CHAPTER I
INTRODUCTION, ORGANIZATION, AND FUNDAMENTALS

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

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

1. Introduction

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

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

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

2. Close Air Support Defined

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

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

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

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

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

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

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

3. Use of Close Air Support

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

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

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

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

(2) Enemy disposition and composition.

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

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

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

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

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

4. Close Air Support Integration

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

5. Fratricide

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

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

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

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

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

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

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

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

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

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

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

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

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

7. Conditions for Effective Close Air Support

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

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

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

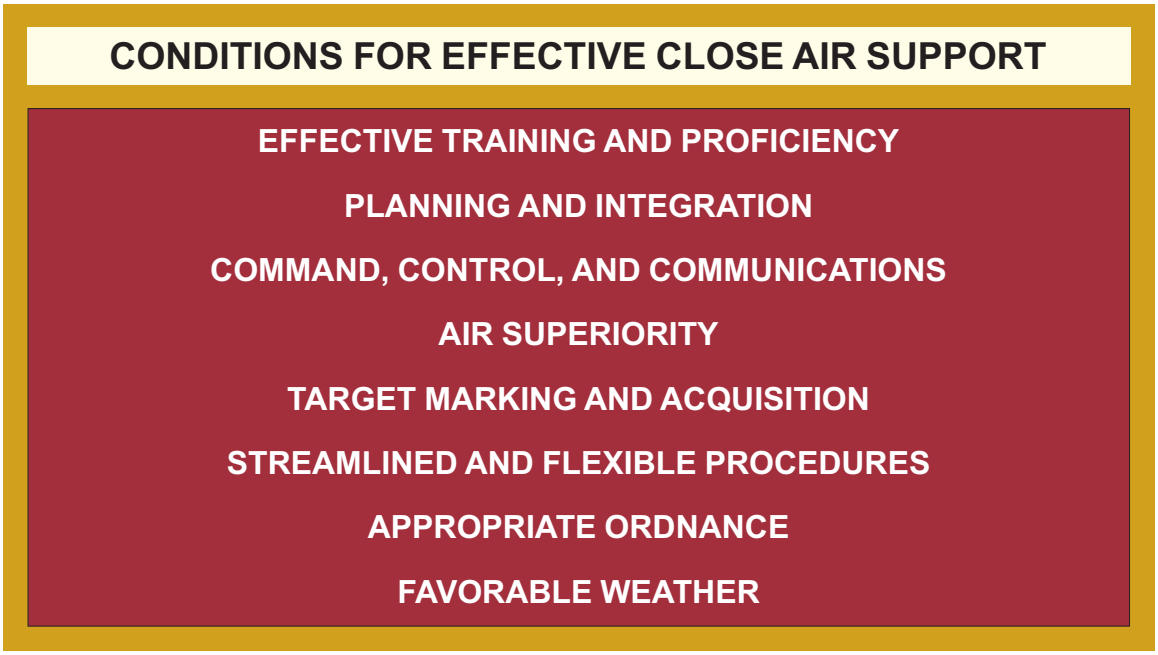

Figure I-1. Conditions for Effective Close Air Support

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

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

e. **Target Marking and Acquisition.** The commander employing CAS can improve its effectiveness by providing timely and accurate target marks. Target marking builds situational awareness, identifies specific targets in an array, reduces the possibility of fratricide, and facilitates terminal attack control. When the commander employing CAS foresees a shortfall in ability to mark for CAS, the commander should request that capability during the planning phase. See Chapter V, "Execution" for further details.

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

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

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

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

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

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

Responsive CAS allows a commander to exploit fleeting battlefield opportunities.

h. **Favorable Weather.** Favorable weather improves aircrew effectiveness regardless of aircraft or weapon capability. Tactical decision aids, such as target acquisition weather software, night vision device (NVD) planning software, infrared (IR) target/scene simulation software, and integrated weather effects decision aid, assist planners and operators by providing target and background detection data. **Before CAS missions are executed minimum weather conditions must be considered.** Targets located solely by radar or geographic coordinates may not offer the aircrew or JTAC precise enough information to ensure positive target identification and assure avoidance of fratricide.

8. Responsibilities

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

b. **Joint Force Air Component Commander. The JFACC is given the authority necessary** to accomplish missions and tasks assigned by the establishing commander. For CAS, **these responsibilities include recommending an air apportionment decision**, allocating forces/capabilities made available from the JFC and components, creating and executing the ATO, and other applicable actions associated with CAS execution. The JFACC maintains close coordination with the other component commanders to ensure CAS requirements are being met in accordance with JFC guidance.

c. **Service Component Commanders. Service component commanders are responsible for ensuring that their assets are capable of executing CAS missions within Service roles or as directed by the JFC.**

and size; priority targets, final protective fires (FPFs), and special munition priority targets; laser equipped observation teams.

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

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

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

5. Command and Staff Responsibilities

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

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

b. **Intelligence Officer.** The intelligence officer is the principal staff officer for all matters concerning military intelligence, counterintelligence, and security operations. In this capacity, the intelligence officer provides current and timely CAS targeting information as well as projected enemy actions. He serves as the focal point for ISR systems that feed real time or near real time battlefield intelligence. The intelligence officer is the source of targeting data and other JIPB information.

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

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

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

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

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

6. Close Air Support Planning Considerations

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(1) Other enemy considerations include:

(a) What are his offensive/defensive capabilities?

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

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

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

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

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

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

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

1. Target updates.

2. Enemy/friendly situation.

3. Surface fire support activities.

4. Surface-to-air threats.

5. Airspace coordination measures.

6. JTAC contact instructions.

(b) **Airborne C2 Assets.** Consider integrating airborne C2 assets to enhance the plan. Are these assets critical and do they warrant specific requests to HHQ? What is the specific role and function of each? As a minimum, review the following:

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

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

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

(c) **TACP.** While corps through brigade TACPs function primarily as liaisons, BN TACPs and company JTACs have the primary responsibility of terminal attack control. It is important to consider TACP capabilities and limitations as well as subordinate or adjacent unit TACPs. This consideration should include personnel (levels of training and qualification) as well as equipment serviceability and availability. How will the TACP move, shoot, and communicate?

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

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

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

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

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

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

(3) **Contrast and Brightness.** A major factor in target detection is the contrast of the target against its background. Camouflaged targets against a background of similar color

may be impossible to detect. All targets, regardless of contrast differences, are more difficult to locate under poor light conditions.

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

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

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

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

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

(a) **Target Acquisition.** Due to limited LOS ranges, both vertical and horizontal, target acquisition will be difficult for both the attacking aircraft and the JTAC. Target marking techniques and attack profiles may have to be altered to engage targets. Smoke has limited effectiveness; however, even in forested terrain, white phosphorous (WP) is normally effective as a marking round.

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

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

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

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

(a) **Target Acquisition**

1. Increased need for marking and designating CAS targets.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

f. **Time Considerations**

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

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

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

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

7. Integrating Close Air Support with Surface Fire Support

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

a. **SEAD. The primary objective of SEAD is to allow friendly aircraft to operate in airspace defended by an enemy air defense system** — including the target area and ingress/egress routes. SEAD missions do not guarantee aircraft immunity from enemy air defenses. JTACs should first evaluate different mission profiles, in order to minimize the aircraft's