BOC attacks the readback will be from the aircraft system.

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

(f) Attack aircraft will provide the JTAC with an "IN" call indicating entering terminal phase of air-to-ground attack prior to weapons release. Aircrew should make this call at the appropriate time to allow clearance before entering the release window.

(g) JTAC/FAC(A) will provide a "CLEARED HOT" or "ABORT".

*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.*

— Joint terminal attack controller (JTAC) is unable to acquire the target but receives accurate real time targeting information from a scout and that they are troops in contact. The JTAC verifies target location and coordinates through the use of an aircraft—with Joint Direct Attack Munitions.
— Attack lead aircraft checks in, informs the JTAC regarding his onboard capabilities, receives a situation update, and is provided the close air support briefing.

JTAC: "Hog 11, this is A3C, this will be a Type 2 control, 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
Advise when ready for remarks.

Attack Aircraft: "Ready to copy remarks."
JTAC: "Request one GBU-31, 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, forward-looking infrared, radar, etc.

Attack Aircraft: "450, NB 8652342745, final attack heading 300-345"
JTAC: "Readback Correct. Report IP inbound, time on target (TOT) 45"
Attack Aircraft: "Roger, TOT 45"

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

Attack Aircraft: "Hog 11 IP INBOUND"
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, 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.**

The JTAC must acquire the target; visually or utilizing targeting data from a scout, COLT, FIST, JFO, UAS, SOF, CAS aircrew, or other asset with accurate real-time targeting information. While not required, if the tactical situation allows, the JTAC/FAC(A) should make every effort to visually acquire the aircraft and assess attack geometry under Type 3 control, in order to provide an additional measure of safety, enhance SA, and be able to abort the attack if necessary. Likewise, the attacking aircraft may be able to visually acquire the target/mark prior to weapons release, but it is not required. JTAC/FAC(A) will provide the CAS aircraft with targeting restrictions (e.g., time, geographic boundaries, final attack heading[s], specific target set). Following mandatory readback by the CAS asset, the JTAC/FAC(A) then grants a weapons release clearance ("CLEARED TO ENGAGE"). Observers may also be used to mark targets during Type 3 control. All targeting data must be coordinated through the appropriate supported unit's battle staff for approval. The JTAC/FAC(A) will monitor radio transmissions and other available digital information to maintain control of the engagement. The JTAC/FAC(A) maintains abort authority. Type 3 is a CAS terminal attack control procedure and should not be confused with TGO, air interdiction, or other "air support" missions which do not employ a JTAC/FAC(A). **Type 3 control procedures** are as follows:

(a) JTAC/FAC(A) acquires the target or acquires targeting data from a scout, COLT, FIST, UAS, JFO, SOF, CAS aircrew, or other assets with accurate real-time targeting information.

(b) JTAC/FAC(A) will send the CAS briefing (9-line) to attack aircraft. Briefing should include area for attacks, restrictions/limitations, and attack time window, in the remarks.

(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, and etc.

(d) Aircraft will read back Line 4, Line 6 and any restrictions provided by the JTAC/FAC(A). For BOC attacks the readback will be from the aircraft system.

(e) Once satisfied the attacking aircraft have SA of the target area, the JTAC/FAC(A) will provide attack aircraft "CLEARED TO ENGAGE".

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

(g) Prior to initial weapons release, the attack aircraft will provide "COMMENCING ENGAGEMENT" to the JTAC/FAC(A).

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

(i) Attack aircraft will provide "ENGAGEMENT COMPLETE" to the JTAC/FAC(A).

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

— The supported commander is in contact with a company of mechanized infantry 1.1 km to the north. 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 joint terminal attack controller (JTAC) to determine which type of close air support (CAS) control best suits the situation. Two ships of A-10s are currently in the CAS stack and have sensors and eyes 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, this will be a Type 3 control, 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 1100

Egress S to MAZDA, advise when ready for remarks"

Attack Aircraft: "Razor 11 ready to copy"

JTAC: "Razor 11, expect to engage from time 45-55. Execute attacks north of the river. No attack run-ins from north to south. Cobra recon team, callsign Lonewolf, is currently 1100m south in position to lase, as required, contact on this tactical air direction (TAD). Report BHA on this TAD."

— 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, forward-looking infrared, radar, and etc.

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

JTAC: "Razor 11, readback correct."

— Attack aircraft establishes communications with Cobra recon team and calls established overhead and ready for talk-on.

Attack Aircraft: "Razor 11, overhead, ready for talk-on."

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

Attack Aircraft: "Contact North-South running bridge."

JTAC: "Razor 11 the target area is a large staging area west of the bridge, stand by for Laser Mark, Laser to Target Line is 360, make a run-in 035 to 345 or 055-105."

Attack Aircraft: "Razor 11 affirmative, Spot, contact several tactical vehicles in a plowed out field, Northwest of the bridge."

Cobra: "Razor 11, that is your target."

A3C JTAC (listening to frequency): "Razor 11, CLEARED TO ENGAGE from time 45-55."."

— JTAC monitors progress of the mission via radio.

— Attack Aircraft make multiple attacks within the time window while complying with other restrictions. The attacks continue until time 1255.

Attack Aircraft: "A3C, Razor 11 is ENGAGEMENT COMPLETE at time 1255. Advise when ready to copy battle damage assessment (BDA)."

— Aircrew passes BDA to JTAC.

(4) Additional Considerations for all Types of Controls.

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

form of remote targeting. When any form of remote targeting is used with single source targeting information, targeting data should be routed through the commander's battle staff to ensure target validity.

(b) JTACs/FAC(A)s 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/FAC(A) may control helicopters working Type 2 control from a BP outside the JTAC/FAC(A)'s FOV while simultaneously controlling medium or low altitude FW attacks under Type 1 or 3 control. The JTAC/FAC(A) maintains the flexibility to change the type of terminal attack control at any time within guidelines established by the supported commander and should be coordinated with the appropriate fires approval agency. This change must be made prior to the 'IN' call for Type 1 and 2 attacks and the commencing call for Type 3. If a Type change is required after these calls, then the JTAC/FAC(A) should abort the attack and brief the aircraft. 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.

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

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

(c) **BOT and BOC.** These concepts apply to all ordnance employed in CAS missions. BOT and BOC are **not** new concepts; rather a new manner to simply communicate an old idea. Every CAS engagement conducted is BOT or BOC regardless of the weapon being employed. JTACs /FAC(A)s and CAS aircrew should think of and use these concepts as a clear, concise, effective manner to communicate the requirements for targeting confirmation from CAS aircraft employing ordnance. Effective use of BOT and BOC concepts to clarify JTAC/FAC(A) and CAS requirements for a CAS engagement will result in more expeditious and successful attacks. The misapplication of BOT and BOC in **tactical scenarios** will often result in confusion between CAS aircraft and JTAC/FAC(A) and increased time to kill or even missed targeting opportunities. There is no requirement to pass BOC or BOT during a CAS attack brief, remarks, or restrictions. What is important is that the JTAC/FAC(A)'s intent is clear. By using the phrase "bomb on target" or "bomb on coordinate" in the preface to the 9-line with type of

control or in remarks/restrictions terminal controllers can clarify the requirements for the CAS attack.

1. An identical attack brief could have remarks stated as: "Lead aircraft's GBU-12, JTAC's laser 1688." or as "Lead aircraft's GBU-12, BOC laser 1688". Both communicate the same idea.

2. Type 1 control is always a BOT attack due to the requirement for the CAS aircraft to be either tally the target or contact the mark. Type 2 and 3 can be either BOT or BOC for any ordnance.

(d) A **BOC attack** is used when the JTAC/FAC(A) determines that he can create the desired effects against that target with CAS aircraft and ordnance employing on a specified set of coordinates. The JTAC/FAC(A) does not need to delay the CAS attack in order to build CAS aircraft visual awareness to achieve tally/capture the target. If a BOC attack is planned based on the **tactical scenario**, then unnecessary exposure to the threat by CAS platforms is avoided; and time is not wasted conducting targeting confirmation. CAS aircraft are not required to be tally/capture the target when conducting BOC attacks. Great care must be taken to ensure that the target location with the requisite precision and accuracy determined in the commander's tactical risk assessment is obtained and entered into the weapon/navigation system. Aircrew will not modify coordinates once read back. For a BOC attack, aircrew readback will be from the weapon or aircraft system steering point, waypoint, or target point after the coordinates have been entered from the CAS attack brief. Aircrew will provide the weapon/system readback as requested by the terminal attack controller if the CAS aircraft systems are capable of providing it.

A few bomb on coordinate attack examples include:

- Laser guided weapons employed into a laser basket with the intent to be guided by a source outside the close air support (CAS) element, i.e., joint terminal attack controller (JTAC)/forward air controller (air) (FAC[A])/another CAS element.

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

- Inertially aided munitions employed in an absolute mode on coordinates sufficient to achieve the supported commander's intent for CAS.

- Hybrid weapons employed on a Global Positioning System coordinate and then lased by an off-board source/JTAC/FAC(A).

The following scenario provides an example of how "bomb on coordinate" (BOC) may be employed as part of a Type 2 attack.

- Weather is 500 feet above ground level, overcast, and joint terminal attack controller (JTAC) visually acquires an enemy formation in a trench line with camouflage overhead. The JTAC has a digital portable tactical targeting system but the trench line is not in the imagery and therefore the JTAC cannot generate an accurate location. JTAC is able to terrain associate using his 1:50K map and derive a 6 digit grid with a high degree of confidence. At the direction of the

supported commander, the JTAC submits an immediate joint tactical air strike request (JTAR) requesting rotary-wing (RW) close air support (CAS) or aircraft with coordinate seeking weapons in order to bring CAS assets under the weather and engage the enemy formation. The ASOC routes 2 AV-8B with 2 GBU-32s with DSU-33s as the quickest response option airborne.
- Attack aircraft check in and pass that they are carrying "1,000 lbs JDAMs with an airburst fuze option"
- JTAC determines that he can create desired effects to the enemy personnel in the trench with the current target location and the combination of the airburst fuze on the JDAM and decides to employ the AV-8B Type 2 bomb on coordinate.
- AV-8B receive the CAS briefing

JTAC: "Latch 61, this is Broadsword 11, Type 2 in effect, **bomb on coordinate** advise when ready for 9-line."
- The JTAC does not have to ever say the term 'bomb on coordinate' to the CAS aircraft. By passing BOC with the type of control just before the 9-line, the JTAC is telling the CAS aircraft up front that they do not need to gain visual or sensor SA to the target or be concerned with getting under the weather. BOC could be passed in remarks as well or not at all as long as the requirement for CAS aircraft is clearly understood.

Attack Aircraft: "Broadsword 11, Latch 61 ready to copy"

JTAC:
"CHEVY
270
10.0
1650
Company of infantry in trenchline
NB234876
None
South 1100
Egress East CHEVY
Advise when ready for remarks"

Attack Aircraft: "Ready to copy remarks"

JTAC: "Final attack headings 250-290. Request 2 GBU-32s from each aircraft, simultaneous employment, all set to airburst."

- Attack aircraft validate target location by cross-checking that the position is coincident with the expected target area using all appropriate means: map plot, digital map set, and radar through the weather, etc. Additionally, attack aircraft complete entry of line 4 and 6 into both GBU-32s on board and confirm fuzing is set to airburst.

Attack Aircraft read back: "Latch 61, from my weapon, 1650, NB234876, final attack headings 250-290."
JTAC: "Latch 61 readback correct, time on target (TOT) 35."

Attack Aircraft: "Latch 61, TOT 35."

(e) A **BOT attack** or self-derived targeting requires that the aircrew is tally/contact/captured the JTAC/FAC(A)'s intended target or aim point. Coordinate accuracy and precision (to include TLE) are not as important as the JTAC's/FAC(A)'s ability to aid CAS aircraft in gaining tally/capture. This **delivery method** is advantageous in numerous tactical situations such as mobile target sets (whether

stationary or moving), low threat environments that support continuous target observation by CAS aircraft, situations where controllers are not able or do not need to generate low TLE coordinates, or when aircrew are tally/have captured/contact the target. If a BOT attack is planned based on the **tactical scenario**, then time should not be wasted conducting detailed precision and/or accurate target coordinate generation. In many tactical scenarios suited to BOT attacks, delaying the attack in order to generate a coordinate for BOC employment will increase the time to kill or result in missed targeting opportunities.

Bomb on target examples include:

- Laser guided weapons employed into a laser basket and lased by the close air support (CAS) aircraft
- Unguided ordnance dropped from any altitude under the weather with CAS aircraft tally the target or contact the mark and employing off of the correction
- Correction from mark, contact is bomb on target
- Inertially aided munitions employed in any self-derived targeting mode
- Hybrid weapons employed on a Global Positioning System coordinate and then lased by the CAS aircraft
- Rockets and guns on positively identified targets, or contact a mark and correction

The following scenario provides an example of how "bomb on target" (BOT) may be employed as part of a Type 1 attack. This example assumes that the joint terminal attack controller (JTAC) in this scenario has no other way to mark the target for the close air support (CAS) aircraft and has degraded to the talk-on. Realize that the talk-on 'mark' is not the most efficient 'mark' available, it is used in this example to highlight the difference between BOT and bomb on coordinate and how it relates to Type 1 control requirements.

- Weather is clear and winds are calm, and ground forces are currently taking effective fire from the machine gun position and need to break contact. The JTAC visually acquires the enemy machine gun position. Due to overhead camouflage, the machine gun position is not sensor significant and will be a difficult tally for CAS aircrew. A section of Marine AH-1Ws are on station loaded with 2.75" rockets and 20mm Cannon.

- While the JTAC has digital portable tactical targeting system and several other tools to provide an accurate and precise target location; that is time he doesn't have. Because the JTAC has passed a detailed update and orientation to the area of operations on check-in; the JTAC and Cobras are able to effectively use common geographical references to quickly employ the CAS aircraft.

- JTAC determines that he can achieve sufficient suppression against the enemy machine gun position with rockets and cannon from the AH-1Ws. Based on the proximity of the enemy position to friendly position, the JTAC decides to use Type 1.

- AH-1Ws receive the CAS briefing

JTAC: “Venom 11, this is Broadsword 01, Type 1 in effect, advise when ready for 9-line.”

- The JTAC does not have to ever say the term ‘bomb on target’ to the CAS aircraft. All Type 1 engagements are BOT due to the CAS aircraft to be either tally/have capture/or contact a mark and employ off a correction. BOT could be passed in remarks as well or not at all as long as the requirement for CAS aircraft is clearly understood.

Attack Aircraft: “Broadsword 01, Venom 11 ready to copy”

JTAC:
“ADDER
270
3000
1650
Machine gun position
PT 740 890
Talk-on
North 600
Egress East ADDER
Advise when ready for remarks”

Attack Aircraft: “Venom 11, Ready to copy remarks”

JTAC: “Venom 11, Final attack headings 230-300. Immediate time on target (TOT), say when ready for talk-on”

- Attack aircraft validate target location by cross-checking that the position is coincident with the expected target area using all appropriate means.

Attack Aircraft: “Broadsword 01, Venom 11, 1650, PT 740 890, final attack headings 230-300, ready for talk-on.”

JTAC: “Venom 11, Broadsword 01, readback correct, understand you are familiar with the ‘black hills.’”

Attack Aircraft: “Broadsword 01, Venom 11 is contact ‘black hills’.”

JTAC: “Venom 11, Broadsword 01, describe the northwest most point of the ‘black hills’.”

Attack Aircraft: “Broadsword 01, Venom 11, the Northwest most point is slightly higher than the rest of the ‘black hills’ and oriented generally northwest to southeast.”

JTAC: “Venom 11, Broadsword 01, from the northwest most point of the ‘black hills’, the machine gun position is 100m west. Just to the west of the enemy position is a north-south wash.”

Attack Aircraft: “Broadsword 01, Venom 11 is contact the north-south wash, it has a small bend to the east in line with the northwest point of the ‘black hills’.”

JTAC: “Venom 11, Broadsword 01, that bend is pointing at the machine gun position to the east.”

Attack Aircraft: “Broadsword 01, Venom 11 is contact target area, no joy machine gun position. In from the West.”

JTAC: “Venom 11, Cleared Hot.”

- While the AH-1Ws are not tally/capture the target, they are contact the mark (black hills) and can employ off of the correction from the JTAC (West 100). Therefore the CAS aircraft have met their requirements for Type 1 visual requirements. This is the most counter-intuitive example of a BOT attack; but it is BOT. The CAS aircraft have a requirement by the definition of Type 1 to have visual awareness to where the JTAC wants their ordnance employed (tally/capture or contact) and have met this through the use of the geographical reference and the correction. Had this attack been conducted with only the 9-line passed and no talk-on, the result could be the same, effective suppression of the machine gun position, but must now be Type 2 or 3 control.

i. **CAS Execution with Non-JTAC Personnel**

(1) In certain circumstances, the ground commander might require air support when a JTAC or FAC(A) is not available, but detailed integration with friendly forces fire and movement is still required. Aircrew executing CAS under these circumstances bear increased responsibility for the detailed integration required to minimize fratricide and collateral damage normally done by a JTAC/FAC(A). Non-JTAC personnel must clearly state to strike aircraft that they are not a JTAC. In these circumstances, CAS aircrew should assist these personnel/units to the greatest extent possible in order to bring fires to bear.

(2) Due to the complexity of air support, the commander must consider the increased risk of fratricide when using personnel who are not JTAC/FAC(A) qualified. The requester must notify/alert his command element when a JTAC or FAC(A) is unavailable to conduct Type 1, 2, or 3 control. If the maneuver commander accepts the risk, the request is forwarded to the CAS controlling agency. This information will alert the CAS controlling agency (ASOC, DASC, JAOC) that aircrew will be working with non-JTAC personnel.

(3) Ground personnel requiring air support will identify themselves as not JTAC qualified by stating “I am not a JTAC” on aircraft check-in, make every effort to involve a JTAC/FAC(A) in the situation, provide as much of the 9-line briefing as able, and as a minimum, pass target elevation, target location, friendly location, and restrictions.

(4) Aircrew in this situation will make every effort to involve a JTAC/FAC(A) in the situation and be prepared to “pull” information from the ground personnel to complete the briefing, and exercise vigilance with target identification, weapons effects, friendly locations, and execution of the final attack/abort procedures.

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, FAC(A)s, CAS aircrews, and fire supporters should be familiar with the standard formats used in passing key information between CAS participants. 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 JTACs and FAC(A)s combine their

efforts in support of a maneuver force. In these instances, it is critical that JTAC and FAC(A) actions are complementary.

a. **JTAC to FAC(A) Coordination.** The responsibilities of the JTAC and the FAC(A) must be determined prior to the attack. These responsibilities may include coordination with maneuver elements, attack aircraft briefing, target marking, airspace deconfliction, SEAD execution, and 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 target. Consequently, it is important for the JTAC/FAC(A) 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 aircraft are on the ATO and the JTAC/FAC(A) have a copy of the ATO, the CAS asset may check-in "as fragged" and subsequent transmissions may be minimized. Authentication procedures will be used if deemed necessary. The CAS check-in briefing format is found in Figure V-12. This brief may be abbreviated for brevity or security ("as fragged" or "with exception"). Capabilities examples include FAC(A), sensors, Link-16, and etc.

d. **Traffic Advisories/Airspace Updates.** JTAC/FAC(A) should immediately advise newly checked-in aircraft of other aircraft on station, their callsign, operating altitude, and frequency as soon as possible. JTAC/FAC(A) should be prepared to deconflict assets (i.e., aircraft from aircraft, aircraft from surface fires, and aircraft from known hazards.) JTAC/FAC(A) should advise aircrew of available airspace and desired IP/hold point locations for the attack.

e. **Situation Update**

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

(a) Situation update #----.

(b) Target - enemy situation.

(c) Threat activity.

(d) Friendly.

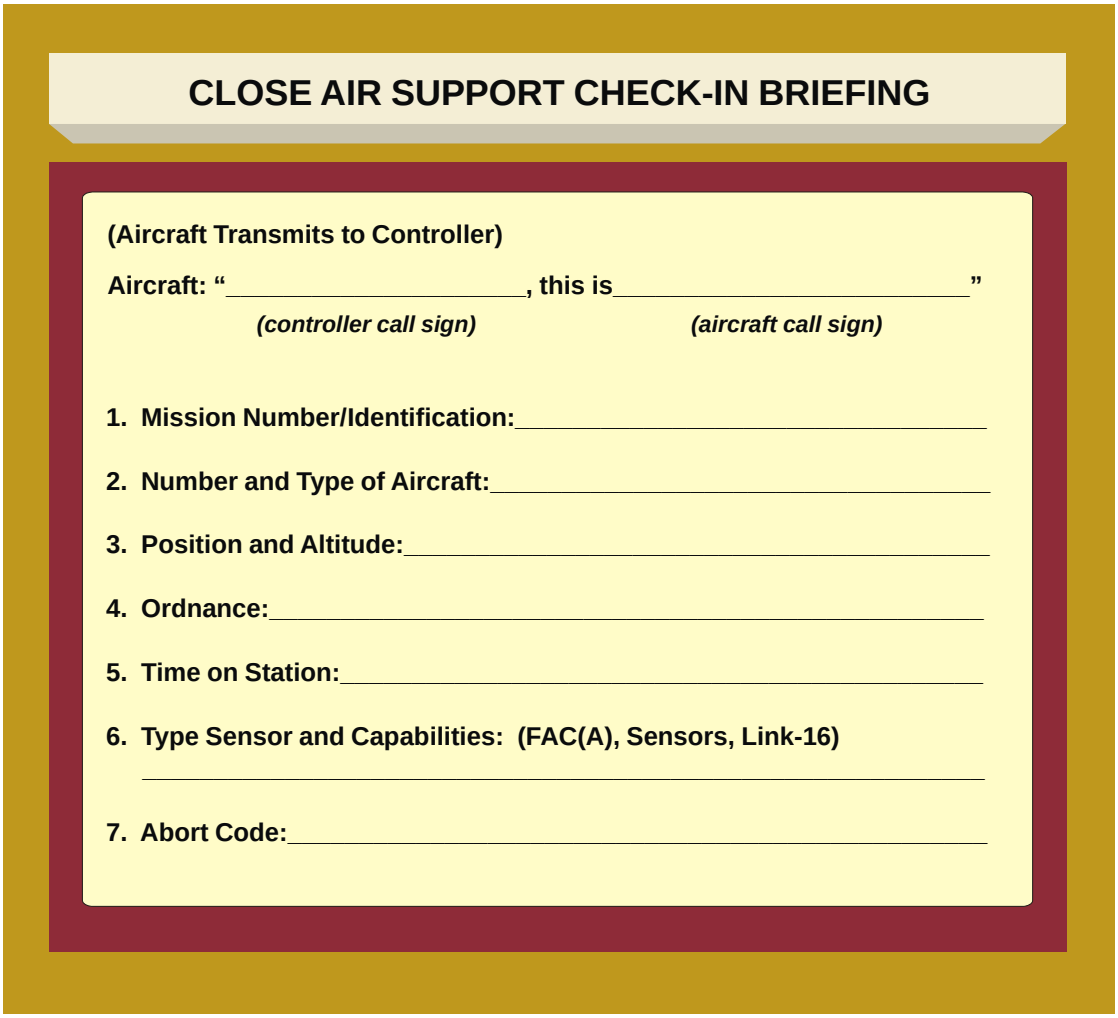


Figure V-12. Close Air Support Check-In Briefing

(e) Artillery.

(f) Clearance authority.

(g) Ordnance requested.

(h) Restrictions/remarks.

(i) Localized SEAD efforts (suppression/EW).

(j) Hazards (weather/terrain/obstructions).

(2) A technique for an effective update is shown in *JFIRE*. JTACs/FAC(A)s (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/FAC(A), aircraft should state if they have the latest ground situation.

f. **Talk-On**

(1) The JTAC/FAC(A) who effectively executes talk on techniques while considering the CAS asset's visual/sensor perspective for a BOT will likely be able to successfully execute expeditious and complete target correlation prior to the CAS attack. The objective of a talk-on is to correlate a specific target or target area between the JTAC/FAC(A) and the CAS aircrew to a level of fidelity such that the terminal attack controller knows the CAS asset has acquired the target. Exact brevity and language to conduct a talk-on are dependant on the situation and perspective of the JTAC/FAC(A) and CAS aircrew and targeting systems available to each. The JTAC/FAC(A) must consider the following basic elements that will affect talk-on effectiveness:

(a) Aircrew perspective.

(b) Controller perspective.

(c) Environmental conditions.

(d) Target area relief.

(e) Resolution and currency of reference graphics.

(f) Ability to establish a unit of measure.

(2) Figure V-13 articulates the elements of a target area which should be considered in determining what visual aspects of a target would be most remarkable and effective. For example, the vertical relief of a structure will be more apparent from the ground terminal controller's position than from an overhead FW aircraft. However, low flying RW aircraft are more likely to perceive vertical relief. The following figure applies to general perspectives as they relate to target descriptions during a talk-on. It is most useful when at least one of the assets is not aided by a multispectral sensor or video downlink. JTACs should select the most prominent structure/feature nearby for initial orientation between themselves and the aircrew.

(3) As the JTAC/FAC(A) considers the CAS asset's perspective, he should also consider whether to use large target area features to cue to smaller features or a more narrowly focused initial search patterns to expedite target correlation. The decision as to which technique to use is dependant on such factors as:

(a) Aircraft sensor capabilities (EO, IR, etc.).

(b) Video downlink capability.

(c) Aircraft inertial navigation systems (INS).

GENERAL VISUAL PERSPECTIVES FOR TALK-ON CONSIDERATION

	Ground	Fixed-Wing	Rotary-Wing	Unmanned Aircraft System
Vertical Relief	Good	Poor	Good	Poor Notes 2, 3
Horizontal Relief	Poor	Good	Poor Note 3	Good
Color Distinction	Good Note 2	Poor* Notes 3, 4	Good Note 3	Good Notes 1, 2, 3
Communications Delay	Not Significant	Not Significant	Not Significant	Significant

This figure assumes the environment is sky clear, visibility unrestricted.

* Aircraft greater than 15,000 feet slant range from the target will likely be unable to discern color with the naked eye. The use of binoculars or other sensors essentially "decreases" slant range to a target to a distance at which the color may be determined.

NOTES:
1. Sensor dependent
2. Slant range dependent
3. Altitude dependent
4. Enhanced when aided (binoculars)

Figure V-13. General Visual Perspectives for Talk-on Consideration

(d) GRGs/operational.

(e) Imagery products with associated elevation data.

(4) The JTAC/FAC(A) may elect to conduct a talk-on cued by larger features if CAS aircraft or terminal controller sensors (optics, NVDs) or systems are either not available or degraded, and precision targeting systems are unavailable. In all cases the starting point would be a feature of the target's surroundings, which based on perspective, is identifiable to both the JTAC/FAC(A) and CAS aircrew. From this feature a gradually more detailed description would begin, ultimately resulting in proper correlation to the intended target.

Example of a bomb on target engagement using a large terrain feature for cueing and target correlation. The target attack brief has already been passed and read backs are complete. Jailbird 21 is the close air support asset, and Broadsword 14 is the joint terminal attack controller.

"Jailbird 21, Broadsword 14, are you familiar with Pilots Knob?"

"Broadsword 14, Jailbird 21, Affirmative, contact Pilots Knob"
"Jailbird 21, Broadsword 14, Roger. 500 m north of Pilots Knob there is a man-made feature oriented E-W. Describe it."

"Broadsword 14, Jailbird 21, it is a multi-lane highway separated by a median."

"Jailbird 21, Broadsword 14, Correct, follow that multi-lane highway to the east, to where it intersects a NE-SW running canal."

"Broadsword 14, Jailbird 21, contact the highway/canal intersection"

"Jailbird 21, Broadsword 14, Roger. Describe what you see 100 m SE of that intersection"

"Broadsword 14, Jailbird 21, contact a large building. Appears multi-story, but unable to determine how tall."

"Jailbird 21, Broadsword 14, Roger. That building is The Q. Describe the area immediately to the west of The Q"

"Broadsword 14, Jailbird 21, there appears to be a parking lot on the west side of the Q"

"Jailbird 21, Broadsword 14, are there any vehicles in the parking lot?"

"Broadsword 14, Jailbird 21, contact three rectangular structures in the parking lot, west of the Q, approx 25 m from the building. They are in a row N-S"

"Jailbird 21, Broadsword 14, Roger, those are three trailers. The northernmost trailer is your target."

"Broadsword 14, Jailbird 21, capture north trailer."

(5) Should the tools be available, the JTACs/FAC(A)s and CAS aircrew may be able to generate relatively accurate and precise target coordinates with elevation due to improvements in portable tactical targeting systems, CAS aircraft sensor suites, and CAS aircraft and JTAC/FAC(A) systems. Leveraging these, the JTAC/FAC(A) may elect to conduct a narrowly focused initial talk-on technique. The terminal controller can use the coordinate and elevation as an "anchor point" from which the CAS aircrew and JTAC/FAC(A) will move in the target area in order to positively acquire the CAS target. Using this narrowly focused cueing to the target area can result in an expeditious target correlation as the cueing should place the CAS aircrew closer to the intended target.

Example of a bomb on target engagement using an aircraft sensor cued from the target coordinate and elevation in the target attack brief. The target attack brief has already been passed and readbacks are complete. Jailbird 21 is the close air support asset, and Broadsword 14 is the JTAC.

"Jailbird 21, Broadsword 14, slew your pod to line 4 and 6."

"Broadsword 14, Jailbird 21, Roger, my pod is in the area."

"Jailbird 21, Broadsword 14, you should see a four-way intersection."

"Broadsword 14, Jailbird 21, Roger. The cross-hairs are on the northwest corner of a four-way intersection."

"Jailbird 21, Broadsword 14, slew your crosshairs to the center of the intersection."
"Broadsword 14, Jailbird 21, contact."

"Jailbird 21, Broadsword 14, is there a vehicle in your field of view?"

"Broadsword 14, Jailbird 21, Affirmative. There is a small or mid-sized vehicle blocking the SW approach to the intersection."

"Jailbird 21, Broadsword 14, Roger, slew your sensor to the first building south of that vehicle and describe the building."

"Broadsword 14, Jailbird 21, there is a small square building immediately south of the vehicle with an oval pool in the yard. The building appears to be the same size as the vehicle itself."

"Jailbird 21, Broadsword 14, on which side of the building is the pool?"

"Broadsword 14, Jailbird 21, the pool is on the south side of the small building."

"Jailbird 21, Broadsword 14, Roger, slew your sensor back to the vehicle blocking the SW approach. That vehicle is your target."

"Broadsword 14, Jailbird 21, capture vehicle."

g. **CAS Attack Control**

(1) **CAS Briefing.** JTACs/FAC(A)s will use a standardized briefing to pass information rapidly. The CAS brief (Figure V-14), also known as the "9-Line Briefing," is the standard for use with FW and RW 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. Elements of a 9-line will not be passed piecemeal over several minutes and out of sequence. The first 9 lines are understood and line numbers do not need to be passed. When applicable, remarks/restrictions should include those items listed in paragraphs 4e(j) and (k) below. Lines 4, 6, and any restrictions are **mandatory readback items** for all three types of control. Additionally, the JTAC/FAC(A) may need confirmation that the aircraft has correctly received other critical items of the brief. In these situations, the JTAC/FAC(A) will specify the additional items to be confirmed.

(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/FAC(A)s give an offset (offset left/right) if a restriction exists. The offset is the side of the IP-to-target line on which aircrews can maneuver for the attack.

THE 9-LINE CLOSE AIR SUPPORT BRIEFING FORMAT

THE 9-LINE CAS BRIEFING FORMAT

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/FAC(A) call sign), (grid, shift from a known point, polar plot)***

Type_____Control_____"
(1,2,3)

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: "_____"
(actual code)

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

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

Remarks/Restrictions (as appropriate): "_____"

Figure V-14. The 9-Line Close Air Support Briefing Format

(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 100 meters.

(d) **Target Elevation.** The target elevation is given in feet above MSL. Target elevation is needed for cuing sensor and for weapon/targeting solutions for CAS platforms which require it.

(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/FAC(A) 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/talk-on). 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/FAC(A)s 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. For a visual description from a reference point, the visual point should be established by the controller and visually acquired by the aircrew prior to the 9-line or during the situation update.

For further guidance on coordinate datum planes, refer to CJCSI 3900.01C, Position (Point and Area) Reference Procedures.

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

(h) **Friendlies.** The distance of closest friendlies from the target is given in meters and is a cardinal/subcardinal heading from the target (N, NE, E, SE, S, SW, W, or NW).

(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 (LTL) (in degrees magnetic).

2. Desired type/number of ordnance and/or weapons effects.

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

4. Any active GTL.

5. Hazards to aviation.

6. Weather.

7. Additional target information.

8. Night vision capability.

9. Other time considerations.

10. Friendly mark (if any).

(k) **Restrictions.** The following information is always a restriction and should be included if applicable. Additional restrictions are at the discretion of the JTAC/FAC(A). All passed restrictions shall be read back.

1. Final attack heading.

2. ACAs.

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

4. TOT/TTT.

(2) **CAS Briefing when CAS aircrew acquires target for JTAC/FAC(A):** An aircrew can acquire a target and derive targetable data (lines 4, 5, and 6) for JTAC/FAC(A) while conducting CAS, ISR, escort, and other missions. After verifying the target data provided by the aircrew, the JTAC/FAC(A) will provide the same aircrew with a CAS briefing using the target data provided by the aircrew. The transmission of the target data by the JTAC/FAC(A) is considered the mandatory readback and is the responsibility of the aircrew to confirm readback was correct. **Note: This situation only applies if the aircrew that provides the target data is the same aircrew that is provided the CAS briefing by the JTAC/FAC(A).**

Situation: Hog 1 has been providing recce for Thunder (JTAC) due to an anticipated attack on their forward operating base. During the search, Hog 1 observed a mortar launch and identified personnel continuing to fire mortars. Using his pod, Hog 1 derived target elevation and coordinates and description of the target.

Attack Aircraft: "Thunder this is Hog 1, have mortar point of origin with personnel firing mortars, advise when ready to copy"

JTAC: "Hog 1, Thunder ready to copy"

Attack Aircraft: "Thunder, elevation 4486 feet, 11S PA 1234 5678."

JTAC: "Hog 1, advise when ready for grid 9-line"

Attack Aircraft: "Thunder, Hog 1 ready"

JTAC: “Type 2”
“1 through 3 N/A”
“4486, mortar position, 11S PA 1234 5678”
“None, SW 800 meters, Egress West”

Attack Aircraft: “Thunder, good readback”

JTAC: “Hog 1, advise when ready for remarks”

(3) **Mission Brief Accuracy.** Ideally, the controlling agency (e.g., ASOC, DASC, TACC, TAC[A]), briefs the aircrew before contact with the JTAC/FAC(A) using the information from the JTAR, Section 1, Block 8 (see Appendix A, “Joint Tactical Air Strike Request”). The brief must be accurate, concise, and executed quickly. Map datum must be considered when determining target grid coordinates. The mission brief should not change once an aircrew leaves the IP/BP inbound to the target.

(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/FAC(A) to coordinate different delivery patterns. When employing standoff munitions or delivery methods, the JTAC/FAC(A) must provide a timely clearance appropriate for the weapon being delivered. For example, medium-altitude attacks can result in weapon releases more than 4 nm from the target.

(b) **Reattacks.** Reattacks allow CAS aircraft to quickly reposition to attack the same target, and while maneuvering, maintain compliance with any restrictions in force. A reattack may be requested if additional fires are required on the target. In a high-threat or non-permissive environment, aircraft may be unable to make multiple passes due to enemy defenses. The JTAC/FAC(A) issues approval for immediate reattack and remains aware of any threats to the aircraft. As was required in the initial attack, clearance to drop/fire on a reattack must be issued by the JTAC/FAC(A) before ordnance release. Corrections and new restrictions can be given to the aircrew during maneuvering. If ordnance adjustments are required, they must be given in a timely manner. Corrections are given in cardinal direction and distance in meters from the previous weapon impact point. In the following example a correction is being given to the second attacking aircraft in the flight based on lead aircraft’s impacts (e.g., “Razor 02, from lead’s hits, north 100”).

(c) **Abort Procedures.** The JTAC/FAC(A) 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 can use the “challenge-reply” method to authenticate the abort command, or may be briefed as “in the clear.” During the CAS check in briefing, the flight lead gives the JTAC/FAC(A) 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 the “abort code.” If no abort code was briefed, then the CAS attack is

aborted by simply transmitting: "ABORT, ABORT, ABORT" (see Figure V-15). The JTAC/FAC(A) may elect to use a single abort code for all aircraft under his control in situations where multiple flights of aircraft with multiple abort codes would be problematic. In such cases the JTAC/FAC(A) needs to state this nonstandard procedure during the situation update and establish the code.

ABORT CALL ILLUSTRATION

(The joint terminal attack controller [JTAC] is "NAIL 11"; the close air support [CAS] attack flight is "SPIKE 41." SPIKE 41 flight has chosen "BRT" [authenticated "D"] as its abort code.)

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

Figure V-15. Abort Call Illustration

(4) **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-16 for a list of CAS related brevity codes or FM 1-02.1, MCRP 3-25B, NTTP 6-02.1, AFTTP(I) 3-2.5 *Brevity, Multi-Service Brevity Codes* for a complete list of all multi-Service brevity codes.

h. **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 reattacked. In a high-threat environment, BDA may be difficult to judge. There is no simple answer as to who is in the best position to determine BDA. 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 reattack requirements. BDA will be difficult to ascertain in a high threat environment, but the difficulty can be mitigated by integration of JIPOE early in the planning process. This assists in developing an appropriate mix of ISR assets that maximizes collection and exploitation potential. Determination of who reports or collects BDA within a given

JOINT TERMINAL ATTACK CONTROLLERS' CLEARANCE 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	Authorized to proceed with the attack profile, 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 joint terminal attack controller. Attack platform will provide "attack complete" to the joint terminal attack controller .
WARNING The word "CLEARED" will only be used when ordnance is actually to be delivered. This will minimize the chances of dropping ordnance on dry passes further reducing the risk of fratricide. Nonstandard calls must be avoided at all times.	

Figure V-16. Joint Terminal Attack Controllers' Clearance Calls

scenario is based upon the objective, capabilities, experience, weather, terrain, employment techniques, and enemy actions. The BDA report should include:

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

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

(c) Location.

(d) Time.

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

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

(a) Whenever possible, the JTAC/FAC(A) provides attack flights with the BDA of their attack as they egress. The JTAC/FAC(A) gives BDA for the flight, not for

individual aircraft in the flight. The JTAC/FAC(A) should not assume the target is completely destroyed since the enemy may employ deception. JTACs/FAC(A)s must use their judgment and be precise ("if you do not see it, do not report it") in reporting BDA. BDA must be passed to intelligence and controlling agencies as soon as possible. If conditions preclude briefing BDA, at a minimum pass "SUCCESSFUL," "UNSUCCESSFUL," or "UNKNOWN" assessment to the aircraft and the controlling agency. In some cases aircrew with various sensors may be better situated to aid the JTAC or FAC(A) in assessing hit results.

(b) The JTAC/FAC(A) should provide a "SALTY" (size, activity, location, time, your actions) report to the appropriate C2 agency to determine if further assets are required. Develop and maintain a log of all BDA. The log should contain the following elements: mission number, call sign, target coordinates, TOT, specific results (number of enemy killed by air, vehicles/structures destroyed, unexploded ordnance), whether the mission was successful, targets remaining, and recommendation.

(3) **Aircrew Responsibilities.** Use the abbreviated US message text format (USMTF) INFLTREP (Figure V-17) 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

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-17. Inflight Report

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.

4. Forward Air Controller (Airborne) Integration

a. **Check-In.** The FAC(A) is an extension of the TACP, and should communicate "FAC(A) capable" at check-in, providing the JTAC knowledge of the capability resident within the asset. TACPs should be prepared for assets that check on-station as "FAC(A) qualified" but were not identified as such on the ATO or in planning. If the JTAC intends to utilize the FAC(A) capability in these situations, the situation update should be much more in depth than that of a normal CAS asset, therefore consider using an enhanced version of the common situation update of TTFACOR.

(1) **Targets.** The JTAC should be ready to pass several target areas/briefs, or 9-lines to the FAC(A), who can then match the CAS fighters and ordnance to the targets. Even if targeting information is not complete in the form of a finalized 9-line, pass what is available so that the FAC(A) will have the information.

(2) **Threat.** The information is the same as passed to the CAS assets. Include detailed threat location, movement, composition, and activity if able to allow for the FAC(A) to coordinate for suppression or destruction of the threat.

(3) **Friendlies.** The FAC(A) needs to know ground commander's intent, the scheme of maneuver, the type of operation, as well as friendly location(s), equipment, and markings.

(4) **Artillery.** The FAC(A) should know the artillery tube locations, i.e., PAA, active gun-to-target lines, and the target areas that the artillery is being shot into. An example call may be, "PAA 6 is active, 030 GTL, 10km maximum ordinate (MAXORD), firing into MB 345987". At a minimum, pass the FAC(A) an ACA to deconflict from the artillery fire. Also provide whether or not artillery is available for SEAD and/or marking.

(5) **Clearance.** Decide whether the JTAC or the FAC(A) will retain final control release authority in accordance with Type 1, 2, and 3 control. As always, if final control is delegated to a FAC(A) for a target set, area, or specified attack, the JTAC will retain abort authority.

(6) **Ordnance.** If there are restrictions on ordnance to be employed within the operational area, pass this information to the FAC(A). Allow the FAC(A), as much as possible, to match the best weapon to the target and requested effects to the available CAS aircraft ordnance.

(7) **Restrictions.** Pass any other attack restrictions. This may be the same information passed to other CAS aircraft.

(8) Additional information that should be passed, communications and time permitting include:

(a) Commander's intent if not already stated in the **friendlies** section.

(b) Weather in the target area.

(c) Surface winds.

(d) Closest airfield for recovery.

b. With this enhanced knowledge of the overall gameplan, the FAC(A) will be better prepared and able to support the GCE. Other information to be passed to FAC(A) should be any present or developing target areas. If the JTAC has 9-lines available, complete or incomplete, they should pass as much to the FAC(A) as the tactical situation allows. Routine "nice to know" information for a CAS asset should be considered and passed as "need to know" information for a FAC(A) as it may become critical for effective execution as the tactical situation changes.

c. It is important that a JTAC understands the capabilities that a FAC(A) brings with him/her to an operational area. The following list highlights these capabilities:

(1) Terminal Attack Control (Type 1, 2, and 3)

(a) Provide final attack clearance in accordance with Type 1, 2, and 3 control.

(b) Coordinate and control SOF gunship fire missions.

(c) Be a reactive CAS asset available to the JTAC.

(d) Provide a final quality control check to prevent fratricide.

(2) Radio Relay

(a) Provide a communication link due to LOS for the JTAC and supported unit.

(b) Provide a communication link between the supported unit and aviation C2 system.

(c) Provide a communication link between the JTAC and RW CAS assets.

(d) Perform on-scene commander (OSC) duties in the event of a search and rescue event.

(3) Reconnaissance

(a) Perform multispectral imagery function in an attempt to fulfill CCIRs.

(b) Provide target analysis and weaponeering recommendations.

(c) Provide perspective from air, same perspective of CAS assets.

(4) Indirect Fires Calls for Fire. Perform as an artillery spotter/perform calls for fire.

(5) Asset coordination/deconfliction

(a) Provide deconfliction of aircraft and surface fires.

(b) Pass situation updates.

(c) Put targeting information into 9-line format, tactical situation dependant.

(d) Pass targeting information (9-line, SOF gunship call for fire, SPINS specified formats).

(6) Battle Damage Assessment. Develop and pass BDA.

(7) Target Marking/Designation/Coordinate Generation

(a) Provide talk-ons.

(b) Provide marks.

(c) Provide terminal guidance for laser guided weapons.

(d) Generate target coordinates for weapons employment.

(8) SEAD coordination efforts.

d. **FAC(A) Duties and Responsibilities.** It is important for the JTAC and FAC(A) to rapidly determine responsibilities for execution and expedite CAS procedures in a tactically safe manner. The three objectives of the FAC(A) are: to achieve the ground commander's intent, maximize and integrate fires on the battlefield, and mitigate fratricide. The FAC(A) must understand the tasking and duties set forth by the JTAC in

order to accomplish them autonomously and reduce the work load required of the JTAC. Absence of or misidentification of the tasks and duties for the FAC(A) during planning and/or execution will likely result in delayed CAS operations. It is important to note that these duties can change at any time during the time on station for the supporting FAC(A), at the discretion of the TACP. Should TAC duties be divided between the JTAC and FAC(A), the element who has the authority to provide final weapons release permission **must** be clearly stated. This will alleviate any confusion during the critical phase of employment. JTACs and FAC(A)s should use the following brevity terms to quickly communicate duties:

(1) "Brief" – The FAC(A) will automatically pass information such as operational area updates, available 9-lines, BDA, etc. to CAS assets within the operational area as well as copy down CAS asset check-in information. The FAC(A) will keep JTAC updated of the situation but allow him to focus on other duties.

(2) "Stack" – The FAC(A) will deconflict all CAS assets from surface fires within the operational area as well as provide deconfliction for assets upon check-in. Deconfliction will include HAs, ingress and egress routings, and target areas. The FAC(A) will keep the JTAC updated of the situation as required, allowing the JTAC to focus on other duties. The JTAC must keep the FAC(A) updated on any changes with FSCMs/indirect fire operations.

(3) "Mark" – The FAC(A) will provide target marks for CAS attacks. It is critical that the FAC(A) and JTAC coordinate whether or not the JTAC will issue a clearance via Type 1, 2 or 3 for the FAC(A) to release a kinetic mark. Talk-ons are considered a mark for this tasking. The FAC(A) will bring aircraft forward with deconfliction established and threat permitting, in order to provide talk-ons to targets associated with passed 9-lines/areas of interest.

(4) "Control" – The FAC(A) will provide final release authority to attacking aircraft if delegated this authority by the JTAC. As always, the JTAC retains abort authority.

Forward air controller (airborne) (FAC[A]) and joint terminal attack coordinator communication examples:

For a FAC(A) who provides aircraft deconfliction:
"Venom 11, A3C, your stack, my brief, mark and control"

For a FAC(A) who will deconflict aircraft and provide talk-ons:
"Bengal 61, Titus, your stack and mark, my brief and control"

For a FAC(A) who is operating as an autonomous tactical air control party:
"Hawk 81, Broadsword 02, your brief, stack, mark and control."

e. **Communication Techniques.** Communication often becomes complex with a FAC(A) and numerous CAS assets on station simultaneously. Several options and techniques are available to maximize the use of verbal communication, while preserving

radio time for critical weapons release authority, mission approval, and passing information.

(1) Establish two or three separate frequencies for CAS coordination and execution. One will serve as the primary AO/ALO frequency on which all CAS target attack missions may be passed and coordinated, and final weapons release permission may be passed. All players including the JTAC, FAC(A), and CAS aircraft should be on the frequency. This frequency will normally be the TAD net assigned to the JTAC. The auxiliary frequency (UHF or VHF) can be used as a coordination frequency between the AO/ALO, JTAC, and the FAC(A) to pass administrative details, situation updates, new targets, coordination for SEAD and coordination for marks, and **CAS mission approval.** In a Marine operation, this is often the TACP (local) net. A third frequency could be established if numerous aircraft are anticipated within an operational area as terminal control communication can quickly become intensive and draw away from the ability to deconflict aircraft. On this additional frequency, communications such as check-in, updates, and asset deconfliction can be passed by the FAC(A) and/or JTAC. This prevents these vital but lower priority communications from interfering with target talk-ons, coordination between the FAC(A) and JTAC, or terminal attack communications. If such a frequency plan is established, the FAC(A) must understand that coordination should occur on this frequency but that all terminal attack control is to occur on the primary net in order to ensure that the JTAC has SA and is able to abort attacks if necessary.

(2) Another technique when utilizing a FAC(A) and/or several CAS assets simultaneously is to ensure that when information is passed, it is passed to as many assets as possible. When passing a 9-Line to a FAC(A) or CAS asset, preface it with a “heads up” call to all players, alerting them to copy down the information. This will potentially prevent the same information from being passed several times on the same frequency.

(3) A final communications technique is to inform all players that communications is becoming intensive and to limit all calls to 10 seconds or less as well as for attacking aircraft to provide a “30 seconds” call. This will allow information to continue to be passed in short segments to all players within the operational area as well as provide attacking aircraft breaks in communications to inform the JTAC and/or FAC(A) that they will be making an “In” call soon and will need final attack clearance. When the “30 seconds” call is made, inform the aircraft that information is being passed to standby, monitor the attack, and provide weapon release permission (clearance), or abort and then resume passing pertinent information to the respective aircraft.

f. **Holding.** The FAC(A)’s holding pattern will vary greatly throughout the time on station in order to accommodate such tasks as target identification, coordinate generation, or visual acquisition of CAS assets. If the threat and weather allows, the FAC(A) may wish to orbit over or near the target. This will allow the FAC(A) to be in a position to mark, accomplish talk-ons, provide final clearance, and conduct other tasks previously listed. Provide the FAC(A) with as much airspace as possible, both laterally and vertically, consistent with existing limitations, to allow the FAC(A) to manage the

airspace deconfliction between himself and the other CAS aircraft. This flexibility is necessary for the CAS assets and the FAC(A) to effectively employ ordnance consistent with existing tactics and threat considerations.

g. **Marks.** The requirement for JTAC clearance for FAC(A) marks must be clearly stated real-time. Consideration should be given to providing "blanket approval" for FAC(A) target marking. If the TACP determines that they will provide clearance in the form of a Type 1, 2, or 3 control for FAC(A) marks, the FAC(A) should request "blanket approval" for the use of nonlethal marks (e.g., IR pointers/markers). Ultimately, the decision will rest with the ground commander, and as such, the TACP must provide guidance that will allow an informed decision.

h. **Attacks**

(1) During medium altitude operations, with JTAC approval, the FAC(A) can execute all tasks listed above including briefing the CAS aircraft, bring them into the target area, providing the talk-on, marking, and providing final clearance. The JTAC must continually monitor the mission, provide necessary corrections, retain abort authority, monitor artillery and rotary wing activities, and work with the ground commander and his representatives to further refine target priorities in support of the commander's objectives.

(2) During low altitude or rotary wing operations, with TACP approval, the FAC(A) will normally remain at the BP/IP, brief the CAS aircraft, provide them holding instructions for deconfliction, confirm a common time hack, and possibly provide target marks.

(3) In a time-sensitive situation such as a troops in contact, an on-station FAC(A) working with ground forces may have greater SA than CAS fighters checking in, and may also be able to provide support quickest through the employment of own-ship munitions. As stated previously, this ordnance release must be coordinated with the JTAC and be either under a blanket approval to mark and suppress targets ('your mark and control') or via a terminal attack control clearance.

(4) A FAC(A) can use several techniques to aid the JTAC with flexible and lethal aviation fires. One such technique is to initiate a CAS attack window with a visual mark followed by either a Type 1 or 2 control for the first weapon to be employed to ensure that all members of the attacking flight are tally/capture on the target/target area. Once the attacking aircraft are tally/capture, the FAC(A) may then request a transition to Type 3 on the specified target set, allowing the FAC(A) to continue monitoring the engagement while assisting the JTAC with any of the other FAC(A) capabilities or tasks listed earlier.

i. **Post Attack.** If the FAC(A) is providing deconfliction at the IP and/or in the target area, he will continue to do so for the CAS aircraft egressing the area. Whoever has best "observation" the attack and weapons effects should provide the CAS aircraft

with BDA. If communications are interrupted by terrain, the JTAC should plan to relay BDA through the FAC(A) to the CAS asset.

j. **Battle Handover.** Prior to the FAC(A) checking out with the JTAC, a handover brief shall be conducted with the JTAC or on-coming FAC(A). Information should include but is not limited to:

(1) Assets on station

(a) Location.

(b) Ordnance/time on station remaining.

(c) Established deconfliction plan for assets within the operational area.

(2) Threat updates.

(3) Missions conducted

(a) Targets engaged/9-lines passed.

(b) Targets currently being engaged under Type 3.

(c) Targets remaining.

(4) Communications plan.

(5) Recommendations to JTAC or on-coming FAC(A).

(6) Any other pertinent information.

k. **FAC(A) integration in the absence of an on-scene TACP**

(1) As per the definition, a FAC(A) is normally an extension of the TACP. However, as the demand for qualified controllers increases, it is important to highlight considerations for employing a FAC(A) either as a separate terminal attack controller working directly for the ground commander, or as an extension of a TACP not physically located with the supported unit commander.

(2) When operating as a separate TACP or without a JTAC on scene, the FAC(A) must maintain the communication links to the ground commander and receive authorization (either in planning or real-time) for coordination and delivery of aviation fires. The close and continuous coordination with the supported GCE will foster understanding about the FAC(A) platform's capabilities and when to leverage them. The supported commander is responsible for all fires, both aviation and surface-based, that are delivered in the assigned operational area. A FAC(A) conducting **CAS operations** as a

separate TACP must be aware that the fires in the support of the GCE are occurring in a unit's operational area. All FAC(A) fire missions (aviation or surface-to-surface) **must still be approved by the supported ground maneuver element's appropriate fire support coordination agency.** This may require the FAC(A) to conduct detailed, real-time coordination on the supported unit's fire support coordination net. Additionally, the FAC(A) must understand that the unit in need of FAC(A) support may not be the one that owns the operational area. In recent counterinsurgency operations, FAC(A)s have been employed supporting convoys and mounted patrols from one unit, while those elements are transiting another unit's operational area. Often in these situations the on scene unit leader did not have the same SA with regard to nearby friendly force disposition or fire missions as the unit that was responsible for the operational area. In many of these situations, CAS engagements resulting in fratricide were avoided due to a FAC(A)'s ability to conduct coordination, understand through whom fires approval must be requested, and build each unit's SA quickly as a radio-relay between agencies. The FAC(A) must understand that complex operations as discussed will require potentially greater and more detailed, real-time integration with adjacent and higher GCEs.

(3) Ground commanders should provide the FAC(A)s the same direction with respect to the fire support plan and execution as would be provided to the TACP/JTAC, and expect the FAC(A) to perform the tasking. The FAC(A) can and will likely be the terminal controller who will retain the employment authority of FAC(A) and CAS element ordnance as required to support the GCE's maneuver. While positively identifying targets may be challenging for the FAC(A), it is important to note that since the establishment of the FAC(A) role in the Korean war, this difficult task has been accomplished through sound understanding of the supported GCE scheme of maneuver, SA, and detailed integration and coordination.

(4) While the emphasis is usually placed on the "control" in FAC(A), recent combat experience has shown that the most important utility in having a FAC(A) overhead may lie with the mission essential tasks other than terminal control that the FAC(A) can provide to the supported commanders. The FAC(A) may be given TAC or, by focusing on the other mission essential tasks (radio relay, reconnaissance, calls for fire, asset coordination/deconfliction, BDA, target marking, designation, coordinate generation, and SEAD), may become the critical link that allows a JTAC to provide weapons release approval. In recent counterinsurgency operations, TAC has been a low percentage task for the FAC(A)s, whereas the requirement for the coordination aspects of the FAC(A) mission have increased. The requirement for the FAC(A) to seamlessly assume control and coordinate with the ground commander for fires approval and weapons release authority during terminal attack operations has not diminished. The increased role of the FAC(A) executing the coordination missions allows the FAC(A) to act as a facilitator between agencies maintaining and expediting the kill chain. As the TACPs and JTACs operate at greater distances from the supported ground maneuver units, the requirement for aircrew to be well versed in the finer details of CAS has increased. Whether delivering sophisticated ordnance in close proximity to friendly troops, dropping new classes of weapons through increasingly complex airspace or operating as part of the air-ground team against an enemy mindful of collateral damage

and political impact, the FAC(A)s must bring to bear all of the knowledge and equipment necessary to best contribute to the GCE's success on the battlefield.

(5) Whether operating as an extension of a TACP or as a separate TACP, FAC(A)s are terminal attack controllers with a host of capabilities that vary based on platform. They can and should be used to maximize and integrate fires on the battlefield and achieve the supported commander's intent while minimizing the risk of fratricide.

5. Close Air Support Aircraft Tactics

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

a. Fixed-Wing Tactics

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

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

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

2. Lower fuel consumption and increased time on station.

3. Reduced navigation difficulties.

4. Improved formation control.

5. Improved mutual support.

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

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

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

9. More flexibility in attack axis selection.

10. Easier timing of TOT.

(b) **Disadvantages of medium/high altitude tactics include:**

1. Enemy acquisition systems can detect the attack force at long range, allowing the enemy to prepare its air defenses.

2. Requires local air superiority.

3. May require high weather ceilings and good visibility when using laser guided or other weapons requiring visual target acquisition by the aircrew (may not be a limiting factor when the ground commander authorizes use of IAMs).

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

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

(c) **Ingress.** The higher altitude of the aircraft often makes receiving situation updates from extended ranges feasible. This enables the aircrew to build SA prior to entering the immediate target area. JTACs/FAC(A)s may route CAS aircraft to the target area via IPs, control points, geographic references, dead reckoning (time, distance, and heading), or a combination of these techniques. JTACs/FAC(A)s should use caution to not send friendly aircraft into uncoordinated adjacent unit airspace or known areas of concentrated enemy air defense. Multiple attack flights can be deconflicted using vertical and horizontal separation.

(d) **CAS Aircraft Observation and Holding Patterns.** When possible, CAS aircraft should be given enough airspace to hold in an area of relatively low AAA activity that provides a good position to observe the target area. JTACs/FAC(A)s should not restrict attack aircraft to specific observation or holding patterns but should specify the observation or HA that will best accomplish the mission. Considerations for observation or HA and altitude selection include: artillery GTLs and MAXORD, adjacent unit operations, weather conditions such as sun position and clouds, terrain and threat locations and activity, and other attack aircraft either on station or inbound. Typical holding patterns include the following:

1. **Racetrack:** An oval holding pattern with straight legs of at least 10 miles in length and with standard-rate 180 degree turns on each end. Bomber aircraft may require holding between 10-40 miles from the target, with 10-15 mile legs.

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 Orbit:** Circle around the designated target. Appropriate for nonlinear battlefields with "pockets" of enemy activity.

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

1. **Level Deliveries**: Used for guided and unguided free-fall weapons. Release points may have bomb ranges outside of visual range. Because of the long bomb ranges and weapons profiles, nose position may not be indicative of where weapons will impact.

2. **Dive Deliveries**: Used for guided, unguided, and forward firing ordnance, these dive deliveries typically use dive angles of 15 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.

3. **Dive Toss**: These deliveries provide increased standoff by using aircraft systems to compute release points similar to loft deliveries. The target is designated in the weapon system's computer by the aircrew at an extended slant range with the aircraft in a dive. The weapon is then released as the aircraft's dive angle is decreased.

(2) **Low/Very Low Altitude Tactics.** Low/very low altitude tactics are flown below approximately 8,000 ft AGL. **Low altitude bombing** can be described as **bombing with the height of release between 500 and 8,000 ft AGL.** Very low can be described as a height below 500 ft AGL. 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.

6. May allow easier assessment of aircraft geometry relative to the target/friendlies during CAS terminal attack control.

(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 are more critical than in higher altitude tactics.

7. Exposes aircraft and aircrew to small arms, MANPADS, and AAA.

(c) **Ingress.** Aircrews and mission planners may employ support aircraft and other countermeasures to degrade threat system effectiveness. Aircrews, JTACs/FAC(A)s, and air controllers select routes that avoid known threat weapon envelopes. Routes should include course changes to confuse and deceive the enemy concerning the intended target area. During simultaneous CAS with helicopter and FW aircraft, CAS aircrew must be under the control of the JTAC/FAC(A) to transit above or below the coordination altitude. Low altitude FW CAS CPs and IPs will likely require lateral deconfliction with helicopter HAs and BPs. Formations are used to complicate enemy radar resolution and improve lookout capability against enemy fighters. Aircrews plot, brief, and study the ingress routes to gain the maximum advantage from terrain masking. Entry should be delayed into a heavily defended target area until the aircrew has a clear understanding of the mission. The expected threat intensity and sophistication influence the selection of ingress tactics. **JTACs/FAC(A)s and aircrews tailor communications and control requirements to counter the threat.** Normally, control of CAS flights is handed over to the JTAC/FAC(A) at the control point. In a limited

communications environment, scheduled missions may be the primary method used to limit the required communications. Proper planning increases the chances for mission success even if there is little or very difficult radio communications after the flight becomes airborne.

(d) **Attack.** During low/very low altitude attacks, many of the same considerations apply as in high/medium altitude attacks. However, aircrews will have less time to acquire the target and position their aircraft for a successful attack. When planning ordnance and attack profiles, consider the requirement for fragmentation pattern avoidance in the low altitude environment. The final run-in from the IP to the target is the most crucial phase of the CAS mission. Aircrew tasks intensify as the aircrew must follow a precise timing and attack profile. The terrain dictates the type of formation flown by the attack element. Figure V-18 illustrates the attack phase of a typical FW CAS mission.

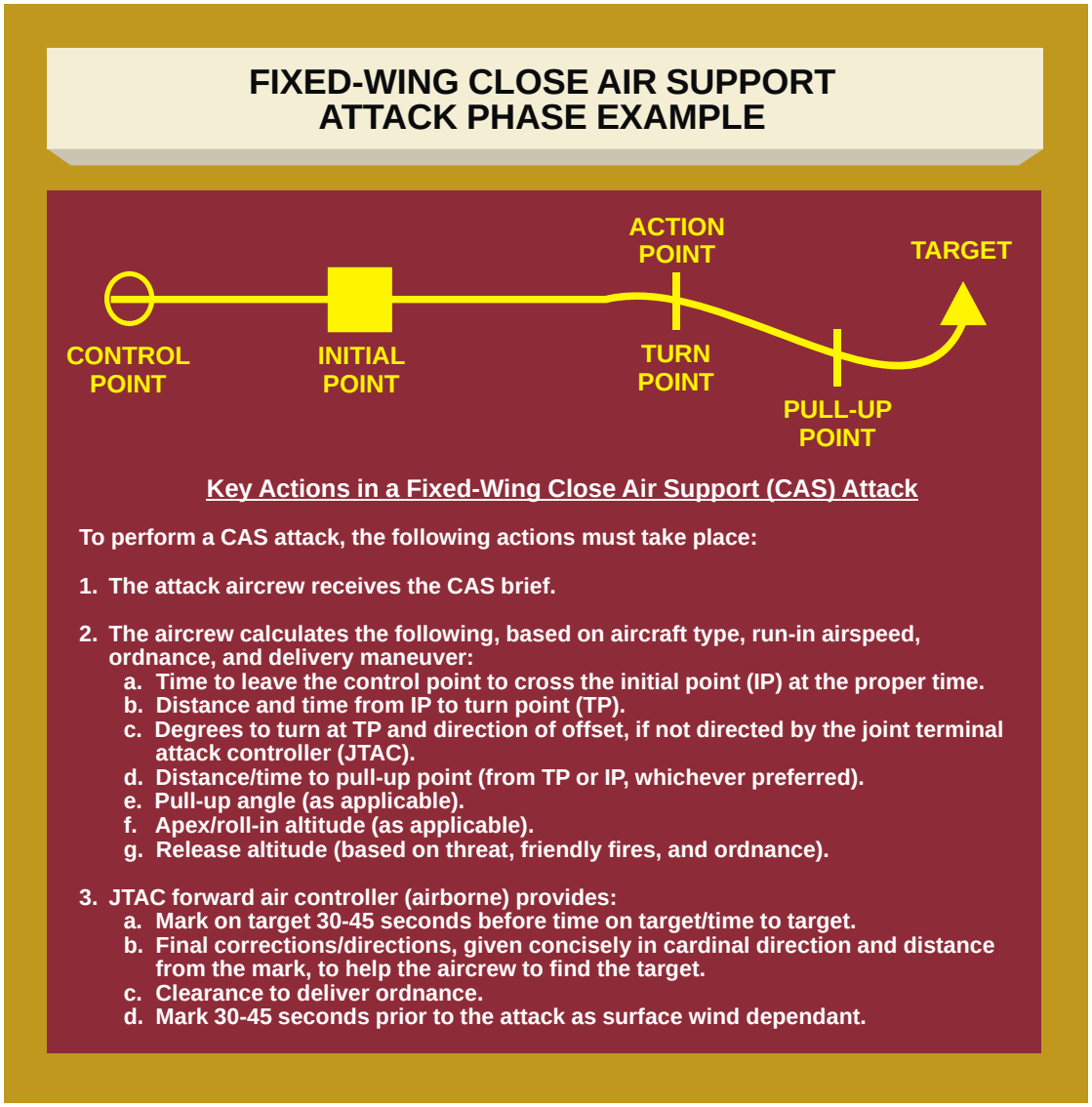


Figure V-18. Fixed-Wing Close Air Support Attack Phase Example

(e) **Types of Delivery:**

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

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

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

4. **Dive Deliveries.** Used for both free fall and forward firing ordnance. These deliveries typically use dive angles of 5 to 45 degrees.

(f) **Coordinated Attacks.** Coordinated attacks include multiple flights of aircraft using either combined or sectored tactics in conjunction with some type of deconfliction measure. The JTAC/FAC(A) must approve use of coordinated attacks. Coordinating flights for attacking the same target/target area can add firepower to the attack and help to split target defenses. An 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/FAC(A). While the OSC directs deconfliction between flights, the JTAC/FAC(A) is still the "owner" of the target area. While the JTAC/FAC(A) and aircrews must conduct the attack using a common frequency, the aircrews can use a separate frequency to conduct inter-flight coordination (e.g., ordnance deconfliction, timing between flight members). Figure V-18 shows the relationship between attacks and attack timing.

(g) **Type of Attack** (Figure V-19). 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 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/FAC(A) must approve reattacks (after coordination with the ground force commander).

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-19. Coordinated Attack Types

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

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

(i) **Immediate Reattacks.** The aircrew's goal is to complete a successful attack on the first pass. Reattacks may be required for the following reasons: multiple targets remaining in the target area; desired effects not created on first attack; and aircraft reconnaissance/BDA. JTAC/FAC(A) must authorize all reattacks. JTACs/FAC(A)s authorize reattacks after assessing the need for a reattack, aircraft vulnerability to enemy fire, and probability of success. The JTAC/FAC(A) may provide additional target marks for the reattack and can describe the target location using the last mark, last hit, terrain features, or friendly positions. The reattack may engage other targets within a specific target area. For any retargeting or attacks on alternate targets, controllers must ensure the affected sorties have appropriate munitions and fuzes on board. Additionally, controllers and pilots must ensure appropriate safe distances from friendly forces are considered for any new munitions and fuzes assigned. Due to the prevalence of mixed weapons loads, JTACs and aircrews must ensure follow on munitions used in immediate reattacks still meet the ground commander's intent and JTAC restrictions before expending ordnance.

(j) **Egress.** While operating in a high-threat or nonpermissive environment, the need for a rapid egress may delay the ability to rendezvous and regain mutual support. Egress instructions and rendezvous should avoid conflict with ingress routes and IPs of other flights. Egress instructions may be as detailed as ingress instructions. Egress fire support coordination and deconfliction requirements are the same as those used during

ingress. Upon attack completion, aircrews follow the egress instructions and either execute a reattack, return to a CP for further tasking, or return to base.

(k) **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 CAS Tactics**

(1) US Marine Corps attack helicopters operate as part of a MAGTF in general support or may be tasked in direct support of a unit of operation for a specific period of time. With this in mind, this section identifies some of the TTP attack helicopter aircrews can use to perform CAS.

(2) US Army attack helicopter units support maneuver commanders as a subordinate maneuver unit. They are given mission type orders and execute these orders as a unit. Nevertheless, US Army attack helicopter units will conduct attacks employing CAS TTP when operating in support of other forces.

ARMY ROTARY-WING ATTACK OPERATIONS

US Army describes close combat attack (CCA) as a hasty or deliberate attack by Army aircraft providing air-to-ground fires for friendly units engaged in close combat as part of the Army combined arms team. Due to the close proximity of friendly forces, detailed integration is required. Due to capabilities of the aircraft and the enhanced situational awareness of the aircrews, terminal control from ground units or controllers is not necessary. **CCA is not synonymous with close air support (CAS).**

The primary mission of US Army attack reconnaissance helicopter units are: (1) reconnaissance, (2) security, (3) attack, and (4) movement to contact. Attack/reconnaissance units conduct two basic types of attack CCA and interdiction attack. For further guidance on US Army helicopter operations and associated tactics, techniques, and procedures for CCA, refer to Field Manual (FM) 3-04.126, *Attack Reconnaissance Helicopter Operations*. FM 3-04.126 presents the close air support (CAS) check-in brief and 9-line, but there is no mention of the remaining CAS information to include the distinction on types of control, definition of troops in contact, risk, estimates, and etc.

(1) **Flight Composition.** Both US Army and USMC attack helicopters use the section as the basic flight element for general support operations. A section consists of two aircraft. Unlike FW aircraft, RW sections will often be a mix of aircraft types. For example, an Army mixed section might consist of an AH-64 and an OH-58, while in the

Marine Corps a mixed section will consist of an AH-1W and a UH-1N. Mixed sections provide the RW CAS element with the most flexible mix of sensors, communications capabilities, maneuverability, firepower, and mutual support.

(2) **Operating Altitudes.** The following are altitude ranges for RW aircraft:

(a) **High** - Above 3,000 ft AGL.

(b) **Medium** - 500 to 3,000 ft AGL.

(c) **Low** - Below 500 ft AGL.

(3) **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.

(4) **En Route Communications.** CAS planners must consider the threat environment and RW CAS TTP in use when planning for communications connectivity and support. Maintaining communications with RW CAS platforms is often difficult because their operating altitudes can hinder LOS connectivity. Every attempt should be made to overcome these shortcomings with an airborne C2 asset, ground relay nodes, tethered array, or some other method of extending low altitude communications coverage in order to maintain C2 of RW assets after launch.

(5) **En Route Tactics**

(a) **Purpose.** Ideally, en route tactics (route, altitude, and airspeed selection, terrain flight profile, and formations) allow attack helicopter aircrews to avoid concentrations of enemy air defenses, prevent early acquisition, avoid detection, or allow the attack helicopters to remain outside of the effective range of certain threat systems.

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

1. **Low Level.** Conduct low-level flight at a constant altitude (normally 100-200 ft AGL) and airspeed. Low level flight reduces or avoids enemy detection or observation.

2. **Contour. Contour flight conforms to the contour of the earth or vegetation to conceal aircraft from enemy observation or detection.** Aircrews use contour flight until reaching a higher threat area. Contour flight is normally conducted from 50-100 ft AGL.

3. **NOE.** NOE flight is as close to the earth's surface as vegetation and obstacles permit while following the earth's contours. Terrain and vegetation provide cover and concealment from enemy observation and detection. NOE flight uses varying airspeed and altitude AGL based on the terrain, weather, ambient light, and enemy situation.

4. **Dense Small Arms/Rocket Propelled Grenade (RPG) Threat.** In an environment where small arms and RPGs are the predominant threat, attack helicopter aircrews will normally elevate in order to stay out of the effective range of the weapons systems, usually operating at medium altitude. Specific altitudes selected will depend on the mission en route. For example, if the mission en route is to conduct visual reconnaissance, the helicopters will select the lowest altitude that will allow them to effectively use their sensors while avoiding the heart of the small-arms threat envelope. When transiting urban areas attack helicopters may elect to transit at roof top level to minimize exposure time. In general, attack helicopters will avoid urban areas unless they are conducting an attack

5. **Day versus Night.** Altitudes will normally vary for the same area of operations from day to night time, and will depend heavily on threat, weather, and terrain. In open desert, helicopters will normally decrease their altitude as lighting conditions decay in order to maintain visual reference with the ground. Over urban areas, attack helicopters can often operate more safely than during the daytime, but will elevate high enough to avoid being belly-lit by cultural lighting, usually operating in the 1,500-3,000 ft AGL block.

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

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

a. **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.

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

2. **Techniques of Movement.** Due to proximity to the threat, aircrews use TERF to move during ingress to the BP. If aircrews are close to friendly artillery and mortars, they use TERF in conjunction with ACMs to deconflict with artillery and mortar trajectories. Particularly when conducting terrain flight, helicopter movement must be coordinated with the applicable FC/FSCC. Aircrews use three techniques of movement: traveling, traveling overwatch, and bounding overwatch (see Figure V-20).

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.

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-20. Movement Techniques

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

3. **Communications and Control.** Flexibility allows a variety of communication and control procedures. However, TERF and techniques of movement may restrict the JTAC's/FAC(A)'s ability to communicate with low flying aircraft. Typically, communications may not be desirable during the ingress phase. To preserve operations security, aircrews can land to receive face-to-face mission briefs and mission-essential information from the supported commander or JTAC/FAC(A) before leaving the HA. An airborne relay may be used to maintain communications.

(d) **Attack Phase (Within the BP).** The attack phase is the most important phase of the attack helicopter mission. Figure V-21 illustrates an example of RW tactics during CAS attacks.

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

2. **Attack Tactics. Specific techniques used to attack a target are**

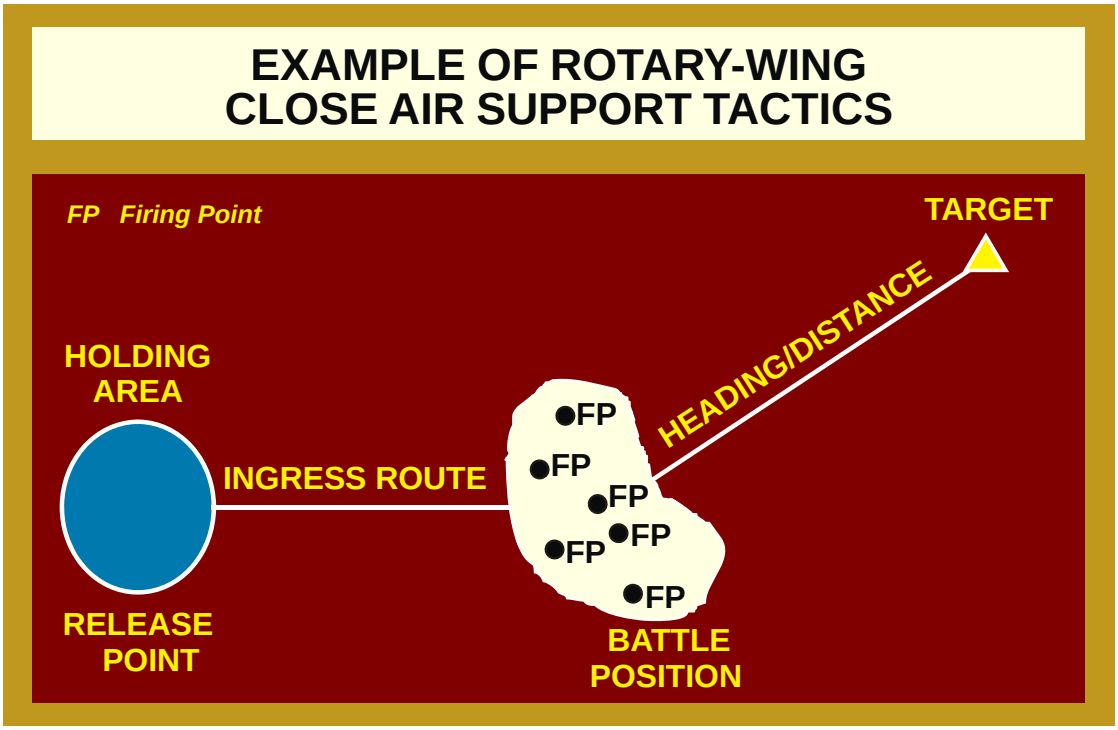


Figure V-21. Example of Rotary-Wing Close Air Support Tactics

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 or when standing off in a safe area. To prevent being targeted by enemy weapons, aircrews maintain the hovering fire position only for **short periods,** and deliver indirect hovering fire **hidden from the enemy** by terrain when able. After delivering hovering fire, aircrews **remask or displace.** Hovering fire is the most effective profile for delivering precision guided munitions. Hovering fire may reduce the accuracy of unguided ordnance (rockets, canon/gun fire) because the aircraft can be less stable in a hover. Often, a wingman will suppress the target with rocket and gunfire while the tactical lead fires PGMs to reduce the vulnerability of the flight.

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, and 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.** Using diving fire the aircrew can remain above or outside the threat envelope. Diving fire is often employed by attack helicopters operating in an overhead position. The overhead position allows the aircrew to maintain high SA, look down into urban settings, maintain a constant weapons solution, and deliver more accurate fires. The overhead pattern does leave the attack helicopters continuously exposed to enemy fire. The altitude of an overhead pattern will reduce vulnerability to small arms and RPGs, but increases tracking time and reduces background clutter for an IR SAM shot. Risk versus benefit must always be weighed by the aircrews when considering the overhead pattern.

(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.

(6) **Disengagement and Egress.** Following actions on the objective area or when the attack helicopters' time on station is complete, the flight will conduct a check out and egress via planned or assigned routing. Tactical considerations for the egress and return to force in terms of airspeed, altitude, formation, and TTP are the same as for the inbound en route phase. RW attack assets may use a FARP to refuel and rearm, extending their ability to provide support to the troops on the ground. When complete with the mission, the attack helicopter aircrew will make every attempt to provide BDA and a MISREP via the AO/ALO's C2 system. The connectivity plan for the low altitude block will enhance the flow of information from attack helicopters to decision makers allowing for timely decisions regarding follow on sorties and support required, as well as vital information flow on the enemy and friendly force situations.

6. Laser Guided and Inertial Aided Munitions Considerations

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

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

(1) **Basic Considerations.** There are five basic considerations for using LSTs or LGWs:

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

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

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

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

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

(5) **Laser designation operations** are divided into 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 or in some cases from the same or another aircraft. LSTs are laser sensors that provide heads up display cueing for aircraft equipped with these systems. While scanning for laser energy, these systems have a limited FOV that depends on range and switch settings. In general, the chances of acquisition are improved when cueing aids such as target marks, landmarks, and INS/GPS coordinates help the pilot point the 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, some at standoff distances.

(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 LGW 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/FAC(A)s 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 weapon delivery.

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

4. **HELLFIRE Employment considerations include**:

a. In the event the laser signal is lost after lock on, the missile seeker is programmed to begin searching for properly coded laser energy. The HELLFIRE system allows aircrews to engage targets designated by either air (buddy or autonomous, FW, or RW) or ground forces with in-flight selectable PRF codes.

b. The HELLFIRE can be employed in a lock-on before launch (LOBL) or lock-on after launch (LOAL) mode. In LOBL, the missile must acquire the laser energy prior to launch, requiring LOS to the target. In LOAL, the missile can be fired from defilade or behind a mask and climbs on a preprogrammed profile, searching for properly coded laser energy as it executes its fly-out. The trajectory of the missile can be altered by delaying laser designation.

c. The HELLFIRE missile uses last pulse logic in case of underspill and to protect the designator. The missile will hit the most distant laser spot within the seeker FOV.

d. The HELLFIRE is unimpeded by ceilings of 2,000 ft AGL and above. For employment under ceilings below 2,000 ft the aircrew will vary the missile mode, designator delay, and employment range to shape the trajectory. The rule of thumb minimum ceiling for HELLFIRE employment is 500 ft AGL.

(b) **Laser Target Designators.** Ground laser target designators (GLTDs) are employed by ground forces to illuminate targets with laser energy. LGWs use this energy to guide to the target. LSTs use the reflected laser energy as a reference point for lock-on and tracking. The laser energy PRF is adjustable and must match the PRF setting on the weapon or tracker. GLTD ranges vary from 10 meters to 20 km. Airborne laser target designators (ALTDs) are carried on aircraft and provide the same function as the

GLTD. ALTDs are capable of very long range lasing and are normally employed below 30,000 ft AGL. See Figure V-22 for advantages and disadvantages of airborne and ground designators.

AIRBORNE AND GROUND DESIGNATORS ADVANTAGES AND DISADVANTAGES

TYPE DESIGNATORS	ADVANTAGES	DISADVANTAGES
AIRBORNE	Increased Standoff Larger target area footprint	Larger laser spot size Increased susceptibility to podium effect
1. Trail Position	Increased probability of success (spot detection) Increased standoff	Axis restrictive Increased platform predictability
2. Overhead Wheel Position	Decreased platform predictability Good standoff	Decreased effectiveness in target areas with varying vertical developments (podium effect)
3. Offset or Opposing Wheel Position	Decreased platform predictability Excellent standoff	Axis restrictive Increased susceptibility to podium effect Coordination intensive
GROUND	Smaller laser spot size Decreased targeting ambiguity Rapid battle damage assessment	Axis restrictive Increased designator exposure Coordination intensive

Figure V-22. Airborne and Ground Designators Advantages and Disadvantages

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

(c) **Laser Range Finders/Target Locating Devices.** LRFs use low power laser pulses to measure range to an object. **As the ground range to the target increases, azimuth errors in digital magnetic compass systems reduce the probability of generating target coordinates that would permit a single IAM to hit a point target.** 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 TLEs. Due to the variables listed previously, TLE may vary from 10 meters at 1 km to more than 300 meters at maximum ranges.

(d) **Laser Spot Trackers.** LSTs are systems that allow acquisition of a coded laser designated target. LSTs must be set to the same code as the coded LTD for the user to see the target being lased. In the case of airborne LSTs, the aircrew 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 3-09.32, MCRP 3-16.6A, NTTP 3-09.2, AFTTP(I) 3-2.6 *JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower* for a listing of aircraft with LSTs.

(7) **Laser Procedures**

(a) **Final Attack Headings.** JTACs/FAC(A)s provide aircrews with an attack heading. The attack heading must allow aircrews to acquire the reflected laser energy. Due to the possibility of false target indications, final attack headings must avoid the 20-degree safety exclusion 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-23).

Note: The laser safety zone and optimal attack zone should be used when a ground LTD is used to either mark or designate a target to prevent the LST or weapon from guiding on the designator rather than the designated target.

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

(c) **Coordination with JTAC/FAC(A).** Laser-guided systems improve the delivery accuracy of unguided ordnance. If the attack aircraft has an LST, the JTAC/FAC(A) can designate the target for aircrew identification. An aircrew can use the LST to visually locate the target. Once the aircrew locates the target, they can conduct an accurate attack using unguided ordnance. Aircraft equipped with laser designators can also be "talked onto" the target by the JTAC/FAC(A), then self-designate the target and deliver the weapon or, in some cases, confirm the correct target with an airborne IR marker.

(d) **Employment of LGBs in conjunction with coded LTDs is either autonomous or assisted.** Autonomous LGB employment uses the CAS aircraft's onboard LTD for terminal weapons guidance. Most aircraft capable of delivering LGBs

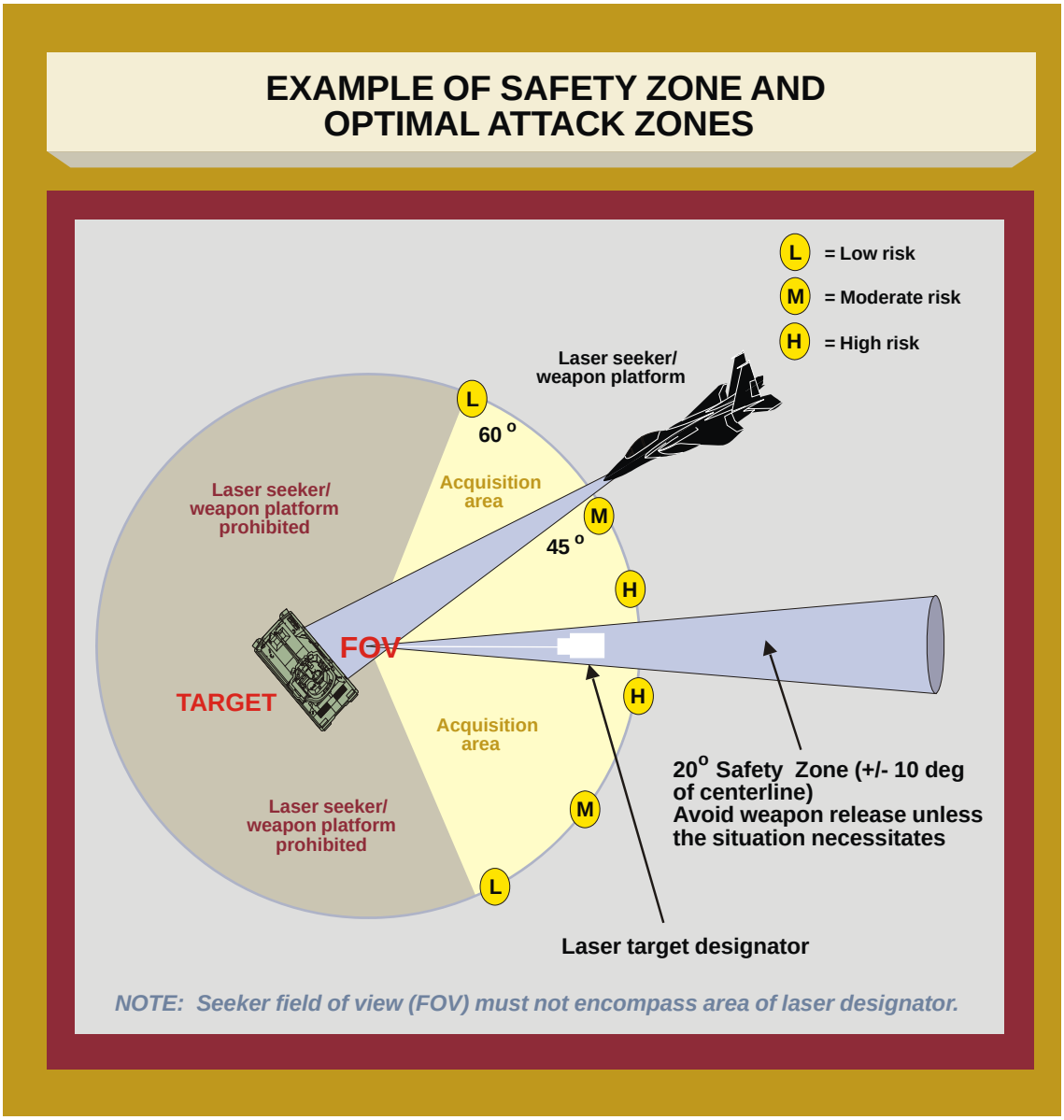


Figure V-23. Example of Safety Zone and Optimal Attack Zones

can provide on-board autonomous self-designation. Assisted LGB employment uses an off-board LTD for terminal weapons guidance. This is typically accomplished by a ground team operating a GLTD (such as a ground/vehicle laser locator designator), FAC(A), or another aircraft (known as "buddy lasing"). Aircraft without on-board ALTDs that can carry and deliver LGBs 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 LGWs. Second, they designate targets for coded LSTs. Coded LTDs emit laser energy with a PRF and require input of specific laser codes for operation. Codes are assigned to LGWs and directly relate to the PRF that harmonizes the designator and seeker interface. **Coded LTDs used for terminal weapons guidance must be set to the same code as the LGW.** Certain LGWs, such as LGBs, are coded

prior to takeoff and cannot be changed once the aircraft is airborne. However, all coded LTDs/FAC(A)s, with the exception of the AC-130H, can change codes while airborne (Note: The AC-130H's LTD is permanently preset with only one code (1688) and cannot be changed). The JTAC/FAC(A) will have to coordinate efforts to ensure both the aircraft and designator are on the same code. Coordination for the LTD to match the LGW code is conducted through the ATO, DASC/ASOC, or JTAC/FAC(A) 9-line briefing. Sometimes, a LTD will serve the dual purpose of target designation for a coded laser acquisition/spot tracker and terminal weapons guidance for LGWs. In these cases, the LTD, LST, and the LGW must have the same code. Laser codes are always passed as four-digits to avoid confusion. When briefing LST-equipped aircraft, include the four-digit laser code and LTL in accordance with the CAS briefing format. If aircraft check in with a different code, then it is the JTAC's/FAC(A)'s responsibility to make appropriate corrections. Even if the aircraft is capable of self-designation, the JTAC/FAC(A) should have a backup GLTD ready if it is available.

(e) **Laser Designation Time.** The aircrew may request a longer laser-on time based on munitions characteristics. If communications are unreliable, the JTAC/FAC(A) 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 LGM 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/FAC(A)/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/FAC(A)/designator.

(c) **Safety considerations.** See Figure V-24 for HELLFIRE designator exclusion zone.

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

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

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

2. **Remote.** The target is designated by an aircraft other than the launching aircraft, or by a remote ground based designator. This requires the designator to properly identify and lase the target because the aircrew may not see the target during this option. Remote designation allows the launching aircraft to fire from a masked

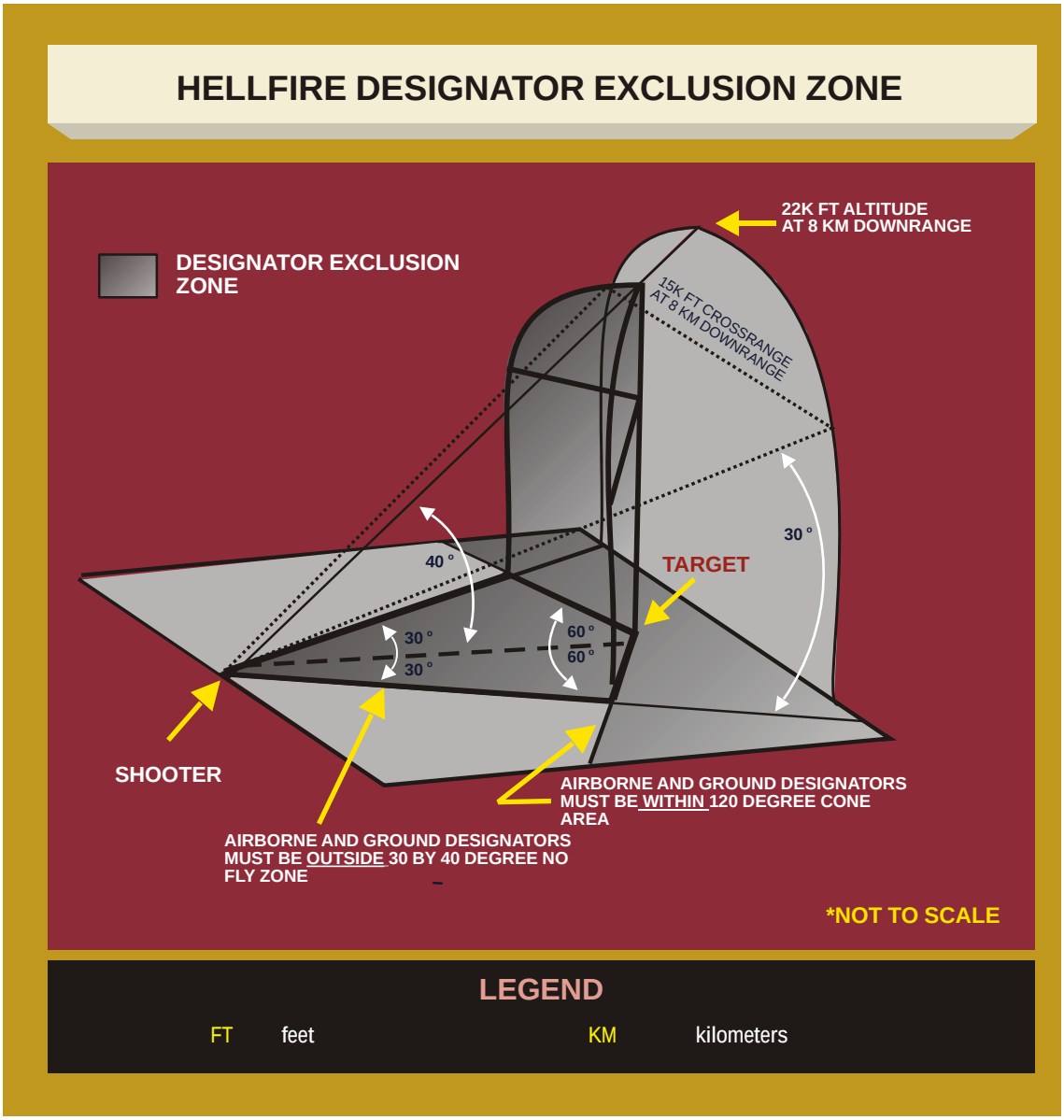


Figure V-24. HELLFIRE Designator Exclusion Zone

position, and with longer standoff than is possible with autonomous designation.

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

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

2. **LOAL** is when the missile seeker locks onto the coded laser energy after the missile is launched and is in flight. This method allows the aircrew to launch the missile without LOS to the target. This reduces the exposure of launch aircraft, helps defeat laser countermeasures by delaying the designation, and extends the missile range when using a remote designator. 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/FAC(A)/designator must be sure that subsequent missiles can receive reflected laser energy without interruption. Dust and smoke from initial missile detonations can block or interrupt reception of laser energy by follow-on missiles. The JTAC/FAC(A)/designator should consider wind speed and direction when selecting multiple targets. Multiple missile launches require close coordination and timing.

b. **Inertially-Aided Munitions.** These weapons rely on a self-contained GPS-aided INS, which guides the weapon from the release point to target coordinates regardless of weather, camouflage, or obscurants. Some IAM/GPS-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 preflight planning to achieve optimum accuracy depending on weapon type, mission, and etc.

(1) **Advantages**

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

(b) **Standoff.** These weapons can provide standoff capability at very long distances. Aircraft and aircrew can thereby effectively avoid any threat point defense weapons systems by employing these weapons.

(c) **All weather capability.** IAM/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'.

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

(2) **Limitations**

(a) **Moving Targets.** Single mode IAM/GPS weapons have no inherent capability against moving targets. These weapons fly to preprogrammed coordinates. If the target moves between the time it is targeted, and the weapon is released, the weapon will miss. Dual mode IAM/GPS weapons allow the munition to guide onto a pre-programmed coordinate, as well as receive follow-on guidance via a laser designator allowing the weapon to be effective against moving targets.

(b) **Location Error.** These weapons require extremely accurate target location in both the horizontal and vertical plane. Additionally, some weapons require sufficient time to acquire guidance information following release. If precise information is not available, the commander must be advised of the impact on accuracy and subsequent reduction in effectiveness. **(All CAS participants must ensure they are using the same maps, charts, data bases, and target materials with the same datum and/or grid reference system. WGS-84 is the Department-of-Defense-assumed standard unless stated otherwise in the SPINS.)**

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

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

(a) **Bomb on Coordinate.** Using this method, IAMs guide to a designated impact angle and azimuth over the coordinates entered into the munitions via the aircraft system. Aircrew will not adjust coordinates that are passed and input to the system for any reason. **Therefore, great care must be taken to ensure that the most accurate**

target location (i.e., lowest TLE) is obtained and correctly input into the weapon/system. The tactical scenario and commander's tactical risk assessment determine the acceptable TLE. Aircraft altitude and speed can yield significant standoff ranges (in excess of 10 nm). Therefore, it is necessary to deconflict high altitude/long range release profiles from other systems operating below the release altitudes. Significant issues exist when using weapons that transit over or around friendly forces using preprogrammed flight paths and impact points. Once released, these weapons may not be redirected.

(b) **Bomb on Target.** Some aircraft can deliver IAMs via self-derived targeting. Examples include FLIR, ATP, or radar. This method indicates that aircraft are employing an IAM based on a sensor or visually, as opposed to bombing on coordinate. It assumes that the aircrew is tally/has captured the JTAC's/FAC(A)'s intended target or aimpoint. TLE for a BOT delivery will depend on aircraft/sensor type

(c) **Visual.** Some aircraft can deliver IAMs via a visual mode. This delivery mode is advantageous in dynamic situations where accurate (low TLE) coordinates cannot be obtained. Although not as accurate as BOC with low TLE, these weapons are at least as accurate as unguided weapons when employed visually. Therefore, all normal methods of deconfliction and release restrictions apply. If an IAM is delivered visually, the coordinates do not have to be read back from the weapon/system.

Inertially aided munitions flight path geometry may not be predictable when using visual delivery methods

7. 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/FAC(A)s, AOs/ALOs, ground units, and aircrews **must routinely train together during these conditions.** In addition to training, limited visibility CAS relies heavily on systems and sensors due to pilot's limited ability to visually ascertain friendly positions and targets. Aircraft and JTACs/FAC(A)s can perform night CAS using artificial illumination or with NVDs. Specific attack and delivery techniques vary depending on the amount of illumination, the specific capability of the CAS aircraft, and equipment available to the JTAC/FAC(A). For these reasons, limited visibility operations require additional coordination and equipment. **There are three general categories of limited visibility employment: visual, system-aided, and NVD.**

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

(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) **Rapidly changing ambient lighting conditions (dusk/dawn).** At dawn and dusk, controllers and aircrew must adapt to rapidly changing light conditions, and visual acuity limitations when transitioning from NVDs to optical vision (or vice versa). Therefore, use all available means to ensure correct target identification. These means include, but are not limited to referencing significant terrain features, using external marks such as smoke or illumination rounds, and employing targeting pods and/or other on-board sensors and navigation systems. If necessary, controllers and

aircrew may need to alter attack geometry or change timing to mitigate the negative effects of increasing or decreasing ambient light conditions.

(f) **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. FM 3-09.32, MCRP 3-16.6A, NTTP 3-09.2, AFTTP(I) 3-2.6, *JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower* 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 4 minutes.

3. **LUU-19** is a covert illumination flare designed to illuminate while airborne for approximately 8 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. M-278s are similar to M-257s but provide IR illumination. The M-278 IR flare is used to provide target illumination capability when using night vision goggles (NVGs) and FLIR aircraft equipment. The M-278 produces light output of 700 candlepower for approximately 3 minutes. The warhead is similar in function to the M-257 and is employed in the same manner.

(g) **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/FAC(A)s 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.

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

(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 HE/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. However, IR illumination rounds may be available for use by the firing element. 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 detectable even in the absence of fire. This is usable as a mark for a short period of time and can also be used for adjustments.

(b) **Ground Unit IR Marking Devices.** The effective range of ground marking devices (like ground commander's pointer and IR zoom laser illuminator/designator) will vary depending on their power and the amount of illumination that is present. Depending on environmental conditions, the entire IR beam or just a flashlight-type spot around the target may be seen. High illumination levels will decrease the effectiveness of IR marks but will not negate them completely. 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.

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

(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 should be visible to both aircrew and ground personnel 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/FAC(A)'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/**FAC(A)'s** position

(the nonmoving end of the pointer). Again, it is necessary for the JTAC/FAC(A) 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/FAC[A]) 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.

3. **GLINT Tape.** Ground forces with GLINT tape may be seen by the SOF gunship 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 for ground based IR marking devices for a BOT employment.** Anytime IR pointers are employed by ground forces, attacking aircrew will call 'VISUAL' and 'CONTACT MARK' in conjunction with either 'TALLY Target' or 'CONTACT SPARKLE' on each and every pass/attack prior to receiving clearance. In either case, this communications brevity indicates CAS aircrews have distinguished the source end (friendly) from the target end (enemy) of the mark. Depending on environmental conditions, degree of camouflage, and aircraft profile, aircrews may not be able to visually acquire the actual target. In this case, a 'CONTACT SPARKLE' call may be made.

(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.

(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.

8. Terrain Considerations

Terrain must be taken into consideration for CAS execution. Specifically, terrain can affect 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 nonconductive 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. There may also be a significant delay before smoke breeches thick canopy cover and is visible to aircraft. Ground-burst artillery illumination flares may be effective in this type of terrain. FAC(A) aircraft that can remain on station may aid the targeting process due to their increased SA.

(b) **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 denser. 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 Considerations.** The compressed urban environment creates unique considerations for planning and conducting CAS operations. These include operations in urban canyons, deconfliction in confined airspace, restrictive ROE, difficulty in threat analysis, the presence of noncombatants, the potential for collateral damage, and the increased risk of 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. FW aircraft require a minimum of 10 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. RW aircraft should be given a safe sector or area to hold so they can roam in order to remain less predictable and maneuver to adjust for attack timing and geometry as

required. Every attempt should be made to hold the awaiting CAS aircrew over nonhostile terrain to allow the aircrew to build SA without having to be overly concerned with the threat.

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

(c) **JTAC/FAC(A) Considerations.** Recommended items for a JTAC/FAC(A) include NVDs, an IR pointer, LRF, LTD, IR strobe light, IR and visible chemlights, spotting scope, multiband radio, pyrotechnics (smoke/illumination), GLINT tape, access to an M203 grenade launcher with illumination and smoke rounds, compass, mirror, common objective graphics, and GPS. The JTAC/FAC(A) must plan for redundant communication and marking tools. A single tool will not work in all urban environments. A JTAC/FAC(A) will only be able to utilize a GLTD when in a stationary position and preferably from an elevated position. In brightly lit objective areas, a JTAC/FAC(A) 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/FAC(A) proficiency with CAS is critical in order to step into an urban environment with no previous urban training. A JTAC/FAC(A) 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. Training in an urban environment is required for JTAC/FAC(A) and aircrew proficiency. However, the critical link between the aircrew and the commander for urban CAS is the JTAC/FAC(A). The JTAC/FAC(A) must provide an extraordinary level of detail in the CAS remarks section of the brief working from big to small features (funnel approach). If not, then the pilots must pull details from the JTAC/FAC(A). The "big" portion of the talk-on brief can be eliminated if the JTAC/FAC(A) can mark either his position or the target location visually or electronically with an IR pointer, GPS grid, or with reference to a GRG, for example. Even if a ground JTAC/FAC(A) cannot see the target, TAC hand-off to a FAC(A) can be done. The JTAC/FAC(A) must always keep in mind that his ground perspective is drastically different from the attacking aircraft's. The JTAC/FAC(A) may not be in a position to observe all buildings containing friendly

forces due to intervening buildings and battlefield confusion. It's likely that a JTAC/FAC(A) will be marking and engaging targets within 100 meters of his own or friendly positions, within Danger Close parameters. **Historical studies prove that 90 percent of all urban engagements occur where friendly and enemy forces are within 50 meters of each other, and that urban engagements using supporting arms occur with less than 250 meters between the same. The JTAC/FAC(A) must select the appropriate ordnance to limit the potential of fratricide, particularly in an urban environment.** The JTAC/FAC(A) 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. JTACs will request FAC(A)s or CAS aircrew 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. RW 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, FW aircraft can be used to overfly the unit's position and reconnoiter adjacent threat avenues leading into the JTAC's/FAC(A)'s location. The commander must decide when organic/attached ground weapons are insufficient for the mission, and CAS is required. JTACs/FAC(A)s will judiciously use FW ordnance when troops are in contact, due to fragment and overpressure dangers. Historically, 80 percent of urban combat injuries result from glass shards from blast and overpressure. JTACs may use FAC(A)s or CAS aircraft to reconnoiter and attack enemy forces outside the area of immediate engagement in order to prevent further reinforcement. If the distance between enemy and friendly forces is too close for the JTAC/FAC(A) to use CAS, or the target is not suitable for the CAS ordnance, CAS aircrew should provide reconnaissance and assist the JTAC/FAC(A) in assessing the overall situation. This is most useful for identifying enemy reinforcements or directing friendly reinforcements.

2. **Navigation.** Navigation over urban terrain can be more difficult than over natural terrain. **Navigation is more difficult because maps do not show the vertical development of urban terrain.** Rapid movement from position to position can often create confusion between aerial and ground observers as to friendly and enemy locations. Familiarity with the characteristics of urban terrain allows aircrews to discern key features in this environment. Navigational aids, such as GPS, have reduced but not eliminated this challenge. The use of the GRG, GPS, and handheld pointers or designators eases the problems associated with night navigation, orientation, and target identification. Navigation systems may be degraded due to interference induced by buildings. 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. If appropriate, aircrew and JTACs/FAC(A)s should ensure that the maps and other geospatial products used incorporate the MGRS during pre-mission planning for CAS.

3. **Gridded Reference Graphic/Urban Grid System.** A GRG (often referred to as an urban grid system) labels structures and prominent features (see Figures V-25, V-26, and V-27). It is the responsibility of the ground unit that owns a particular operational area to produce GRGs for that area, ensure dissemination to subordinate, adjacent, and higher echelons, and maintain version control on the products as they are updated or revised. **The developing unit should consider selecting grid sectors based on what the aircrew/aircraft sensors can most easily see such as rivers, road junctions, buildings, bridges, and etc.** The developing unit 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 FW and RW aircrews when sorting through numerous pages of a map attempting to find a specific building. For example, (Figure V-25) starting with the northwestern section of the zone and continuing clockwise, immediate structures surrounding the zone will be labeled Al, A2, A3, and etc. City streets, alleys, and other easily recognizable topographic features 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.

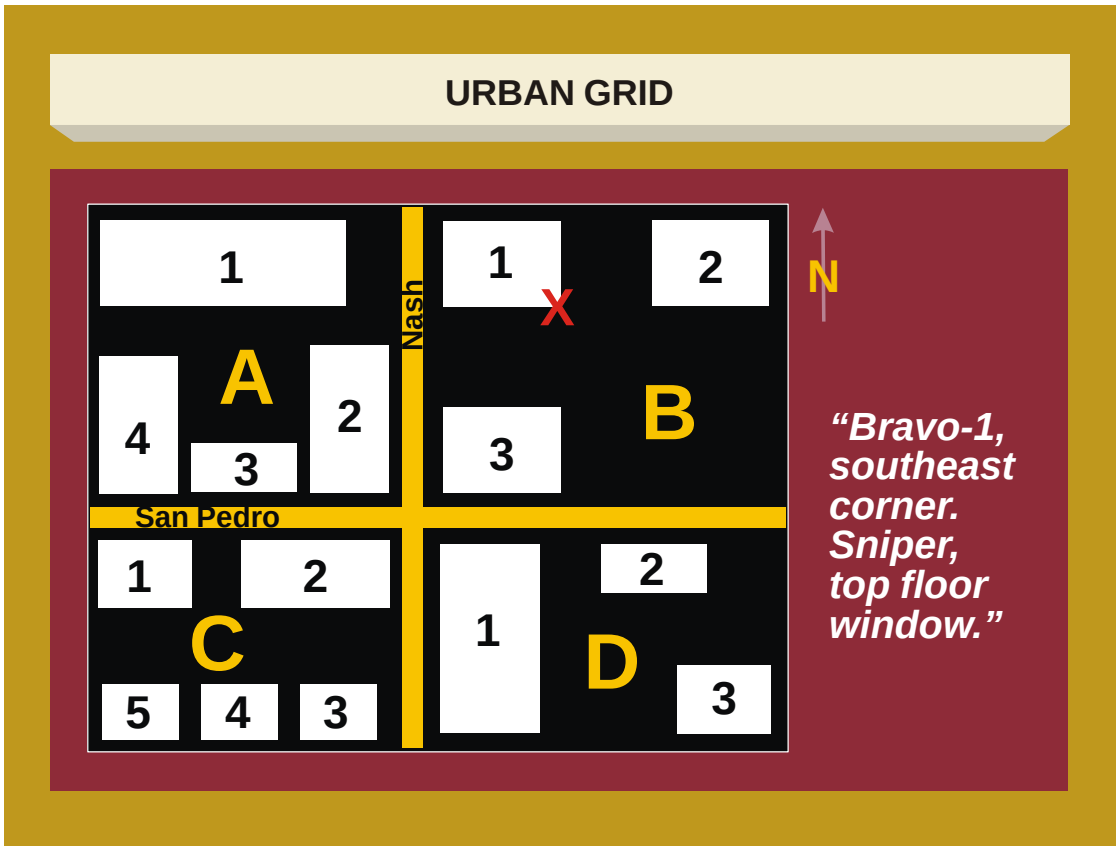


Figure V-25. Urban Grid

4. **Target reference points (TRPs)** (Figure V-28) can also be used. TRPs require labeling buildings or distinctive urban structures in and around the

objective area. These can be labeled TRP#1, TRP#2, and etc. TRPs should be committed to memory by JTAC/FAC(A) and aircrew to expedite passing or interpreting a call for fire. If fire is being received, pass a TRP number, heading, approximate distance and description of where and what type of fire is being received.

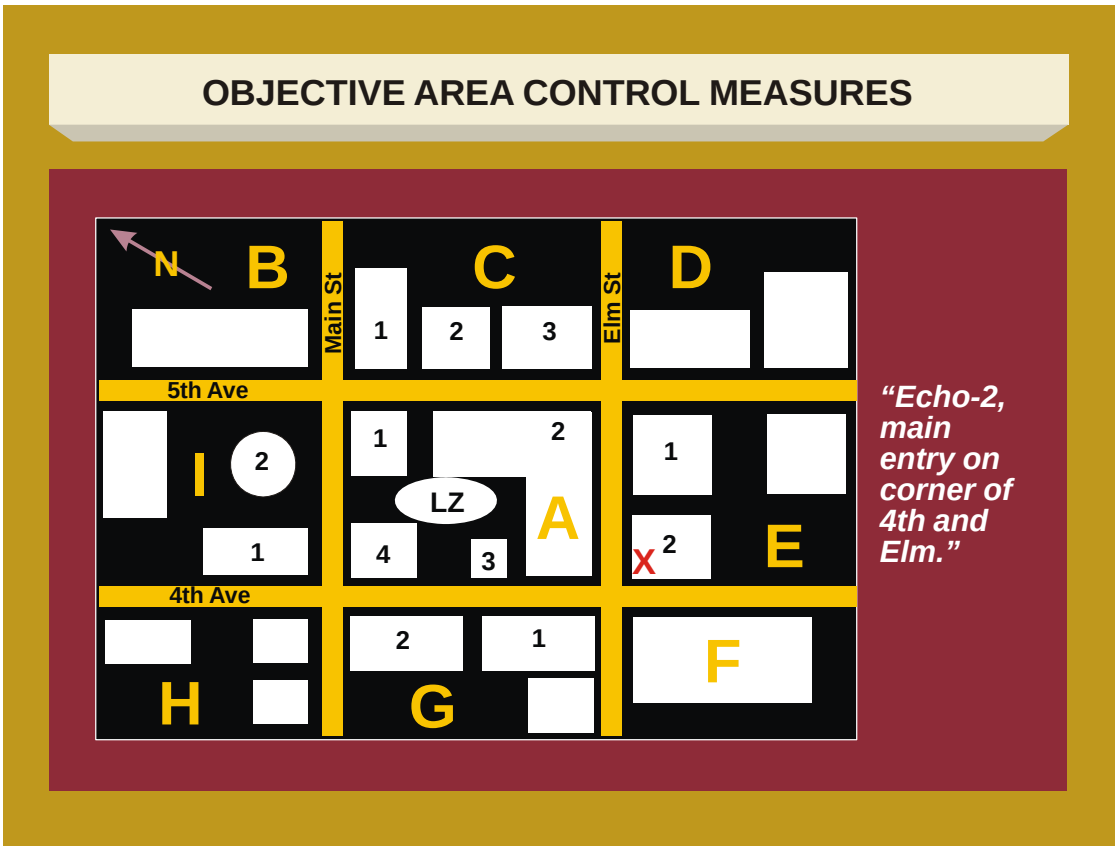


Figure V-26. Objective Area Control Measures

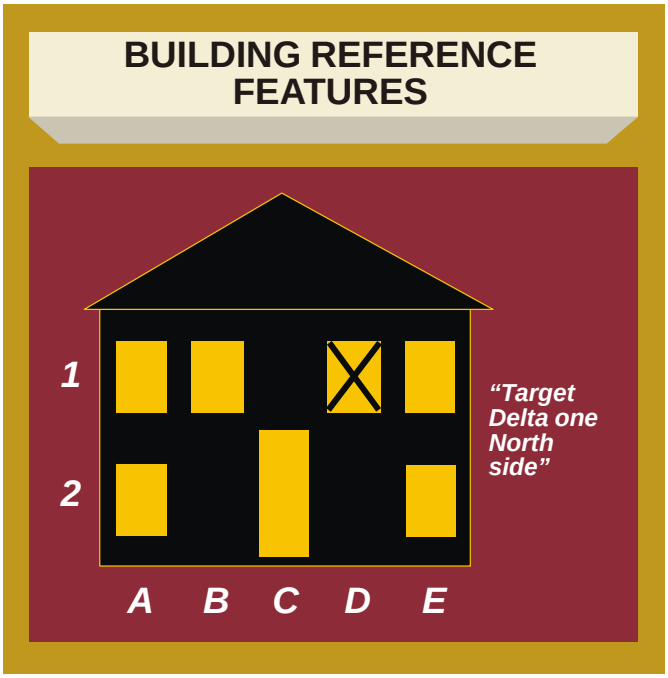


Figure V-27. Building Reference Features

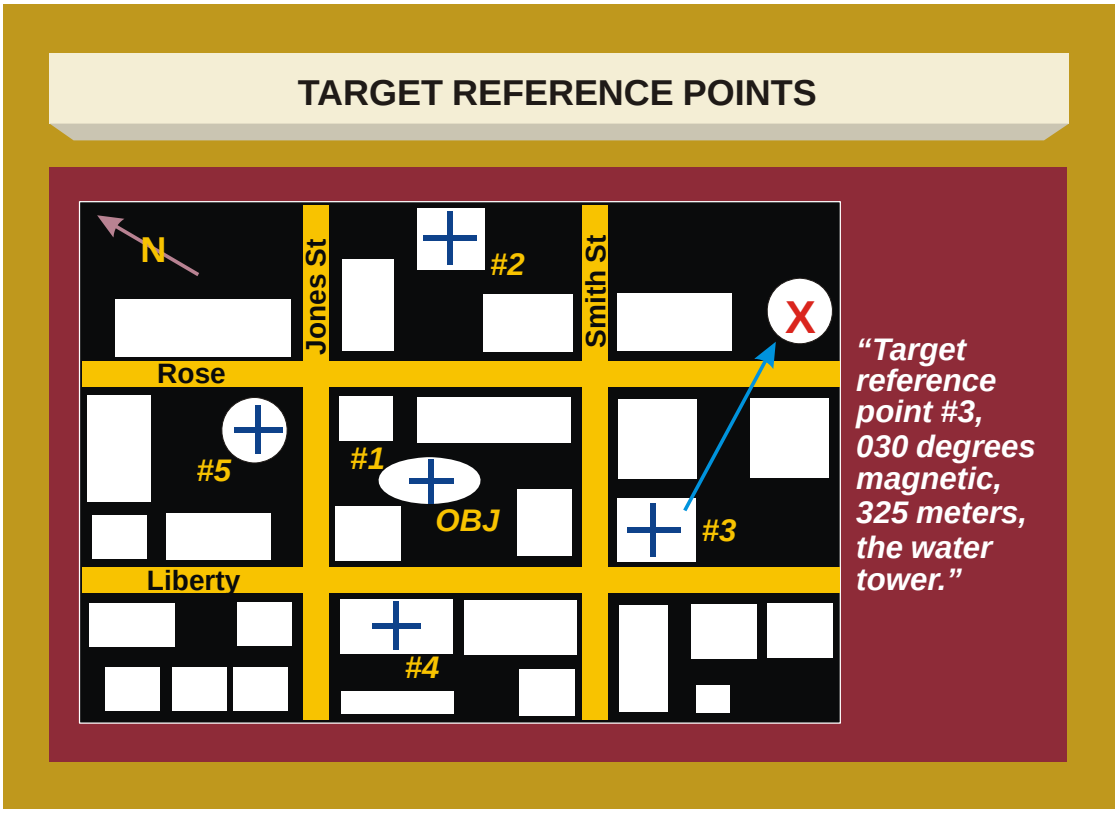
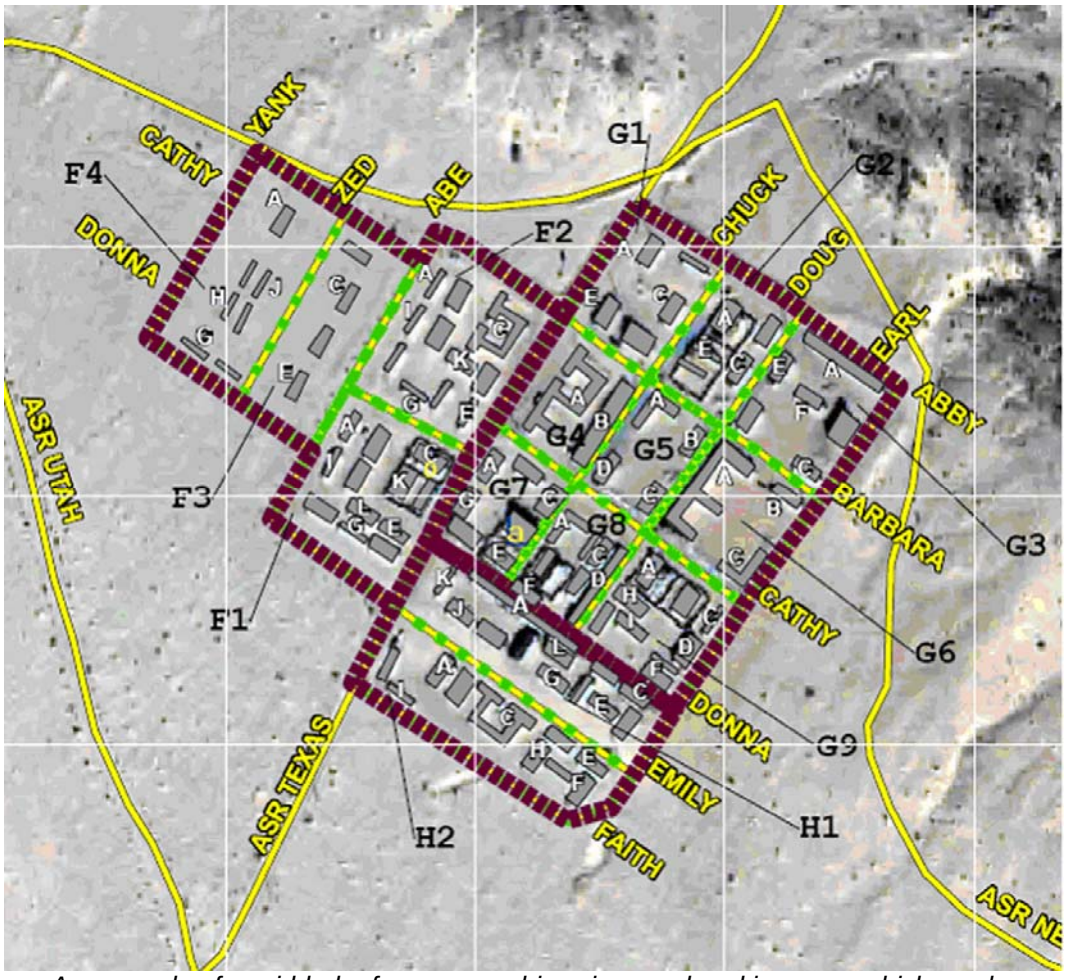


Figure V-28. Target Reference Points

5. **Urban Talk-On.** Due to the uncertainty of urban warfare, it is possible to receive fire from a position that cannot be covered by one of the sectoring methods discussed. Use the CAS 9-line brief. The brief must ensure critical information is passed between concerned participants. Describing the target location as it relates to surrounding structures is essential. Plain language descriptions will greatly assist the CAS aircrew in locating the target. Describing building color, type of roofing, window structure, and etc., as it relates to surrounding structures, can greatly assist aircrew in locating the correct target. However, do not proceed with a talk-on without establishing a common reference point for both the JTAC/FAC(A) and aircrew. 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 a GRG (urban grid) system will only be effective if all players utilize it.** If the supported unit uses one system and CAS aircrew have their own, it will make coordination of CAS difficult. 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, reconnaissance and surveillance teams, intelligence section, TACPs, and all assets, including artillery, mortars, and RW and FW aircraft. The use of TRPs or a GRG (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/FAC(A)s should select the most prominent structure nearby for initial orientation between themselves and the aircrew. The time to pass a brief and then pass talk-on type remarks will decrease as the level of pre-mission planning increases. 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.



An example of a gridded reference graphic using overhead imagery, which can be layer-labeled (as shown) and further expanded to show details.

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 environments.

7. **Weapons Selection. The requirements for weapons in the urban environment 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

civilians, 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 and fuzing 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, IAMs, 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. The type of fuzing to best destroy a CAS-type target is also critical to weapon selection. This is extremely critical when diverting sorties from a different kind of mission or target. For example, antipersonnel targets require air bursts while underground targets require delayed bursts. Either would be ineffective against the other.

9. Digital Information Systems and Video Downlink Considerations

a. **Digitally Aided CAS.** Digital systems in aircraft and ground based JTAC kits provide several benefits which aide in the conduct of CAS planning and execution.

(1) Some of the advantages of digital systems include automation, speed, and communications accuracy. Increased SA may also be possible when friendly and opposing force information is displayed on user systems. Digital systems may also improve C2 of CAS by providing machine-to-machine tasking and information exchange between joint fires support systems and JTACs/FAC(A)s. When digital systems receive and display aircraft information such as sensor point of interest, designated ground target, or aircraft position and target designation targeting efficiencies may result. Aircraft targeting and sensor data displayed on JTACs' situation displays can also help reduce the potential for fratricide and expedite the employment of weapons.

(2) Some disadvantages of digital communications include truncation and data input errors, increased coordination to ensure interoperability, and increased workload in certain situation. Workload can be increased in a visual environment when information must be typed or read versus voice communications while having to maintain eyes on sensors, targets, or ground threats.

b. Communication of digital CAS information occurs primarily by modem-based messages and/or data links and, increasingly, airborne IP networks. One modem-based message protocol is the variable message format (VMF) found in F/A-18, A-10C, and some B-52H aircraft. VMF provides the most extensive digital information exchange between similarly capable platforms and ground based terminal attack controller kits. Other modem-based communications protocols are the Air Force Application Program and Development message set employed by USAF F-16s and the Marine Tactical System currently in use by USMC AV-8Bs. While these different protocols limit pure machine

to machine exchange of data between different aircraft types, JTAC kit software provides varying degrees of interoperability for a variety of protocol messages.

(1) The two most common data links in use by US FW aircraft are Link 16 and situation awareness data link (SADL). JTACs with access to Link 16 and SADL C2 nodes are able to place land tracks reflecting hostile, friendly, and other points of interest on data links. Doing so allows link capable C2 elements and aircraft to view the information published and expedite the target acquisition process. In some cases, this enables C2 elements and TACPs with data link access to provide SA information to CAS aircraft well before they establish voice communications with the terminal attack controller.

(2) Each communication protocol, modem-based and data link has advantages and disadvantages. Modem-based communications are LOS and normally limited to the JTAC and the aircraft executing the mission. Data links are non-nodal, allowing all participants on the link to view the information placed on it. Whereas modem-based communications are two-way and allow for a greater exchange of information, data links provide increased SA to more participants but are currently limited in the extent of information exchanged between CAS aircraft and the JTAC.

(3) Given the varied communication capabilities of CAS aircraft, digitally aided CAS will seldom be applied in the same manner and to the same extent for all participants. Voice communications will continue to be used to fill-in gaps where digital information exchange is limited or nonexistent. This mixed bag of digital and voice capabilities presents a challenge for FAC(A)s and JTACs and should be addressed during the planning phase of operations.

c. Digitally aided CAS requires particular attention to the setup of digital systems. JTACs must be aware of aircraft capabilities and their JTAC system's communication prerequisites to enable the timely and effective use of digital communications. Not all aircraft or JTAC systems have the same setup requirements for digital communications. Thus, it is important that air and ground system operators understand their digital communication requirements and be prepared to provide that information to others. When practical, the ASOC/DASC should include in the JTAR approval the supporting CAS aircrafts' parameters for digital communication.

d. Digitally aided CAS systems are not yet fully mature and continue to evolve. Tools like digital messaging, image exchange, and FMV help increase participants SA but do not replace the need for the verbal give and take that typically completes the tactical situation picture developed by aircrew and JTACs. Where practical, CAS aircrews and JTACs should capitalize on data link capabilities and the increased SA that their use may bring to a tactical situation. In some situations, most often driven by gateway availability, the use of data link (Link 16/SADL) land tracks as "electronic marks" may expedite the target acquisition process. When using land tracks aircrew and JTACs must familiarize themselves with potential system inaccuracies. CAS participants should also use established brevity terms to indicate the transmission and receipt of

digital data. The proper use of brevity terms may reduce the incidence of voice transmissions interfering with digital communications. Brevity terms are also useful when working with a mixed force of digital and non-digital CAS aircraft. Using brevity terms clues non-digital players on when to remain silent so as not to impede data transfer.

e. **VDL Systems.** VDL systems provide FMV downlink to the ground units for CAS execution. In CAS, VDLs are used to build aircrew and JTAC SA, provide precise coordination, target verification, fratricide reduction, collateral damage mitigation, and real time BDA. VDL systems enhance, but do not change standard CAS procedures. FMV feeds should not be used as a single-source target identification method.

(1) Units planning to use VDL need to ensure desired downlink frequencies are on the joint restricted frequency list. When multiple VDL transmitters are operating within an area, deconflict frequencies between transmitters to reduce mutual interference. In multiple aircraft flights, attempt to keep the VDL transmitter on and set to a constant frequency with the ground station switching frequencies to view desired FMV from the VDL platform. This provides a quicker handshake than turning the VDL transmitter on/off.

(2) Aircraft check-in: Aircraft identify themselves as VDL capable and confirm downlink frequency with the operator.

(3) Aircraft holding pattern: Maximize visibility of the target area while minimizing LOS loss between the VDL transmit antenna and the ground station. Minimizing aircraft maneuvering and maximizing wings level time during the hold, will increase successful video reception. Consider orienting the holding pattern so the sensor is viewing the target from the same axis as the operator. This will enhance operator scene interpretation of the FMV and increase talk-on effectiveness.

(4) Talk-ons to specific targets start with the aircrew slewing their sensor to target coordinates passed by the operator. The talk-on should begin and end with the sensors in a wide enough FOV to allow the confirmation of the correct target area. Features directly surrounding the target must be confirmed to ensure proper target correlation and to mitigate collateral damage and fratricide prevention. Operators should develop SA by initially viewing the target area through the sensor in wide FOV, then through narrow FOV, following a “big to small” progression. Once the target is acquired and identified, the sensor may be returned to a wider FOV as a confirmation method.

(5) The operator or aircrew will establish a unit of measure for the talk-on. Avoid using the full screen width or length as a unit measure. Using one-half screen measure allows viewing of previous references when the sensor is slewed or the FOV is changed. Movement directions based on the FMV display (up, down, left, right) are most effective. Most sensors display a reference for North, but this reference should only be used as a SA tool.

(6) Despite time delays of the FMV feed, operators should initially attempt a running dialog. When the aircrew completes slewing the crosshairs to the directed point, they will respond with the brevity term "SET." This technique, deliberately stepping to each point with challenge and response, avoids issues with FMV delays to the display. When the operator identifies the target in the FMV, they should point out the target using descriptive features of the target itself.

(7) Once the aircrew identifies the target they should slew the sensor to place the target directly under the center of the crosshairs. Once complete, the aircrew will state "SET, CAPTURED" with any additional confirmatory communications. Operator verifies the correct target is under the crosshairs and responds with "CAPTURE."

(8) Ground references. The operator directs the aircrew to follow an identified reference until they get to a specific object or point.

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

(10) VDL Limitations. Continuous FMV between an airborne platform and a ground station is rare. Operators must be able to identify when the feed is lost and communicate that to the aircrew with the brevity term "HOLLOW." In addition, aircrew should communicate to operators when they anticipate the feed to be lost due to aircraft maneuvers with the brevity term "EXPECT HOLLOW." Operators can identify loss of FMV by monitoring the clock display on video feed. When the image freezes or the clock stops, reception has been lost. Operators should anticipate a loss of reception during target attacks and aircraft threat reactions. Coordinates displayed on the FMV will have varying degrees of accuracy based on platform and sensor type. Operators should query aircrew for coordinate accuracy prior to using those coordinates for targeting purposes.

VIDEO DOWNLINK BREVITY TERMS

CHECK CAPTURE - Target appears to be no longer tracked by sensor.

CHECK FOCUS - Sensor image appears to be out of focus.

DECLUTTER - Minimize on-screen graphics to prevent an object of interest from being obscured. For sensors with multi-level declutter capability, indicate as Level 1, 2, 3, etc.

HANDSHAKE - Full motion video signal and data operative.

HOLLOW - Lost full motion video signal and/or data.

EXPECT HOLLOW - A condition will likely exist that limits reception (maneuvers, terrain, etc.).

SET - No longer slewing sensor and awaiting further updates.

SHADOW - Follow indicated target.

STAKE - A full motion video system mark has been set and is used as a frame of reference.

STARE (w/laser code and reference point) - Directive call to cue the targeting pod and enable the laser spot search function on the specified laser code in relation to the specified reference point. Reference point may include the following: inertial navigation system steerpoint, geographic reference, bearing and range, data link point, or laser mark.

SWITCH (item)-Switch the setting on the referenced item.

SWITCH FIELD OF VIEW (FOV) - Switch FOV between wide FOV and narrow FOV.

SWITCH CAMERA - Switch full motion video to electro-optical or infrared (IR).

SWITCH POLARITY - Switch IR polarity to black hot or white hot.

ZOOM - Increase/decrease the sensor's focal strength.

NOTE: ZOOM IN/OUT is normally followed by "ONE, TWO, THREE, or FOUR" to indicate the number of FOVs to change.

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

The SOF gunship is a uniquely capable CAS platform. Due to the precision fires, control system and sensor capabilities, ground SA, and flight profile the SOF gunship does not require a Type of control, "Cleared Hot," "Cleared to Engage," or a JTAC/FAC(A) to control their fires. The SOF gunship uses the call for fire in Figure V-28 as its standard format, but is able to accept a 9-line when pre-coordinated. If JTAC/FAC(A) is on scene, the SOF gunship will work directly with them. This section covers the TTP used by ground maneuver units and the SOF gunship aircrews.

a. **SOF Gunship En Route Tactics.** Commanders should adjust these procedures as the combat situation develops.

(1) **Sensor Alignment/Wet Boresight.** The SOF gunship should complete airborne sensor alignment and wet boresight (test fire) procedures prior to any mission. Only under extreme circumstances will a 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. SOF gunship 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 SOF gunship'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 SOF gunship aircrew will make every effort to establish radio contact while en route to speed acquisition of the tactical situation and authenticate the JTAC/FAC(A) or ground party if no JTAC/FAC(A) is on scene.

(5) **SOF gunship Call For Fire.** SOF gunship aircrews use the SOF gunship Call for Fire (see Figures V-29 and V-30). In addition to the standard briefing items, the following items are mandatory for SOF gunships: a detailed threat description, marking of friendly locations, identifiable ground features, and the ground commander's willingness to accept "danger close." Because the SOF gunship is capable of extended loiter, SOF gunship crews can work a series of targets with a single ground party. In these cases, the Call for Fire briefing format can be abbreviated but must include: magnetic bearing and range to the target in meters from the friendly position to the target; and a brief description of the target.

Because of extended loiter, special operations force gunship crews can work a series of targets with a single ground party.

Figure V-29. Special Operations Forces Gunship Call for Fire

b. **Attack Phase**

(1) **Capabilities.** The SOF gunship can provide accurate fire support to ground units for extended periods of time during the hours of darkness. It uses multiple sensors to maintain SA on ground scheme of maneuver. Both –H and –U variants have "through the weather" engagement capability.

(2) **Locating Friendly Positions.** Normally, the first consideration in the attack phase is to identify the friendly position. Various aids may be used by friendly ground forces to expedite acquisition (e.g., strobe lights, flares, GLINT tape). In addition, there are several electronic beacons that may be used to assist in locating friendly forces. The

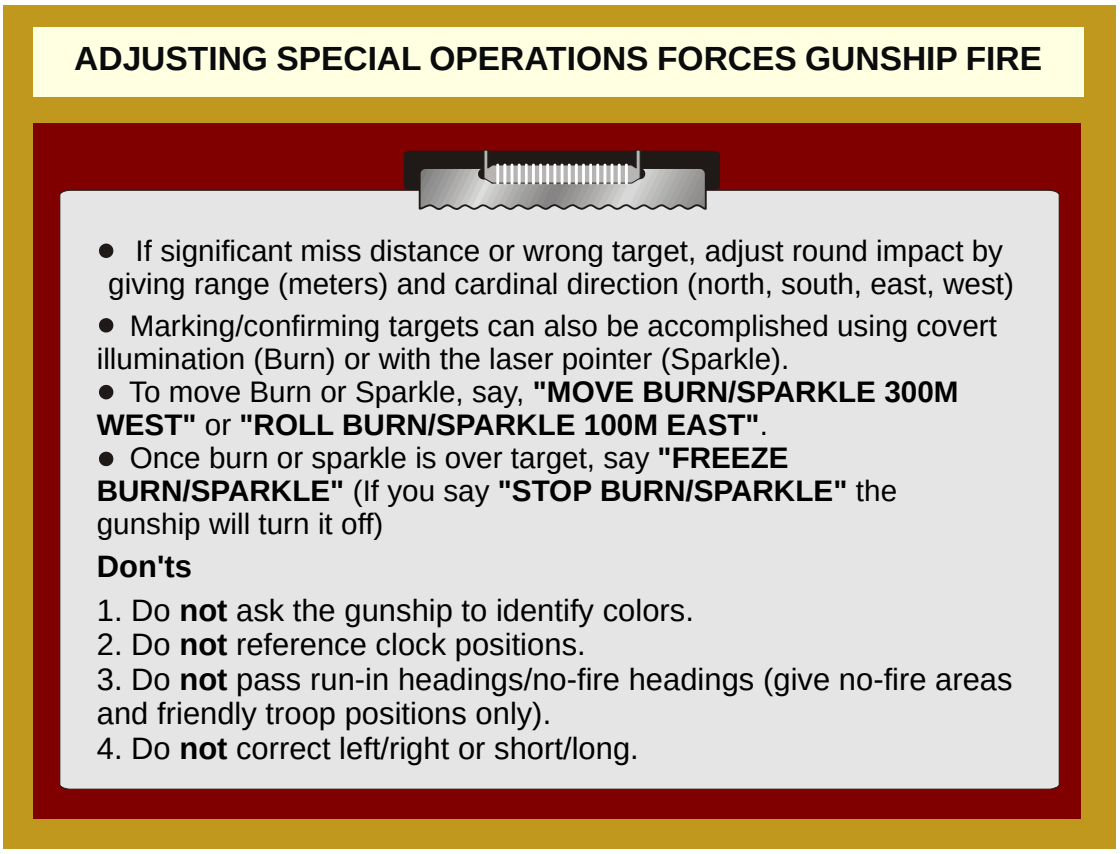


Figure V-30. Adjusting Special Operations Forces Gunship Fire

SOF gunship crew will maintain radio contact with the ground forces at all times during firing.

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

(a) **Terrain Features.** Firing down an incline can cause considerable miss distances.

(b) **Burst Pattern.** Consider the lethal areas of fragmentation for the various types of ordnance (105mm, 40mm, 25mm).

(c) Due to the combination of precision and low-yield munitions employed by this platform, ground forces may minimize the risk of injury by taking cover in a danger close situation.

(4) **Parameters for Attacking the Target.** The **type of target**, its **value**, the **proximity of friendly forces**, and the **damage already inflicted** will determine the gun selection, type ammunition, and the number of rounds required to successfully attack the target. Munition selection should not be dictated to the SOF gunships, but rather provide the desired effects.

(5) **Procedures.** One factor that distinguishes the SOF gunship 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 SOF gunship with radar beacons, the JTAC must give all target ranges and bearings from the location of the beacon. The beacon should be located as close as is practical to the perimeter of friendly forces. **Shorter offset distances allow for more accurate weapons delivery.** For longer offset distances first round accuracy may be reduced. The AC-130U is equipped with APQ-180 radar, giving it a true adverse-weather capability.

11. Unmanned Aircraft Systems Close Air Support

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

a. **UAS capabilities** vary between different platforms and need to be known for proper employment. Many newer UASs have the capability to be, or already are, armed and can provide extremely accurate fires with laser and GPS guided weapons. The current remote video terminals used by ground forces allow the UAS FMV to be viewed directly by ground forces.

(1) UAS capabilities may include:

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

(b) FLIR. Allows for day or night working in the far IR spectrum and allows for some or limited visibility through dust and smoke (**NOTE:** thermal crossover, clouds, and thermal blooming in the target area will degrade performance of FLIR).

(c) Near-IR passive night optics works the same spectrum as NVGs.

(d) LTD marks for LSTs or provides terminal guidance of laser-guided ordnance; desirable for UAS to have the ability to change LTD PRF codes in flight.

(e) IR Pointer permits nighttime marking of targets for NVD-capable platforms or personnel.

(f) SAR provides detailed pictures of radar significant objects and geo-features regardless of weather.

(g) Moving target indicator allows for automatic tracking/cueing of sensors onto moving targets.

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

(i) Laser- and GPS-guided weapons.

(2) **UAS planning considerations.** UAS, either FW or RW, operate using the same CAS procedures as manned aircraft, to include airborne laser procedures. There are some unique considerations that need to be addressed when utilizing UAS.

(a) UAS should follow the same procedures given by the JTAC/FAC(A) as manned aircraft.

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

(c) Armed UAS can not perform Type 1 attacks.

(d) Lost link procedures and UAS contingency routes.

(e) Control at the lowest tactical level or at the command level best suited to exploit the UAS FMV, sensors, imagery, communications, and weapons payload capabilities.

(f) Difficult to re-task a UAS in flight over large distances due to low transit airspeeds.

(g) UASs require deconfliction for operations and airspace.

(h) UASs must adhere to all laser restrictions.

(i) Due to the shallow look angles of helicopters, UAS ideally should be looking approximately on the same bearing, and as low as tactically possible, to assist with target area orientations for verbal “talk-ons.”

(j) When being supported by armed UA, the required attack profiles or orbits needed to launch weapons have to be planned for to include the deconfliction with other aircraft in the area.

(k) A UAS with radio relay payloads in the UHF and VHF frequency range can act as a low-flying, surrogate satellite. This capability allows ground forces to communicate, in an urban environment or mountainous terrain, over long distances using standard man-portable radios.

(l) Weather is a major consideration for UAS flight operations, particularly the launch and recovery.

(m) UAS that fly low and have a large visual signature or a loud engine noise will alert enemy forces, or may give away friendly positions.

(n) UAS are equipped with class-3 and -4 lasers. Planners must ensure planning occurs for nominal ocular hazard distance if working with ground forces or piloted aircraft as manned aircraft may fly through the laser unexpectedly. Additionally, ground forces may be illuminated with reflected laser energy or may be looking up at the UAS. Proper coordination and tactics will minimize this risk.

(3) **Armed UAS Tactics**

(a) The standard 9-line and CAS check-in format is used by UAS flight crews, however the standard control points and IP matrix used by current high performance manned strike/fighter aircraft are usually too far away to be of use to an armed UA due to their slow speed (60-250 knots). The UA will generally orbit over the target area for weapons delivery, using the following flight profiles.

(b) Figure V-31 depicts a "wheel" orbit profile used when there is no restriction or required final attack heading and terrain features or urban development do not mask the target. Orbit size is approximately 12 km (6.5nm) in radius around and above the target. The orbit allows the UA to roll in on time line, command, or when ready. If the UAS is awaiting clearance to fire, the UAS weapons payload operator will update the run-in heading and pass to the controlling authority as required. If terrain or urban development is masking the target during portions of the orbit the UAS pilot may off-set to minimize masking.

(c) The "figure-8" track depicted in Figure V-32 and the "racetrack" pattern depicted in Figure V-33 may be used when restrictions to final attack headings are required for airspace deconfliction purposes or other considerations. These restrictions include: friendly positions, collateral damage concerns, terrain/urban development, or if cluttered or congested airspace precludes UAS CAS operations.

12. Bomber Close Air Support

a. **En route.** Bomber en route times can extend upwards of 12 hours before arriving in theater. Depending on communications equipment, aircraft could arrive on station with threat and situation information that is not current. Voice satellite may not be available for the ground party, but should be used if available. If beyond LOS communications equipment is available SA regarding ongoing engagements may be passed well before a bomber arrives on station to support ground forces. Every attempt should be made to use secure communications.

b. **Pre-attack**

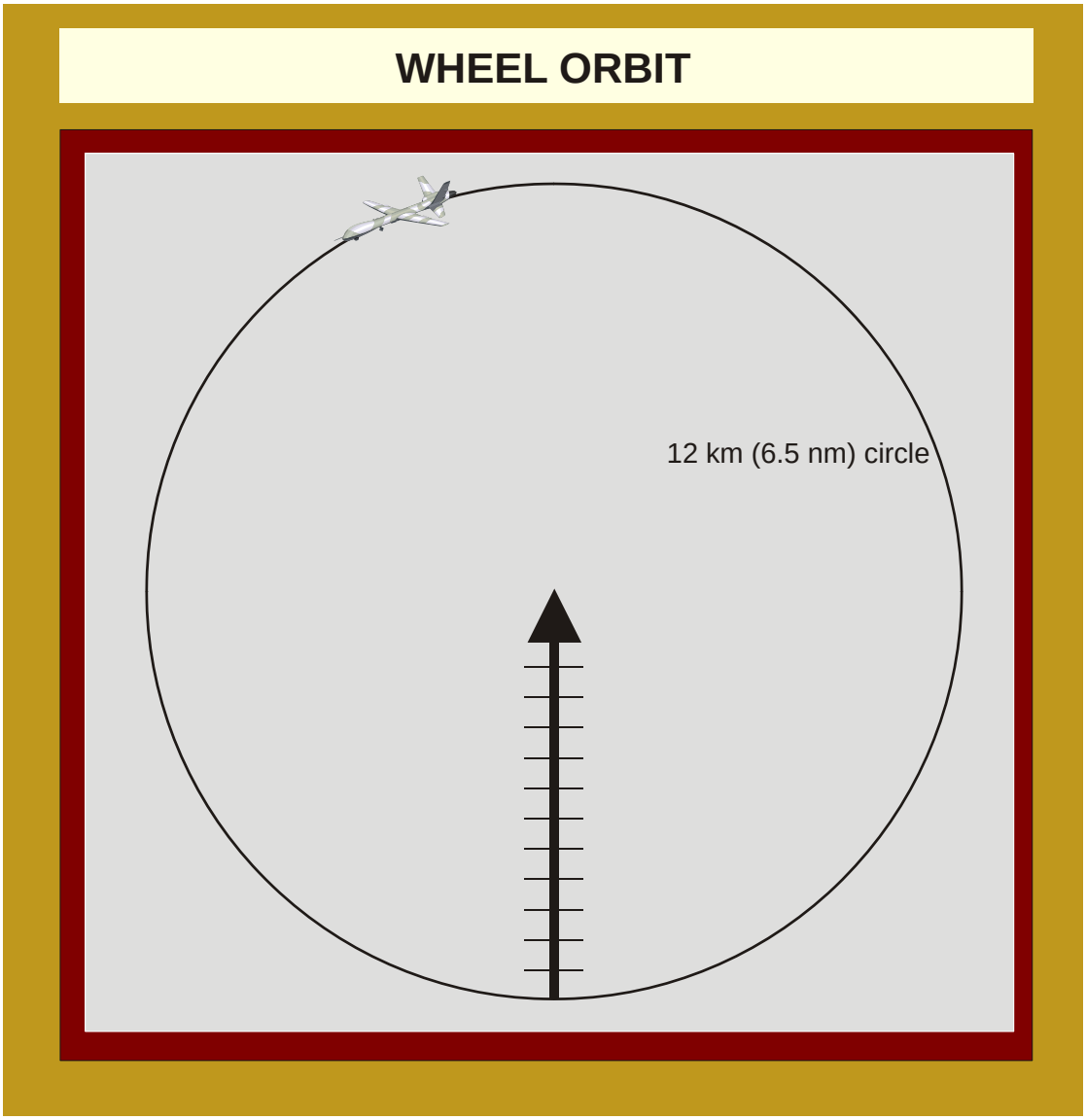


Figure V-31. Wheel Orbit

(1) Station time. Bombers may remain on station 8 hours or more, depending on air refueling capability in the area and transit time.

(2) Data link. Both the B-1 & B-52 use Combat Track II as a data link. The JAOC may relay information from the JTAC/FAC(A) to the en route bomber via data link.

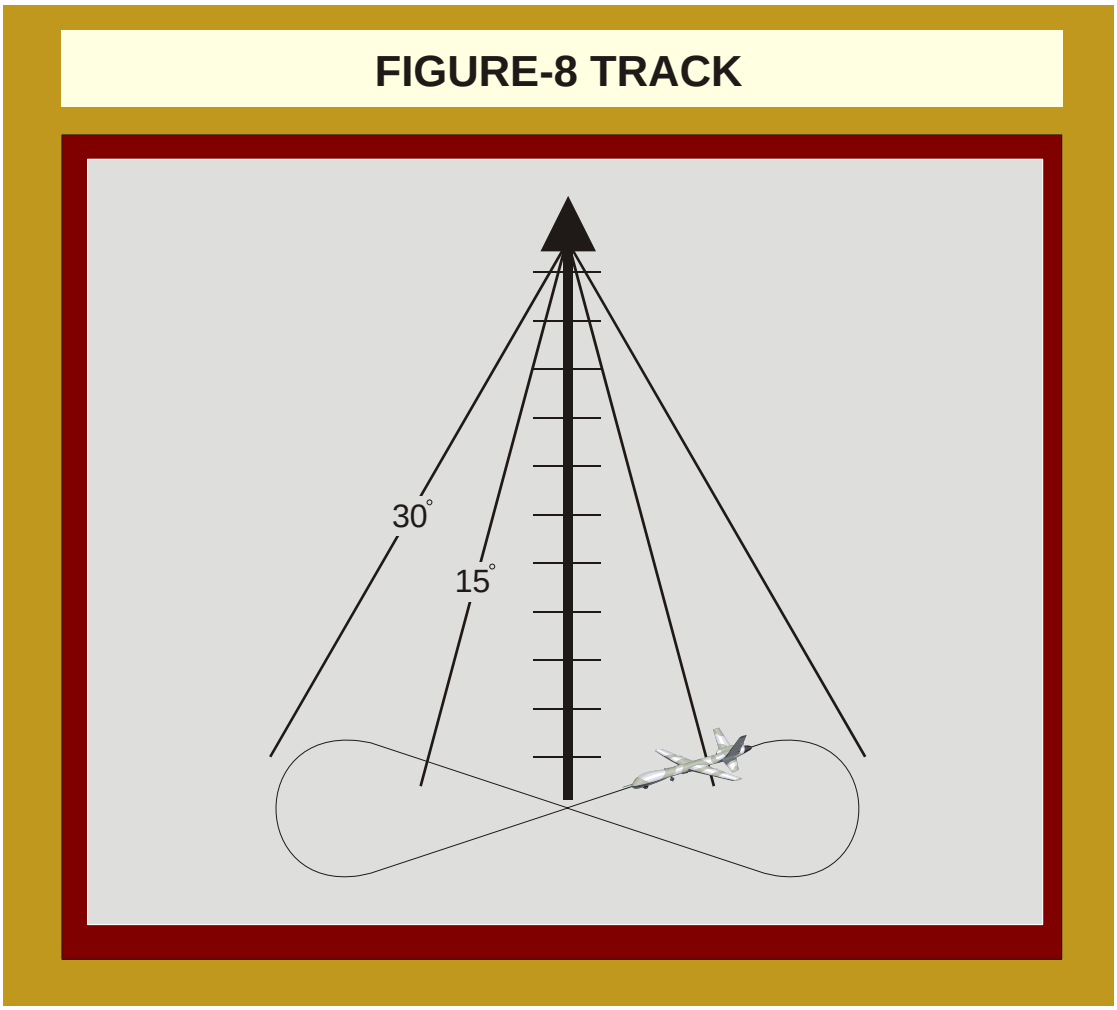


Figure V-32. Figure-8 Track

(3) Orbit. B-1s typically operate in the mid to high 20s while B-2s or B-52s can operate up into the high 30s and even low 40s. Bombers will typically look at the target or at least verify the target location/coordinates passed by the JTAC/FAC(A) using their onboard targeting sensors (radar and/or ATP) from distances as far as 40 nm and as near as 5 nm from the target area, depending on optimum sensor parameters. The B-1 and B-52 use advanced electro-optics (Litening ATP and Sniper) and are able to observe general target areas from this distance, but may require LSS, IR marker, or Rover to positively identity targets once they turn inbound. The JTAC/FAC(A) should not unnecessarily restrict the orbit location as IAMs may not require a traditional track to the target. Orbit locations should be selected based on proximity to threats and friendly locations or in the interest of maintaining the element of surprise and avoiding aircraft visual/audible detection by the enemy-based on ground forces assessment and recommendation. Consideration must be given to aircraft jet engine noise abatement (day and night) and visual observation of aircraft or contrails if ground forces are trying to maintain the element of surprise. Generally, bombers avoiding the use of afterburner will not be heard and very difficult to visually detect outside 5 nm from the target area when above 20,000 ft MSL. Bombers may also have the capability to neutralize threats while en route to the CAS orbit. See Figure V-34.

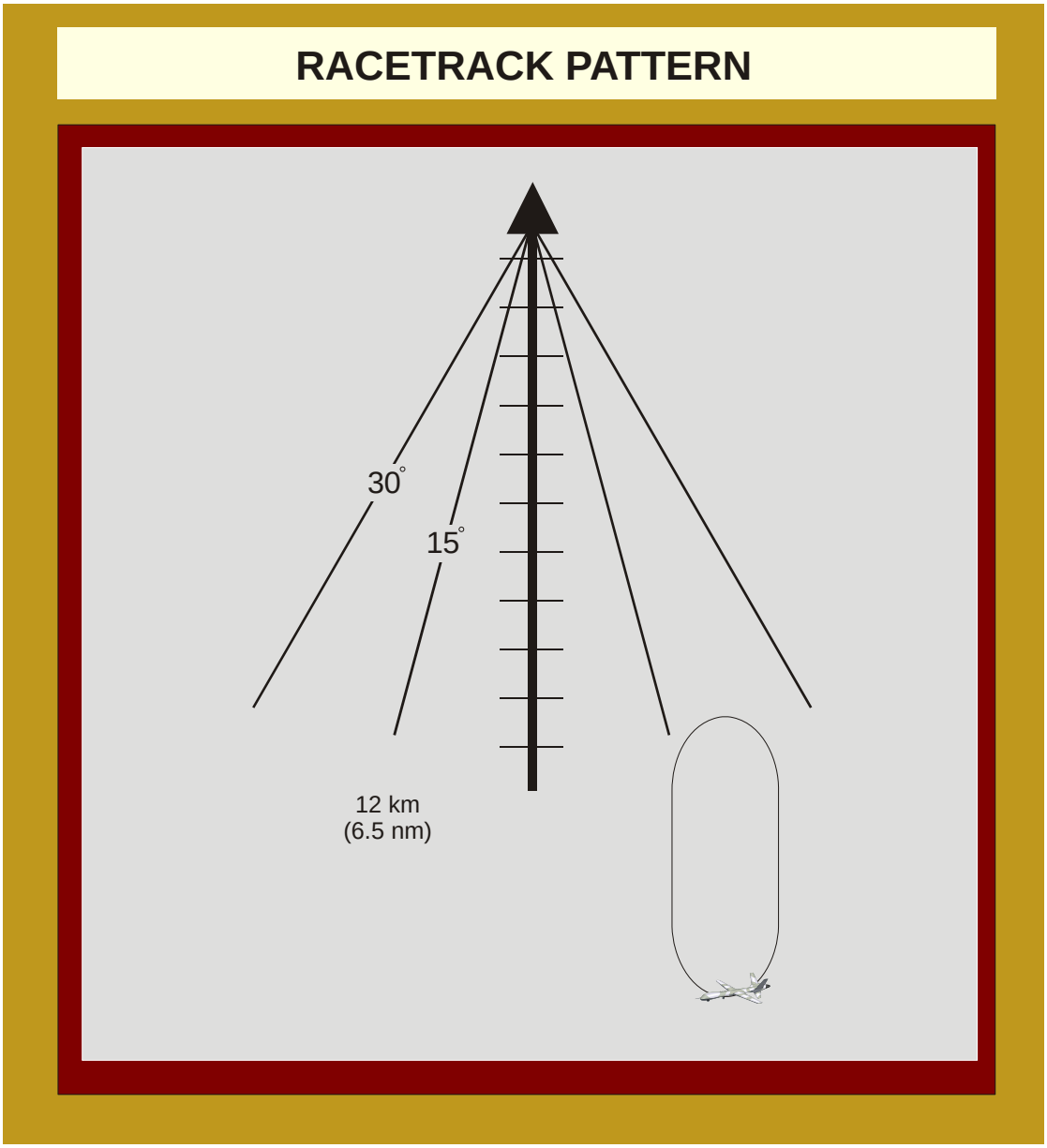


Figure V-33. Racetrack Pattern

c. **Attack phase**

(1) **Target Considerations.** Bombers traditionally employ weapons on given coordinates. Coordinate passage does not provide positive ID of the actual target and careful consideration should be given with respect to the target environment, location of friendlies, and the type of control being employed. Targeting pod usage with video feeds can provide positive target ID in these instances. Both the B-52 and B-1 can generate coordinates using targeting pods, but should provide anticipated accuracy categorization upon initial check-in with JTACs/FAC(A)s.

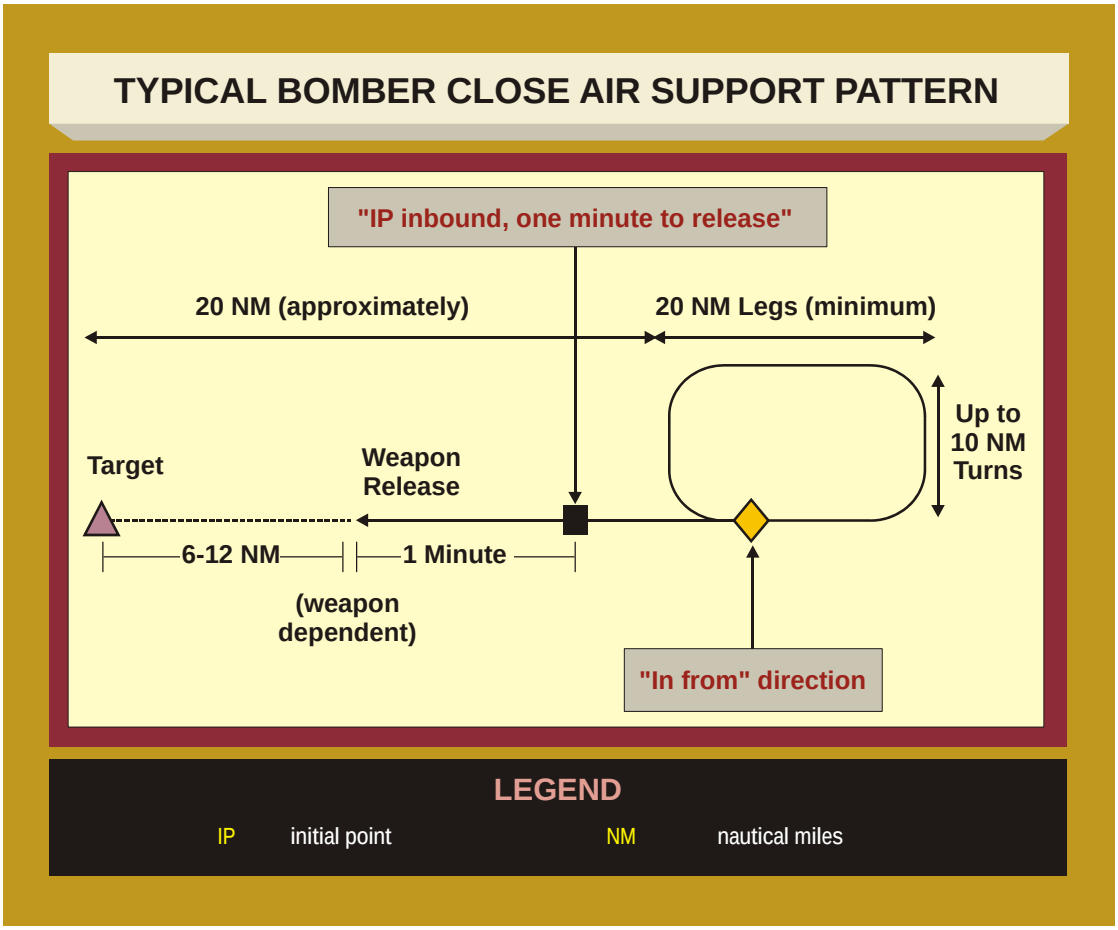


Figure V-34. Typical Bomber Close Air Support Pattern

(a) Talk-on. Bombers can self generate target coordinates and elevation depending on how radar or EO/IR significant the target is. JTAC/FAC(A) cuing is crucial for either bomber to locate typical CAS targets.

(b) CAS in urban environment. Because bombers have a larger turn radius and typically employ at higher altitudes, positive ID of targets in urban environments will be more challenging. The effects of 'urban canyons' on target identification can be minimized from higher altitudes and higher lookdown angles. When using IAMs, accurate coordinate collection in urban environments is critical. Maximum use of LSS, IR marker, and VDL is warranted in these urban settings. In the absence of VDL, the talk-on in such an environment (radar and/or targeting pod) will be extensive. In all cases, careful attention must be paid to the correct coordinates being passed. TTP for designation and marking devices should be carefully employed to avoid erroneous coordinate collection or grazing unintended targets with an IR marker or laser spot.

(c) Because of weapon release/launch altitudes, the bomber will normally have a greater stand off range from the target than fighter aircraft. Typical IAM launch acceptability region, i.e., release points can extend 6-12 nm from the target. Bombers can give a splash time prior to release. This time may vary by +/- 10 seconds depending on

the weapon type and programmed impact parameters. Communication problems are possible due to terrain and distance from the target. The mission lead or mission commander in the bomber formation will deconflict aircraft and weapons flight paths and assign targets to a particular bomber if multiple targets are to be attacked simultaneously. The mission lead or mission commander will pass deconfliction measures to the JTAC/FAC(A).

(d) Direct LOS Communications. Non-pod equipped bombers cannot attack a target with visual cues only, but crew or formation can accept map talk-ons and multiple 9-lines. The preferred coordinate format is DD-MM.MMMM (degrees decimal minutes). MGRS can be used but additional time from 9-line receipt to readback may be necessary for coordinate conversion.

(2) **Target Marking**

(a) The preferred technique of target marking is via lasing if required/available. Smoke and flares may be very useful in armed over watch or convoy support and/or initial marking of friendly position if situation warrants.

(b) Bombers may use ordnance for spotting. The JTAC/FAC(A) would then tell the aircrew "move 120 degrees for 15 meters from the last splash."

(c) Crews will never place radar crosshairs or targeting pod on friendly locations while in bomb mode to avoid potential fratricide.

(3) **Ordnance Employment**

(a) The bomber has the ability to attack several desired point of impact (DPI) on a single pass using IAMs. Each DPI could be attacked with different ordnance.

(b) The bomber can employ a wide range of weapons per pass in large numbers if desired or they can make many passes employing smaller amounts per pass. Bomber crews are trained to weaponeer targets real-time with tabbed data. The JTAC/FAC(A) should pass the desired effects, target area size and true axis or cardinal direction (if applicable) in the 9-line remarks. If the JTAC/FAC(A) passes the target centroid, i.e., desired mean point of impact, coordinates for area targets, the crew will build a weapon pattern around this point.

(4) Expect level deliveries for all bomber weapon releases.

d. **Post attack Phase**

(1) Reattack times can range from as short as 5 minutes to as long as 20 minutes depending on the complexity of the reattack (weapon reassignments, weapons system troubleshooting, fire correction/adjustment), threat environment, and quantity/type of weapons employed.

(2) Targeting-pod equipped bombers can provide extensive BDA due to their ability to loiter over the target area, depending upon the threat environment.

13. Multinational Operations

a. NATO and coalition countries have and continue to use JP 3-09.3, *Close Air Support*, as a basis for conducting CAS. See also Allied Joint Publication-3.3.2, *Air Interdiction and Close Air Support* and Allied Tactical Publication-3.3.2.1(B), *TTP for Close Air Support*. Some differences still remain between US joint doctrine and US-ratified allied joint doctrine but these differences are being addressed routinely.

b. Although the integration of CAS in multinational operations does not require any change in procedures, it is incumbent upon the JFC to understand the capabilities of the JTACs/FAC(A)s in the field. The US Joint Forces Command (USJFCOM) JTAC/FAC(A) Standardization Team has accredited several coalition countries (some of which are NATO members) and plans future accreditation of several others. These accredited countries have agreed to the JTAC/FAC(A) memorandums of agreement for standardized JTAC/FAC(A) training (i.e., “forward air controllers” using NATO terminology).

c. The JTACs/FAC(A)s of participating countries are trained by the contributing countries and adhere to standards such as accreditation by the USJFCOM JTAC/FAC(A) Standardization Team. Adhering to the NATO standardization agreement will enhance the JFC’s confidence in the JTACs’/FAC(A)s abilities and should be considered when authorizing terminal attack control.

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APPENDIX A
JOINT TACTICAL AIR STRIKE REQUEST

SECTION I – MISSION REQUEST

Line 1.

- **UNIT CALLED.** Identifies the unit designation/call sign/preassigned number.
- **THIS IS.** Identifies the request originator by unit designation/call sign/pre-assigned number.
- **REQUEST NUMBER.** For preplanned missions, indicates the originator's request number in series. For an immediate mission, this number is assigned by the ASOC/DASC.
- **SENT.** Indicates the time and the individual who transmitted the request.

Line 2. (Mission Categories).

- **PREPLANNED:** For preplanned requests, enter precedence (block A) or priority (block B).

  - **PRECEDENCE** is stated numerically in descending order of importance, as determined by the requestor.

  - **PRIORITY** is expressed as shown below (#1 for emergency, #2 for priority, or #3 for routine).

- **IMMEDIATE:**

  - **PRIORITY.** For immediate requests, enter priority (block C). A precedence entry is not required for immediate requests because, by definition, all immediate requests are precedence #1. Use the numerical designation below to determine priority (e.g., define the tactical situation) for preplanned (block B) or immediate (block C):

  #1. Emergency is #1. Targets that require immediate action and supersede all other categories of mission priority.

  #2. Priority is #2. Targets that require immediate action and supersede routine targets.

  #3. Routine is #3. Targets of opportunity. Targets which do not demand urgency in execution.

- **RECEIVED.** Indicates the time and the individual who received the request.

Line 3. TARGET IS/NUMBER OF - Describes the type, approximate size, and mobility of the target to be attacked. It is necessary to specify, even if a rough estimate, the number of targets (e.g., 10 tanks) or the size of the target area (e.g., personnel on a 500 meter front). Otherwise planners cannot accurately determine what force is required

— aircraft numbers/type and ordnance amount/type. Note: Item M: "Centers (CP, COM)" refers to C2 centers, command posts, etc.

Line 4: TARGET LOCATION IS - Locates the target by using the military grid reference system prescribed for the area concerned.

BLOCK A. COORDINATES. Locates a point target or starting point

BLOCK B. COORDINATES. When used together with A, provides from A to B coordinates.

BLOCK C. COORDINATES. When used together with A and B, provides a route.

BLOCK D. COORDINATES. When used together with A through C, provides a route or describes a target area.

BLOCK E. TGT ELEV. Target elevation in feet above MSL.

BLOCK F. SHEET NO. Self-explanatory.

BLOCK G. SERIES. Self-explanatory.

BLOCK H. CHART NO. Self-explanatory.

CHECKED. Indicates with whom target information has been crosschecked.

Line 5. TARGET TIME/DATE. Indicates the time/date when the air strike is requested.

BLOCK A. ASAP - As soon as possible.

BLOCK B. NLT - The target is to be attacked before, but not later then the time indicated.

BLOCK C. AT - Indicates time at which target is to be attacked.

BLOCK D. TO - Denotes end of period of time in which support such as airborne alert or column cover is required. When TO is used, NLT and AT are unnecessary.

Line 6. DESIRED ORD/RESULTS. Indicates the requestor's desired air strike results. This is essential information for the planner and must be carefully considered by the requestor.

BLOCK A. ORDNANCE - Desired ordnance.

BLOCK B. DESTROY - Self-explanatory.

BLOCK C. NEUTRALIZE - Self-explanatory.

BLOCK D. HARASS/INTERDICT - Self-explanatory.

Line 7. FINAL CONTROL. Identifies the final controller (e.g., JTAC, FAC[A]) who will conduct the briefing and control the release of ordnance.

BLOCK A. JTAC - Transmit the type of terminal control.

BLOCK B. CALL SIGN - Call sign of terminal controller.

BLOCK C. FREQ - Recommended TAD frequency.

BLOCK D. CONTROL POINT - Military grid coordinates and/or navigational aid fix of a control point which is the furthest limit of an attack aircraft's route of flight prior to control by the final controller.

Line 8. REMARKS - Allows incorporation of information not included elsewhere in the request. Situation Update. When submitting a JTAR, the JTAC or requesting agency will provide a current situation update to the ASOC/DASC. The situation update will consist of:

(1) Situation update number (#)

(2) Target, general enemy situation

(3) Threat activity

(4) Friendly situation

(5) Friendly positions

(6) Artillery activity

(7) Clearance authority

(8) Ordnance requested

(9) Restrictions/Remarks

(10) Localized SEAD efforts (suppression/EW)

(11) Hazards (weather terrain/obstructions)

SECTION II – COORDINATION

Line 9. NSFS - NSFS coordination.

Line 10. ARTY - Artillery coordination.

Line 11. AIO/G-2/G-3 - Air Intelligence Officer, G-2, G-3, or other Service equivalent coordination.

Line 12. REQUEST - Indicates the approval or disapproval of the request.

Line 13. BY - Indicates the individual who approved or disapproved the request.

Line 14. REASON FOR DISAPPROVAL - Self-explanatory.

Line 15. RESTRICTIVE FIRE/AIR PLAN - The ACA establishes airspace that is reasonably safe from friendly surface-delivered nonnuclear fires. The ACA provides a warning to aircrew of the parameters of surface-delivered fire in a specific area. A plan number or code name is issued, as appropriate.

Line 16. IS IN EFFECT - Establishes the time period that the applicable ACA plan will be in effect.

Line 17. LOCATION - Grid coordinates of the start/end points of the ACA's centerline.

Line 18. WIDTH (METERS) - Defines ACA from either side of the centerline.

Line 19. ALTITUDE/VERTEX - ACA altitude given in feet above MSL.

SECTION III – MISSION DATA

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

Line 20. MISSION NUMBER - Self-explanatory.

Line 21. CALL SIGN - Self-explanatory.

Line 22. NO. AND TYPE AIRCRAFT - Self-explanatory.

Line 23. ORDNANCE - Type of ordnance either by code number or actual nomenclature.

Line 24. EST/ALT TAKEOFF - Estimated or actual time the mission aircraft will take off.

Line 25. EST TOT - Estimated time on target.

Line 26. CONTROL POINT (COORDS) - The farthest limit of the attack aircraft's route of fight prior to control by the final controller. Same as Line 7, item D, when designated in the request.

Line 27. INITIAL CONTACT - Indicates the initial control agency the flight is to contact.

Line 28. JTAC/FAC(A)/TAC(A) CALL SIGN/FREQ - Call sign and frequency of the final control agency.

Line 29. AIRSPACE COORDINATION AREA - Refer to lines 15 through 19 for this data.

Line 30. TGT DESCRIPTION - Self-explanatory.

Line 31. TGT COORD/ELEV - Self-explanatory.

Line 32. BDA REPORT (USMTF INFLTREP) This optional space is used to record BDA for each mission.

JOINT TACTICAL AIR STRIKE REQUEST | See JP 3-09.3 for preparation instructions.

SECTION I - MISSION REQUEST

DATE

1. UNIT CALLED | THIS IS | REQUEST NUMBER | SENT | TIME | BY

2. PREPLANNED: A PRECEDENCE ____ B PRIORITY ____ | RECEIVED | TIME | BY
   IMMEDIATE: C PRIORITY ____

3. A PERS IN OPEN ____ | PERS DUG IN ____ | C WPNS/MG/RR/AT ____ | D MORTARS, ARTY ____
   E AAA ADA ____ | RKTS MISSILE ____ | G ARMOR ____ | H VEHICLES ____
   I BLDGS ____ | BRIDGES ____ | K PILLBOX, BUNKERS ____ | L SUPPLIES, EQUIP ____
   M CENTER (CP, COM) ____ | 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 JTAC ____ | B CALL SIGN ____ | C FREQ ____
   D CONTROL POINT ____

8. REMARKS

1. IP/BP ____
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.

FINAL ATTACK HEADINGS/RESTRICTIONS
LASER TARGET LINE
ADDITIONAL THREAT INFORMATION

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. CONTROL POINT (COORDS)	27. INITIAL CONTACT
28. JTAC/FAC(A)/TAC(A) CALL SIGN/FREQ	29. AIRSPACE COORDINATION AREA	30. TGT DESCRIPTION	*31. TGT COORD/ELEV

32. BATTLE DAMAGE ASSISSMENT (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

Figure A-1. DD Form 1972, Joint Tactical Air Strike Request

APPENDIX B
SAMPLE CLOSE AIR SUPPORT AIRCREW MISSION PLANNING GUIDE

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

1. Close Air Support Overview

a. **Friendly Situation**

(1) Forward edge of the battle area/FLOT.

(2) Control points/IPs.

(3) Scheme of maneuver.

(a) Target area.

(b) Key terrain.

(c) JTAC/FAC(A) position and call sign.

(d) Supporting arms.

1. Artillery positions and planning ranges.

2. Mortar positions and planning ranges.

3. Counterfire radar positions and planning ranges.

4. Gun target lines.

(e) Control and coordination measures.

1. Permissive measures.

a. CFL.

b. FSCL.

c. BCL.

d. FFA.

e. Kill boxes.

2. Restrictive measures.

a. RFL.

b. NFA.

c. RFA.

d. Zone of fire.

3. ACMs/ACAs.

4. Missile engagement zone/fighter engagement zone and status.

b. **Intelligence**

(1) Enemy position and number.

(a) Projected intent.

(b) Likely avenues of approach.

(c) Observed tactics.

(2) Supporting elements.

(3) Threats.

(a) Locations.

(b) Threat guidance.

1. RADAR.

2. Optical.

3. IR.

(c) Threat capabilities.

(d) Indications and warnings.

(e) Employment doctrine.

c. **Weather: Takeoff/Target/Land**

(1) Ceiling.

(2) Visibility.

(3) Temperature/dew point.

(4) Winds.

d. **Environment**

(1) Sun azimuth.

(2) Sun elevation.

(3) Sunrise/sunset time to include:

(a) Begin morning nautical time.

(b) End of evening nautical twilight.

(4) Moon azimuth.

(5) Moon elevation.

(6) Percent illumination.

(7) Lux level.

(8) Absolute humidity.

(9) Historical temperature.

(10) Predominant albedos.

(11) Urban lighting.

(12) Thermal crossover.

e. **Mission/Objective**

(1) Mission statement.

(2) Commander’s intent.

(3) Unit supporting.

(4) Target precedence.

(5) POF.

(6) Preplanned missions.

(a) USMTF.

(b) Groups/series.

(c) Search sectors.

(7) TOT/time on station.

(8) Divert authority.

(9) ROE.

f. **Control Procedures**

(1) AOA entry.

(a) Routing.

(b) Altitude/airspeed.

(c) Available control agencies.

(d) Air asset deconfliction.

(2) CEOI.

(a) Authentication.

(b) HAVE QUICK.

(c) Secure voice.

(d) Code/pro words.

(e) Changeover.

2. Execution

a. **Ground Procedures**

(1) Alert posture and upgrades.

(2) Mission tape/mission load.

(3) NVG eye lane.

(4) AKAC issue/checkout.

(5) Step time.

(6) Weapons preflight.

(7) Aircraft preflight.

(8) Engine start time.

(a) INS alignment anomalies.

(b) Aircraft lighting.

(c) FLIR checks.

(d) Built-in test checks.

(9) Marshal.

(10) Check-in.

(a) HAVE QUICK checks.

(b) KY-58/secure voice checks.

(c) VMF check.

(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/FAC(A).

(d) Deconfliction.

f. **Return to Force**

(1) Rendezvous.

(a) Position.

(b) Profile.

(c) Aircraft damage assessment.

(2) Dump target plan.

(3) Combat checklist.

(4) C2.

(a) Route.

(b) Profile.

(c) Tasking.

(d) Lame duck/wounded bird procedures.

(e) C2 agencies.

(f) BDA/intelligence back-brief.

(g) Integrated air defense system penetration.

1. IFF/lights/other emitters.

2. ADA monitors.

(h) Divert/alternate/emergency airfields.

g. **Recovery**

(1) C2.

(2) Recovery type.

(a) Primary.

(b) Secondary.

(3) NVD stowage.

(4) Formation break-up.

(5) Landing.

(a) Primary.

(b) Secondary.

(6) De-arm/safing procedures.

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APPENDIX C
PLANNING CONSIDERATIONS FOR CLOSE AIR SUPPORT USING NIGHT VISION DEVICES AND INFRARED (LASER) POINTERS

PREPLANNED/SCHEDULED (PLANNED LOCATION AND TIME)

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

2. What will the light conditions be at TOT?

    a. Moon Phase/Rise/Set/Angle.

    b. Overall illumination level and/or changing ambient lighting conditions (dusk/dawn).

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

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

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

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

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

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

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

7. Is there a run-in heading or 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 D
REFERENCES

The development of JP 3-09.3 is based upon the following primary references:

1. CJCS Publications

a. CJCSI 3505.01, *Target Coordinate Mensuration Certification.*

b. CJCSI 3900.01C, *Position (Point and Area) Reference Procedures.*

c. CJCSI 3901.01B, *Requirements for Geospatial Information and Services.*

d. JP 1, *Doctrine for the Armed Forces of the United States*.

e. JP 1-02, *Department of Defense Dictionary of Military and Associated Terms.*

f. JP 2-01, *Joint and National Intelligence Support to Military Operations.*

g. JP 2-01.3, *Joint Intelligence Preparation of the Operational Environment.*

h. JP 3-0, *Joint Operations.*

i. JP 3-01, *Countering Air and Missile Threats*.

j. JP 3-02, *Amphibious Operations*.

k. JP 3-05, *Joint Special Operations.*

l. JP 3-09, *Joint Fire Support.*

m. JP 3-30, *Command and Control for Joint Air Operations.*

n. JP 3-52, *Joint Airspace Control.*

o. JP 3-60, *Joint Targeting.*

p. JP 5-0, *Joint Operation Planning.*

2. Service Publications

a. Air Force Doctrine Document (AFDD) 2, *Operations and Organization.*

b. AFDD 2-1, *Air Warfare.*

c. FM 3-09.5 *TTP for Fire Support for Division Operations.*

3. Multi-Service Publications

a. FM 3-09.31 (FM 6-71), MCRP 3-16C, *Tactics, Techniques, and Procedures for Fire Support for the Combined Arms Commander*.

b. FM 3-09.32, MCRP 3-16.6A, NTTP 3-09.2, AFTTP(I) 3-2.6, *JFIRE, Multi-Service Tactics, Techniques, and Procedures for the Joint Application of Firepower*.

c. FM 3-52.2, NTTP 3-56.2, AFTTP(I) 3-2.17, *TAGS, Multi-Service Tactics, Techniques, and Procedures for the Theater Air Ground System.*

d. FM 1-02.1, MCRP 3-25B, NTTP 6-02.1, AFTTP(I) 3-2.5, *Brevity, Multi-Service Brevity Codes.*

e. FM 3-04.15, NTTP 3-55.14, AFTTP(I) 3-2.64, *UAS Multi-Service Tactics, Techniques, and Procedures for the Tactical Employment of Unmanned Aircraft Systems*.

f. FM 3-09.34, MCRP 3-25H, NTTP 3-09.2.1, AFTTP(I) 3-2.59, *Multi-Service Tactics, Techniques, and Procedures for Kill Box Employment*.

APPENDIX E
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, ATTN: Joint Doctrine Group, 116 Lake View Parkway, Suffolk, VA 23435-2697. These comments should address content (accuracy, usefulness, consistency, and organization), writing, and appearance.

2. Authorship

The lead agent for this publication is the US Marine Corps. The Joint Staff doctrine sponsor for this publication is the Joint Staff/J-7.

3. Supersession

This publication supersedes JP 3-09.3, 3 September 2003, Incorporating Change 1, dated 2 September 2005, *Joint Tactics, Techniques, and Procedures for Close Air Support (CAS)*.

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-JEDD//
CDRUSJFCOM SUFFOLK VA//JT10//

Routine changes should be submitted electronically to Commander, Joint Warfighting Center, Joint Doctrine Group and info the Lead Agent and the Director for Operational Plans and Joint Force Development J-7/JEDD via the CJCS JEL at http://www.dtic.mil/doctrine.

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 Services and other organizations are requested to notify the Joint Staff/J-7 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

5. Distribution of Publications

Local reproduction is authorized and access to unclassified publications is unrestricted. However, access to and reproduction authorization for classified joint publications must be in accordance with DOD 5200.1-R, *Information Security Program*.

6. Distribution of Electronic Publications

a. Joint Staff J-7 will not print copies of JPs for distribution. Electronic versions are available on JDEIS at https://jdeis.js.mil (NIPRNET), and https://jdeis.js.smil.mil (SIPRNET) and on the JEL at http://www.dtic.mil/doctrine (NIPRNET).

b. Only approved joint publications and joint test publications are releasable outside the combatant commands, Services, and Joint Staff. Release of any classified joint publication to foreign governments or foreign nationals must be requested through the local embassy (Defense Attaché Office) to DIA Foreign Liaison Office, PO-FL, Room 1E811, 7400 Pentagon, Washington, DC 20301-7400.

c. CD-ROM. Upon request of a JDDC member, the Joint Staff J-7 will produce and deliver one CD-ROM with current joint publications.

GLOSSARY

PART I — ABBREVIATIONS AND ACRONYMS

AAA	antiaircraft artillery
AAGS	Army air-ground system
AC2	airspace command and control
ACA	airspace coordination area
ACCE	air component coordination element
ACE	aviation combat element
ACEOI	automated communications-electronics operating instructions
ACM	airspace coordinating measure
ACO	airspace control order
ADA	air defense artillery
AFARN	Air Force air request net
AFDD	Air Force doctrine document
AFFOR	Air Force forces
AFTTP (I)	Air Force tactics, techniques, and procedures (instruction)
AGL	above ground level
AIRSUPREQ	air support request
ALO	air liaison officer
ALTD	airborne laser target designator
AM	amplitude modulation
ANGLICO	air-naval gunfire liaison company
AO	air officer
AOA	amphibious objective area
AOC	air and space operations center (USAF)
AOF	azimuth of fire
ASCS	air support control section
ASOC	air support operations center
ATCS	air traffic control section
ATO	air tasking order
ATP	advance targeting pod
AWACS	Airborne Warning and Control System
BAE	brigade aviation element
BALO	battalion air liaison officer
BCD	battlefield coordination detachment
BCL	battlefield coordination line
BDA	battle damage assessment
BN	battalion
BOC	bomb on coordinate
BOT	bomb on target
BP	battle position
C2	command and control
CAP	crisis action planning

CAS	close air support
CAT	category
CBU	cluster bomb unit
CCIP	continuously computed impact point
CCIR	commander's critical information requirement
CE	circular error
CEOI	communications-electronics operating instructions
CFL	coordinated fire line
CID	combat identification
CJCSI	Chairman of the Joint Chiefs of Staff instruction
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)
DCGS	distributed common ground/surface system
DPI	desired point of impact
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
FC	fires cell (Army)
FCT	firepower control team
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 (Army)
FMV	full motion video

FOB	forward operating base
FOV	field of view
FP	firing point
FPF	final protective fire
FSC	fire support coordinator (USMC)
FSCC	fire support coordination center
FSCL	fire support coordination line
FSCM	fire support coordination measure
FSCOORD	fire support coordinator (Army)
FSEM	fire support execution matrix
FSO	fire support officer
ft	feet
FW	fixed-wing
G-3	Army or Marine Corps component operations staff officer (Army division or higher staff, Marine Corps brigade or higher staff)
GCE	ground combat element
GLINT	gated laser intensifier
GLTD	ground laser target designator
GPS	Global Positioning System
GRG	gridded reference graphic
GTL	gun-target line
HA	holding area
HDC	helicopter direction center
HE	high explosive
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
IAM	inertially aided munition
ID	identification
IFF	identification, friend or foe
INFLTREP	inflight report
INS	inertial navigation system
IP	initial point
IR	infrared
IRC	internet relay chat
ISR	intelligence, surveillance, and reconnaissance
J-6	communications system directorate of a joint staff

JAAT	joint air attack team
JACE	joint air coordination element
JAOC	joint air operations center
JARN	joint air request net
JCEOI	joint communications-electronics operating instructions
JFACC	joint force air component commander
JFC	joint force commander
JFLCC	joint force land component commander
JFO	joint fires observer
JFSOCC	joint force special operations component commander
JHMCS	joint helmet-mounted cueing system
JIPOE	joint intelligence preparation of the operational environment
JOA	joint operations area
JP	joint publication
JSA	joint security area
JSOAC	joint special operations air component
JSOACC	joint special operations air component commander
JSOTF	joint special operations task force
JSTARS	Joint Surveillance Target Attack Radar System
JTAC	joint terminal attack controller
JTAR	joint tactical air strike request
km	kilometer
LF	landing force
LGB	laser-guided bomb
LGM	laser-guided missile
LGW	laser-guided weapon
LNO	liaison officer
LOAL	lock-on after launch
LOBL	lock-on before launch
LOS	line of sight
LRF	laser range finder
LSS	laser spot search
LST	laser spot tracker
LTD	laser target designator
LTL	laser-to-target line
MACCS	Marine air command and control system
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

METT-T	mission, enemy, terrain and weather, troops and support available-time available
MGRS	military grid reference system
MISREP	mission report
MRR	minimum-risk route
MSL	mean sea level
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
NTTP	Navy tactics, techniques, and procedures
NVD	night vision device
NVG	night vision goggle(s)
O&I	operations and intelligence
OPCON	operational control
OPLAN	operation plan
OPORD	operation order
OSC	on-scene commander
PAA	position area of artillery
PGM	precision-guided munition
PI	probability of incapacitation
POF	priority of fires
PRF	pulse repetition frequency
RFA	restrictive fire area
RFL	restrictive fire line
ROC	rehearsal of concept
ROE	rules of engagement
ROZ	restricted operations zone
RPG	rocket propelled grenade
RW	rotary-wing
S-3	battalion or brigade operations staff officer (Army; Marine Corps battalion or regiment)
SA	situational awareness
SAAFR	standard use Army aircraft flight route
SACC	supporting arms coordination center
SADL	situation awareness data link

SALT	supporting arms liaison team
SAM	surface-to-air missile
SAR	synthetic aperture radar
SATCOM	satellite communications
SE	spherical error
SEAD	suppression of enemy air defenses
SIGINT	signals intelligence
SINCGARS	single-channel ground and airborne radio system
SOAGS	special operations air-ground system
SOCCE	special operations command and control element
SOF	special operations forces
SOI	signal operating instructions
SOLE	special operations liaison element
SOP	standard operating procedure
SPINS	special instructions
SSB	single side band
TAC	terminal attack control
TAC(A)	tactical air coordinator (airborne)
TACC	tactical air control center (Navy); tactical air command center (Marine Corps)
TACP	tactical air control party
TACS	theater air control system
TAD	tactical air direction
TADC	tactical air direction center
TAGS	theater air-ground system
TAI	target area of interest
TAOC	tactical air operations center (USMC)
TAR	tactical air request
TATC	tactical air traffic control
TERF	terrain flight
TGO	terminal guidance operations
TLE	target location error
TOC	tactical operations center
TOT	time on target
TPME	task, purpose, method, and effects
TRP	target reference point
TTFACOR	targets, threats, friendlies, artillery, clearance, ordnance, restrictions
TTP	tactics, techniques, and procedures
TTT	time to target
UA	unmanned aircraft
UAS	unmanned aircraft system
UHF	ultrahigh frequency
USAF	United States Air Force

USJFCOM	United States Joint Forces Command
USMC	United States Marine Corps
USMTF	United States message text format
USN	United States Navy
VDL	video downlink
VE	vertical error
VHF	very high frequency
VMF	variable message format
WGS-84	World Geodetic System 1984
WOC	wing operations center (USAF)
WP	white phosphorous

PART II — TERMS AND DEFINITIONS

Unless otherwise annotated, this publication is the proponent for all terms and definitions found in the glossary. Upon approval, JP 1-02, Department of Defense Dictionary of Military and Associated Terms, will reflect this publication as the source document for these terms and definitions.

air interdiction. Air operations conducted to divert, disrupt, delay, or destroy the enemy's military potential before it can be brought to bear effectively against friendly forces, or otherwise achieve objectives. Air interdiction is conducted 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. SOURCE: JP 3-0)

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. (JP 1-02. SOURCE: JP 3-09.3)

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. SOURCE: JP 3-52)

airspace control order. An order implementing the airspace control plan that provides the details of the approved requests for airspace coordinating measures. It is published either as part of the air tasking order or as a separate document. Also called ACO. (JP 1-02. SOURCE: JP 3-52)

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 operational area. Also called ACP. (JP 1-02. SOURCE: JP 3-52)

airspace coordinating measures. Measures employed to facilitate the efficient use of airspace to accomplish missions and simultaneously provide safeguards for friendly forces. Also called ACMs. (JP 1-02. SOURCE: JP 3-52)

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. SOURCE: JP 3-09.3)

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. SOURCE: JP 3-30)

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 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. (JP 1-02. SOURCE: JP 3-09.3) (This term and its definition modify the existing term and its definition and are approved for inclusion in 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. SOURCE: JP 3-09)

attack heading. 1. The interceptor heading during the attack phase that will achieve the desired track-crossing angle. 2. The assigned magnetic compass heading to be flown by aircraft during the delivery phase of an air strike. (JP 1-02. SOURCE: JP 3-09.3)

battle damage assessment. The estimate of damage resulting from the application of lethal or nonlethal military force. Battle damage assessment is composed of physical damage assessment, functional damage assessment, and target system assessment. Also called BDA. (JP 1-02. SOURCE: JP 3-0)

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. SOURCE: JP 3-0)

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. SOURCE: JP 3-0)

collateral damage. Unintentional or incidental injury or damage to persons or objects that would not be lawful military targets in the circumstances ruling at the time. Such damage is not unlawful so long as it is not excessive in light of the overall military advantage anticipated from the attack. (JP 1-02. SOURCE: JP 3-60)

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. SOURCE: JP 1)

concept of operations. A verbal or graphic statement that clearly and concisely expresses what the joint force commander intends to accomplish and how it will be done using available resources. The concept is designed to give an overall picture of the operation. Also called commander's concept or CONOPS. (JP 1-02. SOURCE: JP 5-0)

contact point. 1. In land warfare, a point on the terrain, easily identifiable, where two or more units are required to make contact. 2. In air operations, the position at which a mission leader makes radio contact with an air control agency. (JP 3-09.3) 3. In personnel recovery, a location where isolated personnel can establish contact with recovery forces. Also called **CP.** (JP 1-02. SOURCE: JP 3-09.3) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02.)

CONTINUE. Brevity code 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.)

control point. 1. A position along a route of march at which men are stationed to give information and instructions for the regulation of supply or traffic. 2. A position marked by coordinates (latitude, longitude), a buoy, boat, aircraft, electronic device, conspicuous terrain feature, or other identifiable object which is given a name or number and used as an aid to navigation or control of ships, boats, or aircraft. 3. In marking mosaics, a point located by ground survey with which a corresponding point on a photograph is matched as a check. (JP 1-02. SOURCE: JP 3-09.3) (This term and its definition modify the existing term and its definition and are approved for inclusion in JP 1-02)

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. SOURCE: JP 3-52)

danger close. In close air support, artillery, mortar, and naval gunfire support fires, it is the term included in the method of engagement segment of a call for fire which indicates that friendly forces are within close proximity of the target. The close proximity distance is determined by the weapon and munition fired. (JP 1-02. SOURCE: JP 3-09.3)

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. SOURCE: JP 3-09.3)

direct air support center (airborne). An airborne aircraft equipped with the necessary staff personnel, communications, and operations facilities to function as a direct air support center. Also called DASC(A). (JP 1-02. SOURCE: JP 3-09.3)

direct fire. Fire delivered on a target using the target itself as a point of aim for either the weapon or the director. (JP 1-02. SOURCE: JP3-09.3)

direct support. A mission requiring a force to support another specific force and authorizing it to answer directly to the supported force's request for assistance. Also called DS. (JP 1-02. SOURCE: JP 3-09.3)

electronic warfare. Military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. Electronic warfare consists of three divisions: electronic attack, electronic protection, and electronic warfare support. Also called EW. (JP 1-02. SOURCE: JP 3-13.1)

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. SOURCE: JP 3-13.1)

fire direction center. That element of a command post, consisting of gunnery and communications personnel and equipment, by means of which the commander exercises fire direction and/or fire control. The fire direction center receives target intelligence and requests for fire, and translates them into appropriate fire direction. The fire direction center provides timely and effective tactical and technical fire control in support of current operations. Also called FDC. (JP 1-02. SOURCE: JP 3-09.3)

fires. The use of weapon systems to create a specific lethal or nonlethal effect on a target. (JP 1-02. SOURCE: JP 3-0)

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. (JP 1-02. SOURCE: JP 3-09.3)

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. SOURCE: JP 3-09)

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. SOURCE: JP 3-09.3)

fire support coordination line. A fire support coordination measure that is established and adjusted by appropriate land or amphibious force commanders within their boundaries in consultation with superior, subordinate, supporting, and affected commanders. Fire support coordination lines facilitate the expeditious attack of surface targets of opportunity beyond the coordinating measure. A fire support coordination line does not divide an area of operations by defining a boundary between close and deep operations or a zone for close air support. The fire support coordination line applies to all fires of air, land, and sea-based weapon systems using any type of ammunition. Forces attacking targets beyond a fire support coordination line must inform all affected commanders in sufficient time to allow necessary reaction to avoid fratricide. Supporting elements attacking targets beyond the fire support coordination line must ensure that the attack will not produce adverse effects on, or to the rear of, the line. Short of a fire support coordination line, all air-to-ground and surface-to-surface attack operations are controlled by the appropriate land or amphibious force commander. The fire support coordination line should follow well-defined terrain features. Coordination of attacks beyond the fire support coordination line 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 fire support coordination line. However, failure to do so may increase the risk of fratricide and could waste limited resources. Also called FSCL. (JP 1-02. SOURCE: JP 3-09)

fire support coordination 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. (JP 1-02. SOURCE: JP 3-0)

fire support team. A field artillery team provided for each maneuver company/troop and selected units to plan and coordinate all supporting fires available to the unit, including mortars, field artillery, naval surface fire support, and close air support integration. Also called FIST. (JP 1-02. SOURCE: JP 3-09.3) (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. SOURCE: JP 3-09.3)

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. A qualified and current forward air controller (airborne) will be recognized across the Department of Defense as capable and authorized to

perform terminal attack control. Also called FAC(A). (JP 1-02. SOURCE: JP 3-09.3) (This term and its definition modify the existing term and its definition and are approved for inclusion in 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. SOURCE: JP 3-09.3)

forward edge of the battle area. The foremost limits of a series of areas in which ground combat units are deployed, excluding the areas in which the covering or screening forces are operating, designated to coordinate fire support, the positioning of forces, or the maneuver of units. Also called FEBA. (JP 1-02. SOURCE: JP 3-09.3)

forward 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 normally identifies the forward location of covering and screening forces. The forward line of own troops may be at, beyond, or short of the forward edge of the battle area. An enemy forward line of own troops indicates the forward-most position of hostile forces. Also called FLOT. (JP 1-02. SOURCE: JP 3-03)

forward-looking infrared. An airborne, electro-optical thermal imaging device that detects far-infrared energy, converts the energy into an electronic signal, and provides a visible image for day or night viewing. Also called FLIR. (JP 1-02. SOURCE: JP 3-09.3)

forward operating base. An airfield used to support tactical operations without establishing full support facilities. 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. SOURCE: JP 3-09.3)

free-fire area. A specific area into which any weapon system may fire without additional coordination with the establishing headquarters. Also called FFA. (JP 1-02. SOURCE: JP 3-09)

general support. 1. That support which is given to the supported force as a whole and not to any particular subdivision thereof. 2. A tactical artillery mission. Also called GS. (JP 1-02. SOURCE: JP 3-09.3)

high altitude bombing. Horizontal bombing with the height of release over 15,000 feet. (JP 1-02. SOURCE: JP 3-09.3)

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. SOURCE: JP 3-52)

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. SOURCE: JP 3-60)

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. SOURCE: JP 3-60)

immediate air support. Air support to meet specific requests which arise during the course of a battle and which by their nature cannot be planned in advance. (JP 1-02. SOURCE: JP 3-09.3)

immediate mission request. 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. SOURCE: JP 3-09.3)

infrared pointer. A low power laser device operating in the near infrared light spectrum that is visible with light amplifying night vision devices. Also called IR pointer. (JP 1-02. SOURCE: JP 3-09.3)

interdiction. 1. An action to divert, disrupt, delay, or destroy the enemy's military surface capability before it can be used effectively against friendly forces, or to otherwise achieve objectives. 2. In support of law enforcement, activities conducted to divert, disrupt, delay, intercept, board, detain, or destroy, as appropriate, vessels, vehicles, aircraft, people, and cargo. (JP 1-02. SOURCE: JP 3-03)

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. (JP 1-02. SOURCE: JP 3-09.3)

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. SOURCE: JP 3-30)

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. SOURCE: JP 3-30)

joint fires. Fires delivered during the employment of forces from two or more components in coordinated action to produce desired effects in support of a common objective. (JP 1-02. SOURCE: JP 3-0)

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. SOURCE: JP 3-60)

joint fires observer. A trained Service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 close air support terminal attack control, and perform autonomous terminal guidance operations. Also called JFO. (JP 1-02. SOURCE: JP 3-09.3) (Approved for inclusion in JP 1-02.)

joint fire support. Joint fires that assist air, land, maritime, and special operations forces to move, maneuver, and control territory, populations, airspace, and key waters. (JP 1-02. SOURCE: JP 3-0)

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. SOURCE: JP 3-0)

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. SOURCE: JP 1)

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. (JP 1-02. SOURCE: JP 3-09.3)

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. SOURCE: JP 3-09.3)

marking. To maintain contact on a target from such a position that the marking unit has an immediate offensive capability. (JP 1-02. SOURCE: JP 3-09.3)

naval surface fire support. Fire provided by Navy surface gun and missile systems in support of a unit or units. Also called NSFS. (JP 1-02. SOURCE: JP 3-09.3)

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. SOURCE: JP 3-09.3)

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. SOURCE: JP 3-09.3)

no-fire area. An area designated by the appropriate commander into which fires or their effects are prohibited. Also called NFA. (JP 1-02. SOURCE: JP 3-09.3)

preplanned air support. Air support in accordance with a program, planned in advance of operations. (JP 1-02. SOURCE: JP 3-09.3)

preplanned mission request. 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. SOURCE: JP 3-09.3)

procedure word. A word or phrase limited to radio telephone procedure used to facilitate communication by conveying information in a condensed standard form. Also called proword. (JP 1-02. SOURCE: JP 3-09.3)

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. SOURCE: JP 3-09)

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. SOURCE: JP 3-09)

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. SOURCE: JP 1-04)

spot report. A concise narrative report of essential information covering events or conditions that may have an immediate and significant effect on current planning and operations that is afforded the most expeditious means of transmission consistent with requisite security. Also called SPOTREP. (Note: In reconnaissance and surveillance usage, spot report is not to be used.) (JP 1-02. SOURCE: JP 3-09.3)

supporting arms coordination center. A single location on board an amphibious 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. SOURCE: JP 3-09.3)

suppression of enemy air defenses. Activity which neutralizes, destroys, or temporarily degrades surface-based enemy air defenses by destructive and/or disruptive means. Also called SEAD. (JP 1-02. SOURCE: JP 3-01)

surface-to-air weapon. A surface-launched weapon for use against airborne targets. Examples include missiles, rockets, and air defense guns. (JP 1-02. SOURCE: JP 3-09.3)

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. SOURCE: JP 3-09.3)

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. (JP 1-02. SOURCE: JP 3-09.3)

tactical air control center. The principal air operations installation (ship-based) from which all aircraft and air warning functions of tactical air operations are controlled. Also called Navy TACC. (JP 1-02. SOURCE: JP 3-09.3)

tactical air control party. A subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft. Also called TACP. (JP 1-02. SOURCE: JP 3-09.3)

tactical air coordinator (airborne). An officer who coordinates, from an aircraft, the actions of other aircraft engaged in air support of ground or sea forces. Also called TAC(A). (JP 1-02. SOURCE: JP 3-09.3)

tactical air direction center. An air operations installation under the overall control of the Navy tactical air control center or the Marine Corps tactical air command center, from which aircraft and air warning service functions of tactical air operations in support of amphibious operations are directed. Also called TADC. (This term and its definition modify the existing term and its definition and are approved for inclusion in 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. SOURCE: JP 3-09.3)

targeting. The process of selecting and prioritizing targets and matching the appropriate response to them, considering operational requirements and capabilities. (JP 1-02. SOURCE: JP 3-0)

target location error. The difference between the coordinates generated for a target and the actual location of the target. Target location error is expressed primarily in terms of circular and vertical errors or infrequently, as spherical error. Also called TLE. (JP 1-02. SOURCE: JP 3-09.3) (Approved for inclusion in 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. (JP 1-02. SOURCE: JP 3-09.3)

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. (JP 1-02. SOURCE: JP 3-09.3)

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. (JP 1-02. SOURCE: JP 3-03)

terminal guidance operations. Those actions that provide electronic, mechanical, voice or visual communications that provide approaching aircraft and/or weapons additional information regarding a specific target location. Also called TGO. (JP 1-02. SOURCE: JP 3-09)

thermal crossover. The natural phenomenon that normally occurs twice daily when temperature conditions are such that there is a loss of contrast between two adjacent objects on infrared imagery. (JP 1-02. SOURCE: JP 3-09.3)

time on target. The actual time at which munitions impact the target. Also called TOT. (JP 1-02. SOURCE: JP 3-09.3) (This term and its definition modify the existing term and its definition and are approved for inclusion in 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. SOURCE: JP 3-09.3)

unmanned aircraft. An aircraft or balloon that does not carry a human operator and is capable of flight under remote control or autonomous programming. Also called UA. (JP 1-02. SOURCE: JP 3-03)

unmanned aircraft system. That system whose components include the necessary equipment, network, and personnel to control an unmanned aircraft. Also called UAS. (JP 1-02. SOURCE: JP 3-03)

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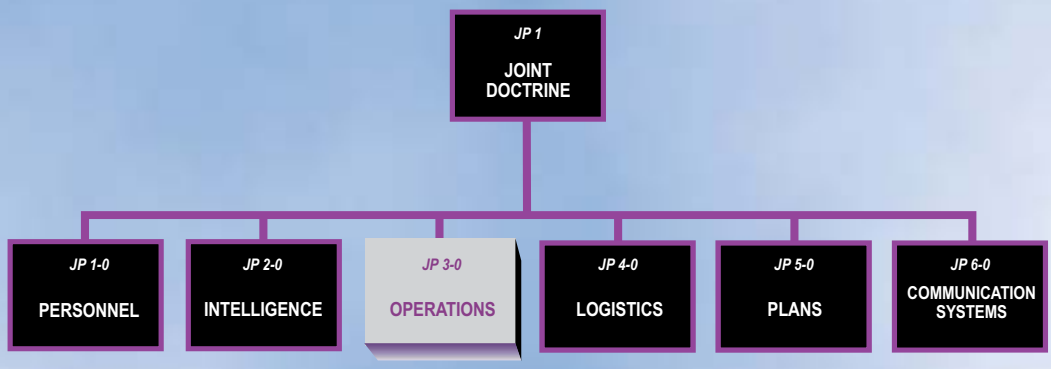
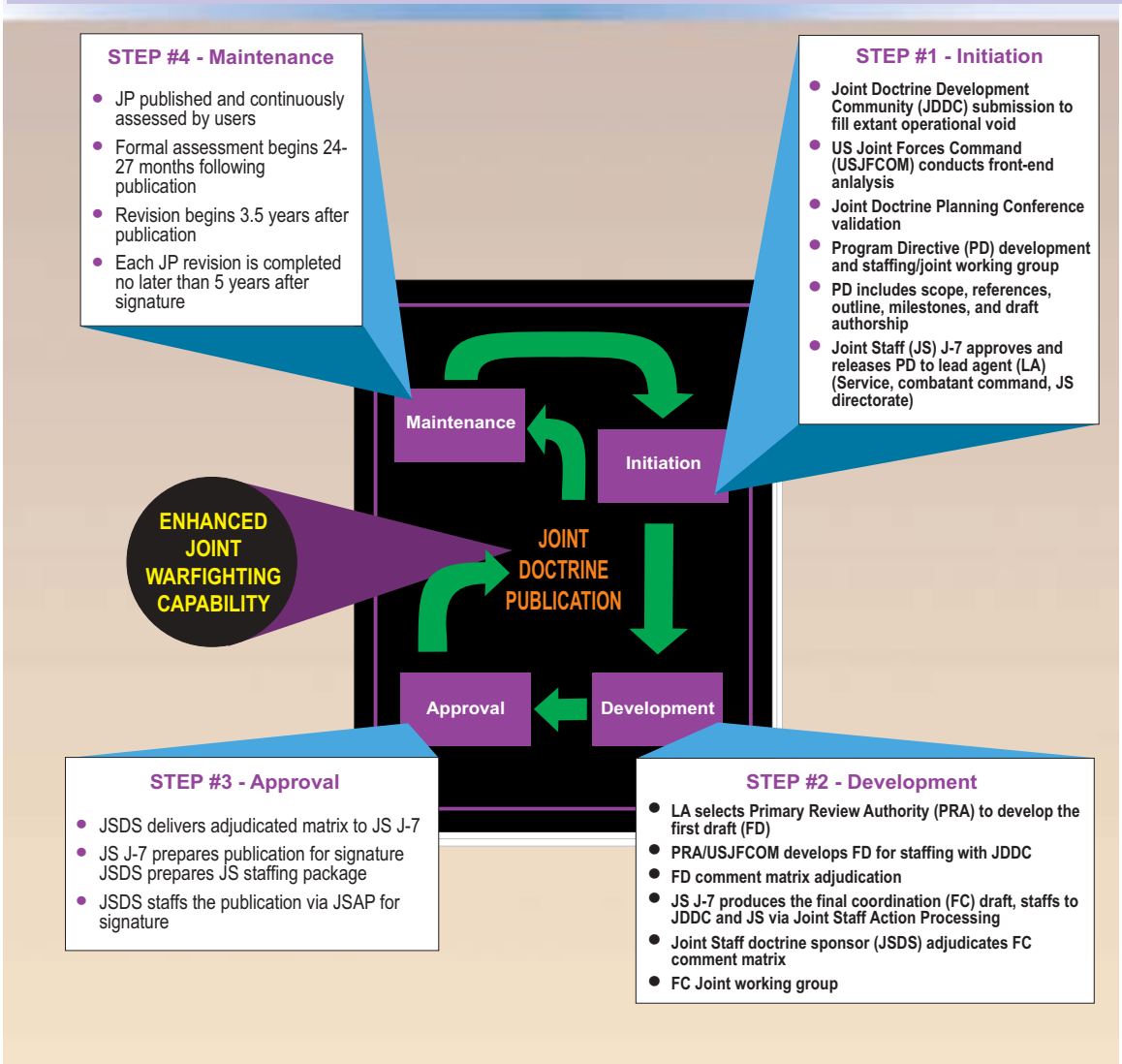


All joint publications are organized into a comprehensive hierarchy as shown in the chart above. **Joint Publication (JP) 3-09.3** is in the **Operations** series of joint doctrine publications. The diagram below illustrates an overview of the development process:

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