MCWP 3-23.2

Deep Air Support

U.S. Marine Corps

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FOREWORD

Deep air support (DAS) was first attempted during the closing weeks of World War I when the U.S. Marine Corps Northern Bombing Group dropped 14 tons of bombs behind enemy lines in 1918. During World War II, offensive air support came into its own as DAS was used extensively in the bombing of enemy air and naval bases. The adoption of "smart bombs" and laser guided weapons such as those utilized during Operation Desert Fox have provided the Marine air-ground task force (MAGTF) with extended operational reach and flexibility and expands its warfighting capability. The MAGTF commander utilizes DAS range, speed, lethality, precision, and ability to focus the convergence of effects in time and space on the desired objective.

Marine Corps Warfighting Publication (MCWP) 3-23.2, *Deep Air Support*, addresses basic DAS tactics, techniques, and procedures. MCWP 3-23.2 complements and expands on the information in MCWP 3-23, *Offensive Air Support*, by focusing on the details of DAS employment in MAGTF operations. Intended for MAGTF commanders, naval commanders, joint force commanders, and their staffs, MCWP 3-23.2 highlights DAS—

- Fundamentals.
- Command, control, and communications.
- Planning.
- Execution.

MCWP 3-23.2 provides the requisite information needed by commanders and staffs to understand DAS employment. Additionally, MCWP 3-23.2 offers standard procedures and terminology used by pilots of fixed- and rotary-wing aircraft in air operations to focus their effects not only on the decisive location but also at the decisive moment in support of the MAGTF concept of operations.

This publication supersedes Fleet Marine Force Manual (FMFM) 5-42, *Deep Air Support*.

Recommendations for improving this publication are invited from commands as well as directly from individuals.

Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

B. B. KNUTSON, JR.
Lieutenant General, U.S. Marine Corps
Commanding General
Marine Corps Combat Development Command

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Deep Air Support

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Chapter 1

FUNDAMENTALS

"Our doctrine does not consist of procedures to be applied in specific situations so much as it establishes general guidance that requires judgment in application. Therefore, while authoritative, doctrine is not prescriptive."

—Marine Corps Doctrinal Publication 1, *Warfighting*

Offensive air support (OAS) is one of the six functions of Marine aviation and is implemented to counter the enemy's ability to maneuver, mass or strike. OAS is further subdivided into deep air support (DAS) and close air support (CAS).

The Marine air-ground task force (MAGTF) commander uses aviation's flexibility, responsiveness, and operational reach in fighting a single battle concept. While the battlespace may be conceptually divided as deep, close, and rear, the MAGTF commander's intent ensures a unity of effort by fighting a single battle. This manual focuses on DAS and how the MAGTF commander can utilize DAS to shape the battlespace. The MAGTF commander can designate the aviation combat element (ACE) as the main effort, with priority of effort towards DAS, to focus the efforts of the force to accomplish the mission. DAS can be used in support of specific surface forces to divert, disrupt, delay or destroy threat forces without detailed integration with the fire and movement of the friendly surface forces.

DAS aircraft engage high-payoff targets (HPTs) that were identified in the MAGTF's targeting cycle. The MAGTF's single-battle concept exploits DAS to achieve the desired effects of shaping actions that set conditions for decisive action in the battlespace. Typically, the apportionment percentage of DAS sorties will be greater during pre-assault operations, and less during the assault phase, due to an increase in CAS apportionment percentage during the assault phase. (See chapter 3 for more discussion on apportionment decisions.)

DAS is air action against enemy targets at such a distance from friendly forces that detailed integration of each mission with fire and movement of friendly forces is not required. DAS can be conducted on either side of the fire support coordination line (FSCL). The determination of proximity to friendly forces determines the amount of integration required.

CAS is air action by fixed- and rotary-wing aircraft against hostile targets in close proximity to friendly forces, which requires detailed integration with the fire and movement of those forces for each air mission prior to ordnance delivery. The major difference between DAS and CAS is the amount of coordination required by aircrew with friendly surface forces prior to the delivery of ordnance. The tactics, techniques, and procedures for CAS are covered in Marine Corps Warfighting Publication (MCWP) 3-23.1, *Close Air Support*.

Detailed integration, for the scope of this manual, is based on proximity, fires or movement as the determining factor. An example of detailed integration is when the controlling fire support coordination center (FSCC) requires aircrew to obtain positive control from a forward air controller (FAC) prior to employing airborne ordnance due to the close proximity of friendly forces. This is a typical example of how CAS will be executed. The critical link between the aircraft and supported FSCC is the FAC on the ground. An airborne FAC (FAC (A)) is able to perform the same mission as a ground FAC and will be considered interchangeably in discussions concerning detailed integration. (See MCWP 3-23.1 for more discussion on positive control.)

DAS differs from CAS in that approval to deliver airborne munitions from the supported FSCC is not required or is obtained before takeoff or entering the controlling FSCC's area of responsibility. It is the responsibility of the MAGTF commander and ACE commander to ensure DAS utilized inside the FSCL is coordinated properly between aircrew and friendly forces to prevent fratricide. However, DAS missions will not usually be flown within close proximity of friendly forces. It should not be assumed that DAS only needs to be deconflicted with surface forces inside the FSCL. There maybe cases where friendly special operation forces or other friendly surface forces are operating outside the FSCL. Once again, it is the responsibility of the joint force commander (JFC) and MAGTF/ACE commander to ensure DAS missions are deconflicted with surface forces outside the FSCL. DAS missions include air interdiction (AI), armed reconnaissance (AR), and strike coordination and reconnaissance (SCAR).

MISSION CLASSIFICATION

Air Interdiction

Successful AI missions require accurately located targets. Accurate location of enemy targets can be gathered through a variety of sources: visual and photo reconnaissance, radar imaging, human intelligence (HUMINT), signals intelligence (SIGINT), and unmanned aerial vehicle (UAV) operations.

Depending on the location of potential AI targets and enemy air defenses of the potential targets, multiple aircraft packages may be required to complete a single AI mission. Aerial refueling assets or forward arming and refueling points (FARPs) may be required if targets are located far from main operating bases. Enemy surface-to-air defenses determine the requirements for suppression of enemy air defenses (SEAD) and fighter escort support that may be required to effectively conduct AI.

AI plays an important role in the MAGTF's ability to neutralize or destroy the enemy's war fighting capability. See Joint Publication (JP) 3-03, *Doctrine for Joint Interdiction Operations*, for more information on how DAS is used for the joint interdiction effort.

Armed Reconnaissance

Similar to AI, the ACE will use the MAGTF's target priority list to determine HPTs for search and destruction. Because target locations are unknown, AR usually requires aircrew to be exposed over enemy territory for longer periods of time searching for potential targets. AR missions may also serve as a collection plan to answer commander's critical information requirements (CCIR). The MAGTF commander may use AR in a variety of ways, such as:

- Identify previously unlocated enemy forces and engage them before they can threaten MAGTF forces.
- Deny the enemy undetected movement and use of key areas.
- Provide timely warning of enemy location and intentions.

- Prevent or degrade enemy mobility and hostility through show of force.
- Collect and report on CCIR.
- Recon large areas of terrain not easily monitored by friendly surface forces.
- Attack time sensitive targets (i.e., mobile threat systems).
- Serve as a collection plan to monitor MAGTF target areas and named areas of interest.
- Support of security operations, either in support of another unit or as the primary unit conducting the cover, guard or screen operations.

AR planning considerations focus on the length and duration that AR is required by the MAGTF. If the ACE is tasked with providing a section (two) of aircraft to conduct AR 24 hours a day, typically one entire squadron worth of assets will be dedicated to performing AR. The support requirements, tactics, and type of aircraft necessary to perform AR are the same as those required for AI.

Weather and battlespace obscurations can adversely affect the successful conduct of AR missions. Clouds, fog, rain, and haze can hinder normal vision and onboard aircraft sensors (e.g., infrared (IR) detection systems, television systems, lasers, and optical systems). Ground fire and camouflage can also hinder aircraft acquisition systems.

When planning and integrating AR into the MAGTF's overall fire plan, it is important to assign AR aircraft to common reference system. The grid box reference system is extremely useful when more that one component may be attacking targets both inside and beyond the FSCL. Each component commander, as well as the JFC, can use a joint "grid box" system to facilitate deconfliction and execution of attacks against surface time sensitive targets throughout the operational area. These "grid boxes" may also be referred to as airspace coordination areas (ACAs). AR missions do not prevent other supporting fires into the ACA where AR operations are being conducted. However, the FSCC responsible for the ACA should set-up the necessary coordination measures to deconflict surface fires with AR aircraft. AR aircraft should also check in with the controlling surface unit responsible for the ACA prior to entering. (See Marine Corps Reference Publication (MCRP) 3-16B, *The Joint Targeting Process and Procedures for Targeting Time-Critical Targets*, and chapter 3 for more information on grid boxes and ACAs.)

Strike Coordination and Reconnaissance

Specifically, SCAR platforms may discover an enemy target and provide a target mark (laser, rocket, talk-on, etc.) for AR missions or accurately locate targets for AI missions. SCAR can also be as simple as the coordination between one aircraft exiting a grid box and passing enemy target locations inside that grid box to another AR aircraft. SCAR aircraft provide the ACE commander with an extended view of the battlespace.

SCAR platforms may be tasked specifically and the aircraft configured with the capability to designate targets for destruction by other DAS aircraft. SCAR aircraft should not be confused with FAC (A) aircraft. FAC (A) aircraft are a direct extension of a surface FAC. SCAR aircraft, like other DAS platforms, do not require detailed integration with surface forces for the delivery of munitions. Because detailed integration is not required with surface forces and SCAR platforms do not normally operate close to friendly surface forces, there are no special qualifications required for an aircraft to be tasked as a SCAR platform.

SCAR platforms can be used to enhance the effectiveness of DAS missions by narrowing search areas for other AR aircraft and potentially locating targets for AI missions. During Operation Desert Storm, Marine Corps F/A-18Ds were used to narrow down search areas for other aircraft. The F/A-18Ds were used to continuously monitor specific "kill boxes" (grid box reference system used during Operation Desert Storm) in front of Marine positions and proved to be very efficient in directing other aircraft to targets. Airborne CAS aircraft that were not being utilized and having insufficient fuel to conduct an extensive search of their own were able to receive targeting information from the F/A-18Ds. Often, the F/A-18Ds provided timely targeting information and a target mark for these aircraft to employ their ordnance.

Some important considerations are listed below in regards to what a SCAR platform is and what it may provide the MAGTF and ACE commanders.

- Does not require a FAC (A) qualification to execute terminal control of DAS missions.
- Provides target, location, description, threat, and area weather.
- Provides a target mark but not clearance to drop ordnance.
- Confirms or locates surface to air threats.
- Assists with bomb or battle damage assessment (BDA).
- Assists the Marine Corps Air Command and Control System (MACCS) in directing the flow of aircraft conducting DAS missions.
- Generally different from a reconnaissance mission in that SCAR locates and coordinates target destruction and will typically be armed with munitions and systems that better enhance target designations.

- Can be performed by any fixed-wing or rotary-wing attack aircraft.

THREAT LEVELS

Threat levels determine DAS feasibility. The three threat levels that are general in nature are low, medium, and high. Threat levels extend from no air threat capability on the low end to a sophisticated and well-integrated air defense system on the high end. Determination of the threat level is based on:

- Friendly aircraft capabilities and limitations.
- Weather expected.
- Type, quantity, and quality of individual threat weapons and weapons systems.
- Command, control, and communications (C3) systems used to integrate enemy weapon systems.
- Quality of the enemy's forces.
- Level of operator training and experience on threat system.

Threat level determination is based heavily on enemy capabilities but friendly capabilities are also weighed in meeting the threat and environmental conditions. Air defense systems that present a low or medium threat level for a type of aircraft may present a high level for another type of aircraft. A medium threat level during daylight hours may be low threat level at night. Current intelligence is used to determine the threat level. Threat level determination aids aircrews when preparing tactics for a particular situation and environment. (See MCWP 3-23, *Offensive Air Support*, for more information on threat levels.)

CONDITIONS FOR EFFECTIVE DEEP AIR SUPPORT

For DAS to be executed effectively, some basic conditions that optimize DAS employment must be considered. DAS is possible without meeting all of these conditions, however its effectiveness may be impaired. The following paragraphs are some considerations essential for conducting effective DAS.

Timely and Accurate Intelligence

To effectively employ DAS assets, accurate and timely intelligence is critical. When executing DAS missions, target location (either general or specific) can minimize an aircrew's exposure to potential threats. Information on adversary air-to-air and surface-to-air capabilities is essential in planning appropriate support assets to protect DAS forces and employ appropriate tactics.

Accurate Coordinates for Global Positioning System

Joint direct attack munition (JDAM) and joint standoff weapon (JSOW) require accurate target coordinates and elevation for effective employment. The maximum target location error (TLE) for these weapons is 7.2 meters for JDAM and 7.5 meters for JSOW. Additionally, aircraft navigation systems and target acquisition sensors require accurate coordinates and elevation.

Local Air Superiority

Local air superiority is necessary to provide security for aircrew engaged in DAS. Air superiority may range from local or temporary control to control over the entire theater. Multiple aircraft have the capability to conduct self-escort into the target area by carrying both air-to-air and air-to-surface weapons. However, due to range limitations and aircraft loading and tactics, this may degrade the effectiveness of DAS aircraft in completing their mission. Theater-wide air superiority or supremacy is not required to conduct DAS operations. However, DAS aircrew must be free from prohibitive enemy air threats in the local operating area.

Suppression of Enemy Air Defenses

SEAD is an activity that neutralizes, destroys or temporarily degrades surface-based enemy air defenses by destructive and/or disruptive means. The level of SEAD effort is determined by the threat level and the degree to which the threat must be reduced. SEAD during the attack phase of a DAS mission may not be enough. It may be necessary to destroy or disrupt all or parts of an enemy's integrated air defense system throughout the period of DAS aircraft operations.

Effective Communications and Early Warning

Threat cueing provided to aircrew by surface or airborne systems is critical to prevent friendly losses and fratricide. Detection of the threat system and changes to the friendly scheme of maneuver must be communicated to DAS aircrew as expeditiously as possible. This will aid in attacking time sensitive targets and aid in preventing fratricide by providing situational awareness. Due to the long range to some targets, AI missions may be conducted without direct communication with the MACCS. Therefore, it is important that ACE commander's plan include coordinating with external assets such as Airborne Warning and Control System

(AWACS) platforms to provide appropriate threat cueing and direction for Marine DAS missions.

Favorable Weather

Favorable visibility improves aircrew effectiveness regardless of the type of aircraft flown. The ACE commander determines the worst weather conditions (minimum ceiling and visibility) in which DAS missions can be conducted based on regulations, aircraft and equipment limitations, and aircrew experience. Weather conditions worse than those considered as the minimum will significantly degrade the ability to perform DAS.

Weaponeering

Weaponeers must identify the proper weapons load, fuze settings, and delivery parameters to achieve desired effects on target. Cluster and general-purpose munitions are very effective against troops and stationary vehicles. However, hardened, mobile or pinpoint targets may require specialized weapons, (laser-guided, electro-optical or IR munitions) or aircraft with special equipment or capabilities. Chapter 2 discusses the planning for target destruction via DAS aircraft.

Aircrew Skill

DAS execution is complex. Aircrew skill can have a major impact on mission success. Maintaining a high degree of proficiency requires aircrew practice and extensive training with current tactics and all available weapon systems.

SUMMARY

DAS provides the MAGTF commander the flexibility, responsiveness, and depth to fight the single battle concept. DAS is vital to maneuver warfare, due to aviation's flexibility, responsiveness, and range. The MAGTF commander employs DAS as AI, AR, and SCAR to impose his will on enemy forces and shape the battlespace for future operations. Effective DAS operations depend on air superiority, weaponeering, battlespace threat level, intelligence, favorable weather, SEAD, and aircrew skill. Through the appropriate use of DAS, the ACE can provide the MAGTF commander with a potent main effort or an effective force multiplier that can have demoralizing and devastating effects on the enemy.

Chapter 2

COMMAND, CONTROL, AND COMMUNICATIONS

"[W]hoever can make and implement decisions consistently faster gains a tremendous, often decisive advantage. Decisionmaking in execution thus becomes a time-competitive process, and timeliness of decisions becomes essential to generating tempo."

—Marine Corps Doctrinal Publication 1, *Warfighting*

Critical to the success of any military operation is the commander's ability to make accurate tactical decisions more quickly than the enemy. Because commanders cannot be physically present over all the battlespace, they must rely on communication channels to relay their intent, gather information, and influence the battle. This chapter deals with Marine aviation philosophy of centralized command and decentralized control in the context of conducting DAS operations.

DAS provides the commander a significant capability to shape the battlespace and impose his will directly on the enemy. This would make command and control (C2) almost impossible if the commander had no way of communicating his intentions to aircrew and the aircrew had no way of communicating their mission results to the commander.

Specifically, to generate greater tempo relative to the threat, a simple, redundant, and reliable C2 system is required. The MACCS is designed to accomplish these requirements. Several unique factors affect the ability of the MACCS to effectively conduct DAS management. The MACCS agencies utilized for C2 of DAS are discussed in this chapter.

MARINE AIR COMMAND AND CONTROL SYSTEM

The MACCS provides the MAGTF with the means to integrate, coordinate, and control all air operations within its area of operations and with joint/combined forces. The principal agencies of the MACCS concerned with DAS are the Marine tactical air command center (TACC), tactical air operations center (TAOC), and the direct air support center (DASC).

Marine Tactical Air Command Center/ Tactical Air Direction Center

The Marine TACC is the senior MACCS agency and is the focal point for aviation command and control. It is the operational command post for the ACE commander. Functionally, it is divided into mutually supporting sections: current operations, future operations, future plans, and air combat intelligence. The current operations section executes the current day's air tasking order (ATO) and includes the deep battle cell. The Marine TACC is capable of functioning as the joint air operations center (JAOC) when the Marine component provides the joint force air component commander (JFACC).

During amphibious operations, the Marine TACC is incrementally phased ashore. Initially, it is a tactical air direction center (TADC) subordinate to the Navy TACC.

The deep battle cell is responsible to the ACE commander for the management of all aviation assets assigned or available to the ACE used in the execution of deep air operations for the MAGTF. Located in the current operations section of the TACC, the deep battle cell will provide the ACE Commander/Senior Watch Officer with the status and results of all DAS missions. The deep battle cell and assessment cell may redirect DAS assets for the destruction of time sensitive targets at the discretion of the ACE and MAGTF commanders. During the planning and execution of DAS missions, the TACC's future and current operations cells should ensure appropriate deconfliction and coordination are conducted with surface forces to prevent fratricide. The deep battle cell doesn't control aircraft. It coordinates the necessary routing and provides the frequency and contact information to Marine air wings, Marine aircraft groups, and squadrons for re-tasking or diverting DAS missions through MACCS agencies. See MCWP 3-25.4, *Marine Tactical Air Command Center Handbook*, for a detailed discussion of the TACC.

Tactical Air Operations Center

The TAOC is subordinate to the Marine TACC. It provides routing, radar control, and surveillance for DAS aircraft en route to and from target areas. See MCWP 3-25.7, *Tactical Air Operations Center Handbook*, for specific details.

Direct Air Support Center

Typically, this center is the first principal MACCS agency established ashore in an area of operations and is subordinate to the Marine TACC. The DASC serves as the alternate TADC for a limited period when the TACC echelons move or become a casualty. The DASC processes immediate air support requests, coordinates aircraft employment with other supporting arms, manages terminal control assets supporting ground combat element (GCE) and combat service support element (CSSE) forces, and procedurally controls assigned aircraft, UAVs, and itinerant aircraft transiting through DASC controlled airspace.

The DASC does not normally control aircraft conducting DAS missions due to the lack of detailed coordination between ground forces' DAS missions. However, the DASC may relay BDA and mission reports from DAS missions to the senior FSCC when required. (See appendix F for an example of in-flight reports.) Normally, the DASC collocates with the GCE's senior FSCC. However, in a MAGTF with multiple GCEs, the DASC may be physically or electronically collocated with the MAGTF CE's force fires coordination center (FFCC)/FSCC. Additionally, the capability exists to operate an airborne variant of the DASC from a KC-130 aircraft. The DASC airborne (DASC (A)) normally serves as an airborne extension of the DASC, but can be employed in lieu of a DASC for a limited [illegible] See MCWP 3-25.5, *Direct Air Support Center Handbook*, for a detailed discussion of the DASC.

Supporting Arms Integration

The link between the DASC and the senior FSCC is critical for the coordination and integration of the supporting arms capability that DAS missions provide when they are conducted inside the FSCL. Aircrews can pass visual reconnaissance reports that are essential to timely battlefield targeting directly to the DASC, which then passes this information to the Marine TACC/TADC and the senior FSCC. The FSCC uses these visual reconnaissance reports in the detect phase of the targeting cycle.

AIRSPACE CONTROL MEASURES

Airspace control measures increase operational effectiveness. They also increase DAS effectiveness by ensuring safe, efficient, and flexible use of airspace. Airspace control measures speed the handling of air traffic to and from the target area and minimize the chance of fratricide, and assists air defense identifying adversary aircraft or civilian interlopers.

The airspace control authority, designated by the MAGTF commander/JFC, coordinates and integrates the use of the airspace control area. The airspace control area is the airspace that is laterally defined by the boundaries of the area of operations. The airspace control area may be subdivided into airspace control sub-areas. (JP 3-52, *Doctrine for Joint Airspace Control in the Combat Zone*) The airspace control authority establishes an airspace control system that is responsive to the needs of the MAGTF commander/JFC, provides for integration of the airspace control system with that of the host nation, and coordinates and deconflicts user requirements.

The airspace control authority develops the airspace control plan (ACP) and, after the MAGTF commander/JFC approval, promulgates it throughout the area of responsibility/joint operations area. Implementation of the ACP through the airspace control order (ACO) must be complied with by all components.

The methods of airspace control vary throughout the range of military operations from war to military operations other than war (MOOTW). The methods range from positive control of all air assets in an airspace control area to procedural control of all such assets, with any effective combination of positive and procedural control measures between the two extremes. See JP 3-52 and MCWP 3-25, *Control of Aircraft and Missiles*, for further discussion on airspace control authority and airspace control planning considerations.

DAS aircraft may use formal minimum risk routes (MRRs) and special corridors detailed in the ACO or use informal routing assigned by the TAOC to transit to and from their target areas. Once inside the target area, DAS aircraft may use procedural control measures detailed in the ACO, such as ACAs, to aid in fire support coordination and coordinating altitudes through the DASC to efficiently attack targets.

Minimum Risk Routes

MRRs are an airspace control measure used primarily for crossing forward line of own troops (FLOT) operations. These temporary corridors of defined dimensions are recommended for use by high-speed, fixed-wing aircraft that present known hazards to low-flying aircraft transiting the combat zone. MRRs are established considering the threat, friendly operations, known restrictions, known fire support locations, and terrain. MRRs also reduce the chance of fratricide between friendly aircraft on return-to-force (RTF) with other friendly aircraft and air defense units. If on-board aircraft communications cannot establish or transmit the appropriate identification, friend or foe (IFF) signal (lame duck) due to battle damage or system failure, the most non-threatening profile of which the aircraft are capable should be flown. MRRs provide a predictable flight path (ground track, altitude, and airspeed) to aide in the positive identification of aircraft. Depending on the threat's air surveillance capabilities, limiting friendly aircraft to specific MRRs may make friendly aircraft more recognizable and vulnerable to enemy surface-to-air systems. Aircrew intentions should always be broadcast despite the ability to gain and maintain radio contact with friendly force air control agencies. See figure 2-1.

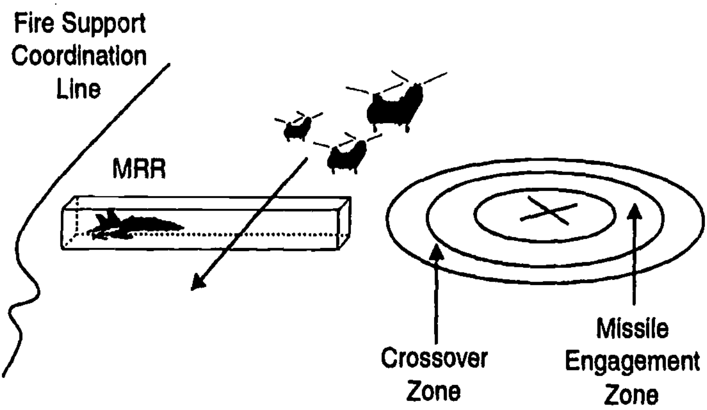

Figure 2-1. Minimum Risk Routes

Special Corridors

Special corridors may be in place when DAS missions require transit over neutral countries not involved in the theater of operations. Special corridors are simply international flight plans that have been approved by the country being overflown to deconflict civilian and military aircraft. These established corridors have defined dimensions and should not be confused with MRRs. MRRs are released to friendly forces only via the ACP or ACO; where as special corridors are released by civilian aviation authorities. Operation Deny Flight is an example where special corridors were used as North Atlantic Treaty Organization (NATO) aircraft transited through Croatian airspace to get to the combat zone.

Informal Routing

Informal routing may be generated by the controlling C2 agency and can be used to deconflict specific AI missions from other aircraft and fires where a more formal MRR is not required.

Airspace Coordination Areas

ACAs provide a universal, joint perspective defining specific areas of battlespace, enabling the JFC and component commanders to efficiently coordinate, deconflict and synchronize surface target attacks. The grid box reference system mentioned earlier procedurally deconflicts friendly ground forces with AR and SCAR missions. ACAs can be used as an informal airspace control measure and be subdivided into grid boxes measuring 15 nautical miles by 15 nautical miles, depending on the performance (range, sensors, and weapons) of participating aircraft, and the potential threats in the area. When AR or SCAR aircraft are employed they may be held at a control point (CP) outside their assigned grid box until other assets clear the area. Aircraft may check in with various controlling agencies as they proceed to the target area. The important thing to note is that if aircraft are talking with the controlling agency and are able to transmit the appropriate IFF signal, they can transit direct from their air base, to their assigned grid box, and back again.

In figure 2-2, ACAs Alpha and Bravo are depicted. Figure 2-3 shows how ACA "A" is further subdivided into grid boxes (15 nautical miles by 15 nautical miles). AR and SCAR missions will be assigned grid boxes in the ATO. For example, two AH-1W Cobras performing an AR mission are assigned grid box "A1A" in the ATO. The first A (A1A) is for ACA Alpha; the 1 (A1A) depicts the column; and the second A (A1A) is for the row. The upper left grid box of ACA Alpha is "A1A."

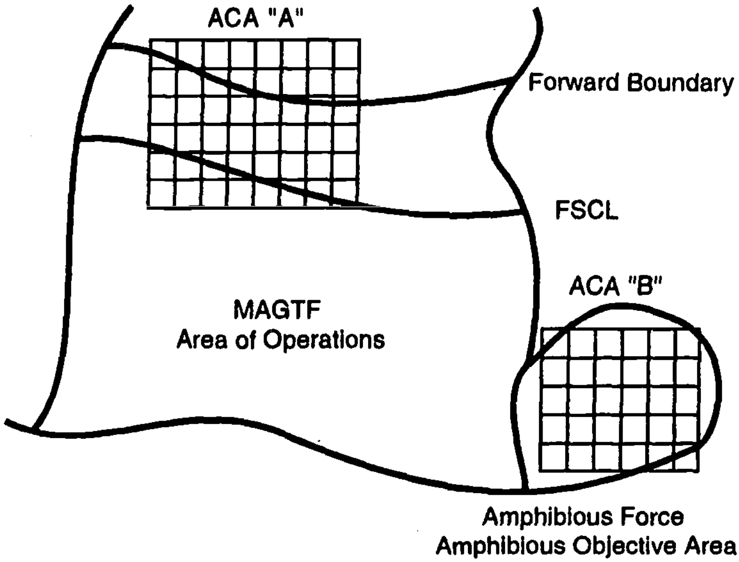

Figure 2-2. Separate Grid Box Systems.

ACA "A"

	1	2	3	4	5	Etc.	
CP **A**	**1A**	**2A**	**3A**	**4A**	**5A**	**Etc.**	
B	**1B**	**2B**	**3B**	**4B**	**5B**	**Etc.**	CP

Figure 2-3. Grid Box Labeling and Identification.

See MCRP 3-16B and MCWP 3-25 for further techniques and procedures on informal and formal airspace control measures.

AIR INTERDICTION

During most AI missions, target locations are known and the C2 requirements are not as complicated as those found in other forms of offensive air support. Generally, during the execution phase of the mission, the MACCS will provide flight following and airborne threat warning to the AI package on the way to the target and facilitate their safe return. Due to the limits of ground base radar coverage, the MACCS may use a combination of positive and procedural control to protect and deconflict AI aircraft from other aircraft. Positive control procedures are typically provided to aircrew when the MACCS can positively track friendly aircraft and direct them through friendly airspace via radar. Procedural controls may be used when the MACCS is unable to monitor friendly aircraft directly or when there may be a high volume of air traffic. Typically, MRRs will be established to provide procedural control and aid in the identification of friendly aircraft. See MCWP 3-25 for a more detailed discussion of air control procedures.

While not a requirement, an additional consideration is the ability of the MACCS to maintain communications with the AI package during the conduct of their mission. This not only allows for increased situational awareness as to the progress and success of the mission, but also allows the commander the ability to dynamically retask these aircraft if required. The ability for the MACCS to maintain this communication is often strained due to the distance to the target and limited communications capabilities of the AI aircraft. The use of external C2 assets (such as AWACS, E-2C, airborne battlefield command and control center (ABCCC), etc.) may help eliminate some of MACCS limitations. These assets or organic MACCS agencies can relay BDA information to the TACC deep battle cell. Aircrew returning from AI missions should transmit mission results to the DASC or DASC (A) to be relayed to the TACC.

ARMED RECONNAISSANCE

Central to the MAGTF's desire to conduct AR is the ability to provide OAS at the most opportune time and place. AR provides the MAGTF an economy of force to cover and defend terrain not suited to other forces if an effective means of C2 exists. It is during AR that the MACCS must be most flexible and responsive. By providing the MAGTF commander with a real-time vision of his air support, he is able to apply his resources in the most efficient manner. It is also critical for aircrew to send real-time information through the MACCS while airborne. Although aircrew in-flight reports may not have been analyzed by intelligence experts, the ACE may combine these reports with other intelligence data to gain greater insight into the enemy situation and intentions.

The MACCS should ensure that a structure exists to provide this situational awareness to the commander and allow him to communicate his desires to those DAS aircraft executing missions. The ACE commander should ensure a consistent and redundant interface with the MAGTF's FFCC or applicable FSCC.

The ACE can then translate the MAGTF commander's desires as to the conduct of deep air support operations into tasking for his aircrew. This is especially critical during the conduct of AR missions. Unlike AI missions which are planned and flown against known targets, the dynamic nature of AR requires the ability to communicate changes to the aircrew as decisions are made by the MAGTF commander as time sensitive targets appear. As the ACE commander makes decisions in concert with the

MAGTF commander's guidance, the TACC should direct mission changes to AR aircraft via the MACCS. The role of the deep battle cell within the TACC is most critical during AR missions.

STRIKE COORDINATION AND RECONNAISSANCE

SCAR aircraft provide the ACE commander with an extended view of the battlespace. The ACE commander, via the deep battle cell located in the TACC, will direct SCAR aircraft with monitoring and reporting on certain areas of the battlespace. For example, a SCAR aircraft can be sent to a specific ACA or avenue of approach to search for high priority targets on the MAGTF's target list before other AR or AI platforms are committed.

SCAR platforms locate targets and collect information that should be passed to the deep battle cell in the TACC via a MACCS control agency. The deep battle cell will direct destruction with other DAS assets. Additionally, if the MAGTF target list changes or higher priority targets are located by other sources, then a MACCS control agency can relay this information to SCAR aircraft. If no SCAR aircraft are available, the TACC will direct AR aircraft through the MACCS to execute the mission.

DAS COMMUNICATION

Information exchange by tactical communication means is necessary to facilitate DAS and provide the MAGTF commander the situational awareness to shape his battlespace. Communications must be mission-tailored and robust to ensure links between aircraft and MACCS agencies are maintained to minimize the chance of fratricide and enhance mission effectiveness. Flexibility and responsiveness of DAS communications is made possible by using a variety of techniques, including secure frequency agile equipment; appropriate countermeasures; disciplined emission control (EMCON); and standard communication nets.

The MACCS provides the ACE commander with the means to exercise C2 of organic and nonorganic aviation assets necessary to support MAGTF DAS operations. The MACCS consists of various air C2 agencies designed to provide the ACE commander with the ability to monitor, supervise, and influence the application of DAS from the TACC. This manual specifically deals with Marine DAS tactics, techniques, and procedures. However, Marines find themselves more often than not operating in joint, combined or multinational operations. Functional equivalents to the Marine TACC that may support Marine aviation in DAS operations are the Navy's TACC and Air Force's air operations center (AOC). In the joint or combined environment the JFC will designate a JAOC to orchestrate theater operations and tasking. See JP 3-56.1, *Command and Control of Joint Air Operations*, Naval Warfare Publication (NWP) 3-09.11M, *Supporting Arms in Amphibious Operations*, and MCWP 3-25.2, *Multi-Service Procedures for Theater Air-Ground System* for a detailed discussion of functional equivalent agencies and C2 of joint air operations.

During the conduct of AI operations beyond the FSCL, aircrew will check-in on a tactical air direction (TAD) net with the MACCS agency that provides deep air operations coordination. If possible, AI missions should be conducted on a single TAD net, where threat warning and other information can be passed. Also, if the deep battle cell or a SCAR platform has mission critical information to be passed, mission commanders can be contacted on this single TAD net. AR missions should check-in with the MACCS control agency providing deep battle coordination. However, due to the high volume of communication between flight members conducting AR, it may be necessary to assign separate TAD nets to each ACA or grid box.

When conducting DAS inside the FSCL, aircrews should check-in with the TAOC after contacting the DASC. The DASC should pass friendly forces situational awareness and any information about other aircraft operating in the immediate vicinity. If the DASC is unavailable or cannot be contacted, aircrews will contact the local FSCC for friendly forces situational awareness. It is critical when conducting DAS inside of the FSCL that aircrew contact the appropriate organization to ensure their fires or effects from their fires do not cause friendly casualties or disrupt friendly maneuvers.

SUMMARY

DAS missions require a flexible, efficient, and controlled system to ensure the assets committed to these missions effectively apply their combat power in a timely manner. The use of SCAR platforms, a deep battle cell within the TACC, and the MACCS can greatly increase the planning and responsiveness of our limited DAS assets. Prior to executing DAS missions, the TACC must ensure coordination and communication with the senior FSCC to avoid delivering ordnance on or near friendly forces inside and outside the FSCL.

C2 is essential to all MAGTF operations and crucial to success in war. Therefore, it is important that timely and accurate information flows throughout the MACCS control agencies, and that radio in and out procedures are understood by all participating units and aircrew. Furthermore, aircrew should send in-flight reports as time and the situation allows. Airspace coordination measures, whether formal and informal or positive and procedural, will ensure the safe, efficient, and flexible control of aircraft and ground forces in the area of operations.

Chapter 3

PLANNING

"Planning encompasses two basic functions—envisioning a desired future and arranging a configuration of potential actions in time and space that will allow us to realize that future. Planning is thus a way of figuring out how to move from the current state to a more desirable future state—even if it does not allow us to control the transition precisely."

—Marine Corps Doctrinal Publication 5, *Planning*

Planning is the act of envisioning and determining effective ways of achieving a desired endstate. It supports the commander in making decisions in a time-constrained and uncertain environment.

Deep operations shape the battlespace to influence future operations. They seek to create windows of opportunity for decisive action, restrict the enemy's freedom of action, and disrupt the cohesion and tempo of his operations. The MAGTF commander's primary tool for shaping the deep battlespace is DAS.

To gain and maintain tempo, commanders, staffs, and aircrews must be involved in all modes and levels of DAS planning by ensuring a constant flow of information vertically within the chain of command and laterally among staff sections. Planning activities occupy a hierarchical continuum that includes conceptual, functional, and detailed levels of planning.

At the highest level MAGTF is conceptual planning. At the lowest level (aircrew) we have detailed planning. Between the highest and lowest (ACE) level is the functional level that involves elements of both conceptual and detailed planning in different degrees. See MCDP 5 for more information on the planning hierarchy. This chapter focuses on elements critical to DAS planning at the MAGTF, ACE, and aircrew levels.

MAGTF

The key to planning at the MAGTF level is through appropriate representation of the six warfighting functions: C2, maneuver, fires, intelligence, logistics, and force protection. Through integrated planning of these fundamental functional areas, we can eliminate many of the omissions that have proven fatal to plans in the past and better visualize the interactions throughout the battlespace that will occur in execution.

An operational planning team (OPT) may be formed to focus the planning effort and gather relevant planning expertise. Normally, the OPT is built around a core of planners from either the future plans section or the future operations sections. The OPT may also be augmented by warfighting function representatives, liaison officers, and subject matter experts needed to support planning. See MCWP 5-1, *Marine Corps Planning Process*, and MCWP 3-23 for more information on OPTs. The OPT serves as the linchpin between future plans, future operations, and current operations sections. (See figure 3-1.)

Not only does the MAGTF use integrated planning within the staff, but it also uses the OPT as a vehicle to integrate planning among major subordinate commands (MSCs). (See figure 3-2.) MSC elements and their respective OPTs pass information to their common higher headquarters (the MAGTF) while integrating and coordinating their own efforts among themselves.

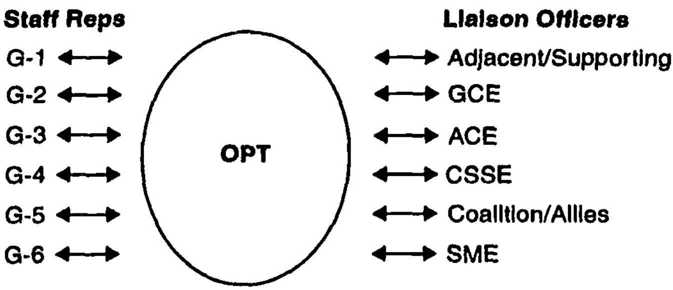

Figure 3-1. Appropriate Representation.

ACE representatives in the OPT provide MAGTF planners with inherent capabilities and limitations of the ACE in planning DAS operations.

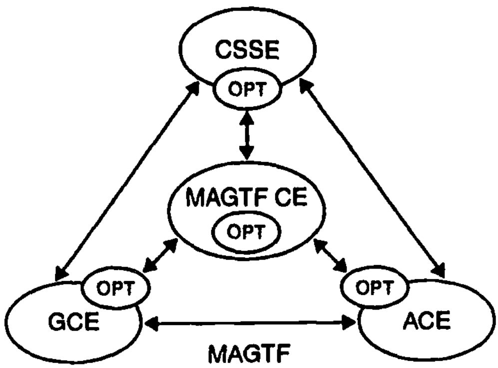

Figure 3-2. Staff Planning Relationships.

The MAGTF begins the planning process through **mission analysis**. (See figure 3-3.) Its purpose is to review and analyze orders, guidance, and other information provided by higher headquarters to produce a unit mission statement. Intelligence preparation of the battlespace (IPB) begins immediately and continues throughout MAGTF planning and execution of DAS operations.

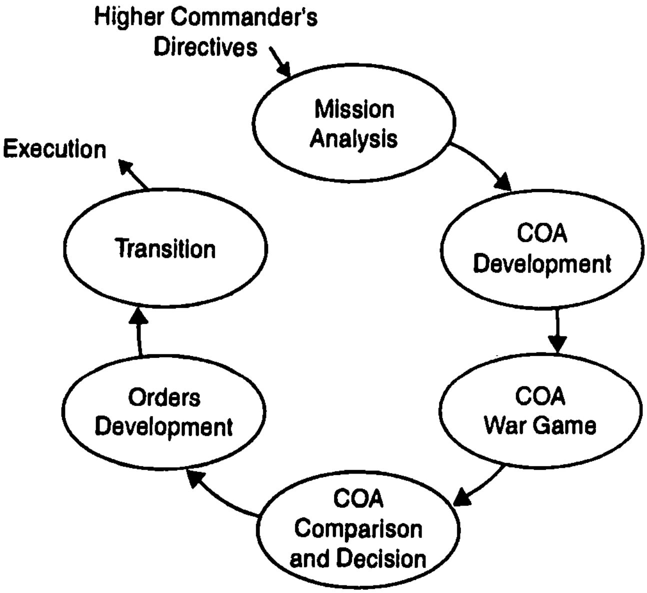

Figure 3-3. The Marine Corps Planning Process.

Intelligence and IPB products support the staff in identifying or refining centers of gravity (COGs) to determine critical vulnerabilities. During mission analysis, intelligence also provides recommended high value targets (HVTs) that the enemy commander requires for the successful completion of the mission.

During **courses of action (COAs) development**, planners use the MAGTF commander's mission statement (including the higher headquarters commander's tasking and intent), commander's intent, and commander's planning guidance to develop COA(s). During COA development, the mutually supporting concepts of maneuver and fire materialize to shape the battlespace leading to decisive action. Based on the desired conditions for the effects we want to achieve, HVTs identified are refined and specific HPTs begin to develop. HPTs are those targets whose loss to the enemy will significantly contribute to the success of the friendly COA. The MAGTF commander makes decisions on DAS apportionment recommendations from the GCE, ACE, and CSSE commanders. See MCWP 3-16A, *Tactics, Techniques, and Procedures for the Targeting Process*, for mofe information on target development.

COA wargaming assists planners in identifying friendly and possible enemy strengths and weaknesses, associated risks, and asset shortfalls for each COA. When wargaming COAs, commanders and their staffs validate whether they can establish the desired conditions and whether those conditions are appropriate. Commanders and their staffs also validate whether their assumptions and planning factors are accurate. It is during this stage of the planning that HPTs are validated and the fire support plan is modified as required.

In **COA comparison and decision**, the commander evaluates all friendly COAs against established criteria, and then evaluates them against each other. The commander then selects the COA that will best accomplish the mission. After the commander selects the COA, targeting objectives and priorities are submitted to the targeting board to support the plan. If the plan is joint or sequel to an ongoing operation, the targeting board inputs may be required earlier to meet deadlines of the ATO process. Based on the selected COA, the MAGTF commander will apportion aviation assets to achieve the effort required for DAS. During joint operations, the MAGTF commander may request additional aviation assets from JFC to meet MAGTF objectives through recommendations from the ACE commander and MAGTF force fires coordinator. See MCWP 3-2 and JP 3-56.1 for more information on apportionment of MAGTF aviation assets.

During **orders development**, the MAGTF staff uses the commander's COA decision, mission statement, and commander's intent and guidance to develop orders that direct unit actions. Orders serve as the principal means by which the commander expresses his decision, intent, and guidance. They direct actions and focus the ACE's and other subordinates' tasks and activities toward accomplishing the mission.

The **transition** is an orderly handover of a plan or order as it is passed to those tasked with execution of the operation. It provides those who will execute the plan or order with the situational awareness and rationale for key decisions necessary to ensure a coherent shift from planning to execution. During execution the plan is continuously updated and modified as necessary to ensure the desired effects meet MAGTF objectives.

ACE

TACC is the operational command post from which the ACE commander and staff plan, supervise, coordinate, and execute MAGTF DAS operations. The ACE plans concurrently with the MAGTF and aircrew in support of DAS operations. Constant information flows vertically within the chain of command and horizontally within the ACE. An OPT may also be formed at the ACE level to plan and facilitate coordination between MAGTF and subordinate commands.

The ACE supports the MAGTF commander's concept of operations and provides recommendations and clarification of ACE assets to engage targets. The number of strike packages, sorties available, and surge requirements affect the ACE's ability to support MAGTF operations. Aviation assets organic to the ACE provide the MAGTF commander lethal and non-lethal fires to limit, disrupt, delay, divert, destroy, and damage the enemy.

Based on the ACE commander's mission and intent, the ACE staff will develop specified and implied tasks to achieve the level of effort required by DAS in supporting the MAGTF's concept of fires. This section will focus on DAS planning at the ACE level. During mission analysis, the ACE staff analyzes the MAGTF commander's objectives and guidance.

- **Objectives** are the MAGTF commander's goals that provide a means to determine priorities and set the criteria for measuring mission success.
- **Guidance** sets the limits or boundaries on how objectives will be attained. It provides the framework to achieve the objectives and establishes force employment scope and restrictions. Rules of engagement (ROE) are an example of guidance.

The ACE and his staff review and analyze orders, guidance, and other information provided by the MAGTF during mission analysis. The ACE commander's intent guides the ACE staff throughout DAS planning and execution. The ACE staff assists the MAGTF in identifying COGs. For example, an enemy's integrated air defense system (IADS) may be a COG for the ACE in conducting DAS. Intelligence analysis of COGs develops critical vulnerabilities that if exploited will do the most significant damage to an adversary's ability to resist. It is also during mission analysis that HVTs are identified. The loss of

HVTs would be expected to seriously degrade important enemy functions throughout the ACE commander's area of interest.

Intelligence supports the ACE from the beginning of the planning phase through the execution of DAS operations. IPB during DAS planning is focused on the following:

- Current enemy situation, previous enemy actions, and enemy doctrine.
- Accurately locate HPTs.
- Identify critical components of HPTs.
- Are HPTs point or area targets? Specifically do potential HPTs have small critical components or are the critical components spread over a large area?
- Aid the targeting cell, with the help of the G-2 and the *Joint Munitions Effectiveness Manual/Air to Surface (JMEM/AS)*, in the determination of the probability of destruction (PD) required to meet MAGTF fires effects. Specific recommendations for suitable PD on individual targets are provided in chapter 6 of the *JMEM/AS Weaponeering Guide*, and appendix C.

During COA development, planners use the ACE commander's mission statement (which includes the MAGTF commander's tasking and intent), commander's intent, and commander's planning guidance to develop COAs. This provides further clarity and focus of the planning effort to determine what conditions need to be set leading us to achieve the MAGTF commander's objectives. ACE planners determine what PD will be required to achieve the desired effects from aviation fires. They also determine what resources (sorties, ordnance, time, etc.) are required for sustained or surge operations. The following considerations affect the ACE staff in developing the level of effort required by the ACE to support each COA.

- What are the types of aircraft and ordnance available to achieve the required PD on target?
- Support requirements (SEAD, fighter escort, aerial refueling, etc.).
- Does level of effort required to strike the target directly relate to the MAGTF commander's specific objectives?
- Factors that may restrict the types of ordnance and delivery options available; such as target location error, distance to the target, weather, visibility, terrain, and target area defenses.
- Target acquisition probabilities for selected weapon systems. See *JMEM/AS Target Acquisition Manual* for detailed information on target acquisition.
- Is the desired time of attack on target focused in support of the MAGTF's concept of operations?
- Are restrictions imposed by national leaders and ROE or to prevent an undesirable degree of escalation due to theater conditions?
- Proximity of non-targets to avoid unwanted collateral damage to friendly forces, infrastructure, civilians or prisoners of war.
- Ability of the MACCS to monitor the battlespace to provide DAS operations proper cueing and threat warning, specifically ingress routes, target areas, and egress routes. During joint operations, if the MACCS is unable to provide the surveillance coverage required to support DAS operations, the ACE commander may request, through the MAGTF commander, joint or combined early warning assets to provide the surveillance coverage required.

When planning for the use of fixed-wing and rotary-wing aircraft for continuous combat operations, it is important that planners know the daily sustained and surge sortie rates for each aircraft. Aircraft require maintenance cycles and a minimum amount of time to load, arm, fuel, and service. A planner will determine the turnaround time (time to load, arm, fuel, and service) and the total number of sorties each type aircraft can fly per day. See Fleet Marine Force Manual (FMFM) 5-70 [MCWP 5-11.1 under development], *MAGTF Aviation Planning*, for more information.

The weapon system-planning document is available for each aircraft and provides the planned sustained and surge combat rates for a particular aircraft. It is used for planning logistics and maintenance requirements for specific aircraft. It may be used as a guide, but planners should be familiar with actual aircraft capabilities and sustained requirements. The weapon system planning document is classified and can be obtained from HQMC or NAVAIR, via the chain of command.

COA wargaming assists ACE planners in identifying friendly and possible enemy strengths and weaknesses, associated risks, and asset shortfalls for each COA. When wargaming DAS operations, determining the effects of weather, refining estimates, and establishing when to conduct surge operations will achieve the MAGTF commander's desired effects through DAS. Wargaming may reveal additional logistical and aviation support requirements to support MAGTF deep operations for selected COAs. It is during this stage in the planning process that DAS force requirements are finalized and the plan is modified for each COA.

In COA comparison and decision, the ACE planning staff evaluates all COAs against established criteria. The COAs are then evaluated against each other. The ACE commander selects the COA that is deemed most likely to accomplish DAS missions in support of the MAGTF commander's concept of operations based on the following considerations.

- Does the level of effort required meet the MAGTF commander's objectives?
- Will surge or sustained DAS operations limit the ACE's ability to support other current or future MAGTF and/or joint operations based on aircraft availability, ordnance availability, and logistical support requirements?
- Is the level of risk acceptable?

The MAGTF commander uses the recommendations of the ACE commander and staff and the MAGTF force fires coordinator to make apportionment decisions. They may recommend to the MAGTF commander that joint aviation assets or weapon systems are required to support MAGTF deep battle operations. From the selected COA, the MAGTF's apportionment (percentage) of the aviation effort toward DAS is translated by the ACE into allocation (number) of sorties for DAS missions. See MCWP 3-2 for more information on the apportionment and allocation of aviation assets.

During orders development, the ACE staff takes the commander's COA decision, intent, and guidance and develops orders to direct the actions of the unit. The operation order (OPORD) articulates the ACE commander's intent and guidance for DAS missions.

The ATO is a means for disseminating tasking on a daily basis. It provides subordinate units, and command and control agencies projected sorties/capabilities/forces to targets and specific missions. Concurrent with the ATO development, the ACE staff coordinates with prospective squadrons that will be assigned

DAS missions. This facilitates continuous information sharing, maintains flexibility, and makes efficient use of time. See MCWP 3-2 for more information on the ATO process.

Transition is the orderly hand over of the plan or order as it is passed to those tasked with execution of the operation. It provides mission executors with the situational awareness and rationale for key decisions that are necessary to ensure a coherent shift from planning to execution.

For aircrews, transition occurs when the ATO is transmitted. Then, the aircrews who will be conducting DAS missions are given the specific mission requirements for detailed planning.

AIRCREWS

Upon receipt of the mission, aircrews begin detailed mission planning. Aircrews select tactics, techniques, and procedures (TTP) that offer the best chance of mission success. The commander's intent is relayed as the purpose of the mission, allowing planners to adapt to changing situations and to exercise initiative throughout the process. Basic DAS planning begins with analysis of mission, enemy, terrain and weather, troops and support available, and time available (METT-T). See appendices A and B for information on aircrew planning.

METT-T Factors

Mission

Planners study the ATO to understand their objective, the specified and implied tasks to be performed in accomplishing the objective, and the commander's intent or purpose for conducting the mission. This understanding increases overall situational awareness by all participants and facilitates the initiative required to maximize DAS effectiveness.

Enemy

By determining key enemy characteristics, such as composition, disposition, order of battle, capabilities, and likely COAs, planners begin to formulate how DAS can best be employed. From this information, DAS planners anticipate the enemy's ability to affect the mission and the potential influence enemy actions may have on the mission's TTP.

Terrain and Weather

A terrain study is used to determine the best routes, navigational update points, and terrain masking to limit detection by enemy radar. Terrain may also restrict the type of ordnance and target area attack that can be utilized. Weather plays a significant role in DAS operations. It influences the capability to acquire, identify and accurately attack DAS targets. Weather will affect target area tactics and ordnance to be utilized. It can also influence the effectiveness of laser designators, precision-guided munitions (PGMs), night vision devices (NVDs), and thermal imaging systems. Planners at every level require an understanding of the effects that weather can have on DAS aircraft navigation, sensors, and weapon systems. The weather can also change the mission from low threat to high threat depending on the enemy's capabilities and the aircrew's ability to see and defend against enemy surface-to-air missiles (SAMs). When forced to fly under a cloud layer it is easier for enemy ground forces to acquire and engage DAS aircraft. With the addition of JDAMs and JSOWs in the Marine Corps ordnance inventory, acquisition of targets in adverse weather is dependent upon the accuracy of target location to ensure the weapon guides to that specific point.

Troops and Support Available

Ideally the support required to conduct a DAS mission is identified early in the planning process. Support for DAS missions can be requested with sufficient time to coordinate its use. DAS mission support requirements that must be determined include escort, electronic warfare (EW), SEAD, aerial refueling, FARPs, and C2 systems.

Time Available

DAS planners must estimate the amount of time to plan the mission, effect the necessary coordination, and execute the mission. Inadequate time management may result in reduced effectiveness and increased risk to aircrew and possibly ground forces.

Selecting Attack Tactics and Ordnance

Target types will weigh heavily into the DAS planning equation. Targets can be unitary (point or line) or area targets. An enemy command and control bunker is an example of unitary target. Many unitary targets dispersed over a wide area like a supply depot or troops in the open are examples of area targets. If the target (such as a bridge) is easy to find, it will determine what type of aircraft, ordnance, and delivery maneuver to be employed against it. If the target is hard to find, the same holds true. Heavily defended point targets may require the use of precision-guided munitions. Their high PD and the ability to deliver them from a greater distance provides the aircrews a higher chance of success, and subsequently increases their survivability.

Visibility

Visibility is more critical for long-range ordnance deliveries than it is for short-range ordnance deliveries. Thick haze or smoke can have a greater adverse effect on low-level attacks than on steepdive attacks due to the horizontal visibility usually being lower than the oblique/vertical visibility. Under ROE that specify visual identification of targets, adverse weather conditions may preclude DAS mission aircrews from engaging their targets altogether. If the ROE allow targets to be engaged without visual identification, the desired affects may not be achieved during the attack. This may force another strike, which will require more planning, more sorties, and more ordnance that could be used elsewhere. The time of day is another important visibility consideration due to the sun angle and shadow effects (sunrise and sunset).

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.

Radar Significant Target

The probability of success at identifying the target is improved with radar significant features. These radar significant features could be the target, terrain and cultural features surrounding the target or other natural objects nearby the target. These radar significant features can improve aircrew situational awareness in the target area enabling better success for target acquisition.

Target Orientation

Targets in close proximity to high terrain and other cultural features may restrict the attack direction for ordnance delivery. Target orientation and range to other targets assigned in the same DAS mission may also effect the attack tactics and direction.

Target Defenses

Enemy targets are usually defended by SAMs and antiaircraft artillery (AAA). Losses from enemy air defenses during target attacks are minimized by reducing exposure time, jinking, using standoff capable weapons, and suppressing these threats with EW. A low threat for one type of aircraft may be a high threat for another. The selection of proper aircraft, ordnance, and target area tactics is critical to the success of DAS operations.

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.

Target Coordinates

Precise target location is important to the successful conduct of AI missions. Without accurate target coordinates, AI essentially becomes AR. Accurate grid, latitude, longitude, target elevation, and target imagery are helpful for determining precise target locations for AI missions. When utilizing munitions guided by a global positioning system (GPS), a ten-digit grid with accurate elevation is required to attack targets. A maximum TLE when planning for GPS guided weapons is 7.2 meters for JDAM and 7.5 meters for JSOW. Although targets may be engaged without precise coordinates or imagery, the desired effects may not be achieved.

Target Weaponeering

The joint task force (JTF), MAGTF or ACE targeting cell assigns ordnance loads to specific DAS missions. When these DAS missions are listed in the ATO, aircrews need to ensure that the weaponeering is the best available for mission success. Changes in the ordnance load may be required due to a change in the weather, visibility, threat or aircraft and ordnance availability. If a change in the ordnance load is required, the ordnance load change needs to be approved up the chain of command prior to executing the DAS mission.

Night

NVDs are susceptible to shadowing effects during sunrise and sunset. The moon angle can affect aircrews' ability to acquire targets and mask terrain due to low angles above the horizon. Illumination and weather also affect NVDs by reducing target acquisition range or obscuring the target completely.

Navigation

As discussed in chapter 2, airspace control measures in the ACP and ACO will simplify and reduce the time required by aircrews to plan navigation routing and to coordinate with friendly air defense and control units for DAS missions.

When planning DAS missions, aircrews will normally follow MRRs or special corridors to and from the battlespace. When conducting AI missions, aircrews will usually follow MRRs to the point where their ingress route begins. When AR or SCAR aircraft are employed, they may be held at a control point until the search area is clear of other assets. Aircrews may check-in with various controlling agencies as they proceed to the target area. The important thing to note is that if aircrews are talking with the controlling agency and can transmit the appropriate IFF signal, they can transit direct from airbases to target areas and back again.

Depending on the threat's air surveillance capabilities, limiting friendly aircraft to specific MRRs or special corridors may make friendly aircraft more recognizable and vulnerable to enemy surface-to-air systems. If unable to talk or transmit the appropriate IFF signal (lame duck) due to battle damage or system failure, the most non-threatening profile of which the aircraft is capable should be flown. Aircrews' intentions should always be broadcast despite the inability to gain and maintain radio contact with friendly force air control agencies. Other factors aircrews must consider during DAS mission navigation planning follow.

- If unable to bypass the threat either above or around, planners need to minimize the time aircraft are exposed to the enemy surface-to-air threats and plan for SEAD support requirements along the route.
- Range to the target and tactical speeds flown by aircraft may require aircraft to refuel pre-mission and/or post-mission. DAS missions may require aircraft to fly a high altitude only profile or carry less ordnance and more fuel tanks due to the long range. The range may also prohibit specific aircraft from executing the mission.
- Threat avoidance, denial of enemy early warning radar detection, range to the target, weather, communication reception, and fuel required are all considerations for altitudes to be planned for on the route.
- Due to the inherent drift (accumulating error) in certain aircraft navigation systems, planners need to ensure that easily identifiable update points (visual or sensor significant) are incorporated along the route. This will increase the accuracy in mission execution and ordnance delivery.

Logistical Support

DAS planners must allow sufficient time for the coordination and preparation of ordnance and aircraft configuration. Determine ordnance availability early in the planning process, so that time is not wasted planning on unavailable weapons. Anticipate utilization rates and plan for resupply accordingly. When planning to use ordnance from services outside of the Navy and Marine Corps, be aware that there may be compatibility problems. Planners need to know the similarities and differences of other services' weapons.

AR missions typically do not have specified targets or target locations known by aircrew prior to takeoff. These missions must follow the commander's guidance in prioritizing targets, and base their search on the enemy situation. Aircraft ordnance load and configuration should be based on the MAGTF commander's target list, intelligence estimates, and associated target precedence. Time-on-station, refueling either airborne or at a FARP, SEAD, and antiair protection of AR assets may also be required and should allow sufficient time to be planned and coordinated.

Control and Coordination Measures

When planning DAS operations, aircrews should take into consideration the ability of the MACCS to monitor the target and surrounding areas. It may be quite difficult to effectively employ air-to-ground munitions without the MACCS being able to sanitize the target area airspace. This would require DAS aircrew to concentrate more on looking for or possibly engaging enemy fighter aircraft in the target area. Therefore, aircrews should have the best possible surveillance and communication system to provide proper cueing and threat warning to increase the probability of mission success.

The ability to communicate between aircraft and the MACCS is important during DAS operations. This can reduce friction during the execution phase. Communications can be voice, visual or digital. The key to successful execution is the development of a simple, secure, and redundant communication plan. The fluid environment throughout the battlespace requires reliable communications between aircrews and commanders to ensure that important information is received. Opportunities that present themselves can be exploited if communications are reliable.

In MOOTW where friend and foe are usually in close proximity, effective communication will lesson the likelihood of fratricide. Threat updates and changes to mission assignments are critical pieces of information that must be received by aircrew as quickly as possible. Often over-looked as a simple reliable communication technique is the use of color coding or marking of surface forces that are visible to aircrew.

As mentioned earlier, DAS can be conducted on both sides of the FSCL. The range of potential DAS targets from the FSCL will often determine how much coordination will be required with other forces. Normally, little or no integration with surface forces will be required when DAS is conducted beyond the FSCL. Special operations forces and other surface units operating outside of the FSCL or very close to the FSCL must be deconflicted by DAS planners and monitored by the MAGTF or equivalent FSCC. The deep battle cell should direct the appropriate deconfliction prior to and during the planning and execution of DAS missions. Further, it is important for aircrew to plan for deconfliction of DAS aircraft transiting over friendly surface forces with other fire support going on inside of the FSCL.

DAS Force Composition

DAS missions may require support from escort or EW aircraft. When conducting AI, there are two basic employment options: force concentration and defense in depth. Force concentration employs all airborne assets in a relatively tight formation, while defense in depth requires aircraft to be dispersed to allow for threat reaction. The size of the strike force will depend on the desired results, such as destruction or neutralization. The size of the strike force will be guided by the weaponeering analysis completed early in the targeting cycle.

The key to planning a successful package composition is detailed intelligence on the enemy and effective early warning of the presence of threat aircraft. If enemy forces can be effectively identified and engaged before disrupting the attack aircraft, both AI composition options have merit.

Force concentration is used when the air-to-air threat is low. After determining the desired results of the strike, the number of fighter and SEAD aircraft is determined. The goal of force concentration is to get as many aircraft through the target area in as short a time as possible. This reduces the amount of time the strike force is exposed to the threat. The mission commander can have increased situational awareness due to the proximity of strike assets. Although force concentration tactics are good to use in low threat situations, they also have application in high threat scenarios. Force concentration is also a very effective tactic to use at night to minimize confusion caused by dispersed formations.

Defense in depth allows for greater dispersion of attacking aircraft and may be utilized when the enemy has a credible air-to-air capability. For example, a fighter sweep may precede the main strike package to ensure the target area is free of enemy aircraft. Defense in depth will require detailed planning and coordination to ensure the proper spacing is maintained between strike and escort aircraft. Escort aircraft may have difficulty in distinguishing friendly from enemy aircraft if the enemy gets by the escorts.

Suppression of Enemy Air Defenses

SEAD is fundamental for effective employment of DAS. Planners should determine what surface-to-air threats are en route and in the target area to provide the most economical and capable assets to suppress those systems. There are various ways to suppress enemy air defense assets depending on the range from the FSCL and number of threats in the target area. Typically, the FSCL will be established based on the range of the MAGTF commander's indirect fire weapons. If targets are inside the FSCL, the DAS planner may be able to coordinate with the MAGTF's indirect fire weapons to suppress enemy surface-to-air systems. Using artillery and mortars to provide SEAD support for DAS missions is economical for DAS; however, this may not be economical for surface forces. Using indirect fire weapons will also require a spotter and increased coordination by DAS aircrews to be effective and also to prevent fratricide. Indirect fire weapons should be considered as an effective SEAD asset as long as the coordination and deconfliction are thoroughly conducted.

Coordination with the senior FSCC will be required when utilizing organic or non-organic indirect fires to suppress enemy air defenses short of the FSCL. It is important that coordination occur with the senior FSCC to ensure that indirect fires are cleared and deconflicted with other supporting arms. For example, when employing attack helicopters in a rotary-wing high threat environment, indirect fires may be the only continuous suppression asset available.

When conducting DAS operations outside the range of indirect fire assets, the DAS planner should utilize airborne SEAD assets. Airborne SEAD includes the employment of high-speed antiradiation missiles (HARMs), tactical air-launched decoys (TALDs) and electronic attack (EA). It is critical that DAS planners integrate SEAD assets to ensure the greatest protection of our DAS aircraft. See JP 3-01.4, *Joint Suppressions of Enemy Air Defenses (J-SEAD)*, and MCWP 3-22.2, *Suppression of Enemy Air Defenses*, for more information on SEAD operations and planning. The key to SEAD planning is to provide a temporary sanctuary/window for DAS aircraft to accomplish their mission without prohibitive interference from the enemy.

Armed Reconnaissance Considerations

Unlike AI missions, where targets location are known prior to takeoff and the appropriate munitions loaded on aircraft, AR missions require planners to determine the most optimum ordnance loads to cover a wide variety of targets. Fortunately, Marine Corps tactical aircraft are suited to carry a wide variety of munitions that uniquely accommodate AR planning.

More importantly, most fixed-wing aircraft possess the capability to select fuse and munitions functioning while airborne. This gives the aircrews more flexibility to attack a wider variety of targets. The ability to adjust munitions functioning and fusing effects airborne is called reactive weaponeering and most of the Marine Corps and other armed forces aircraft have this capability. It is important for DAS planners to be familiar with each aircraft's capabilities and the ordnance it can carry. See appendices D and E for DAS aircraft and naval aircraft munitions capabilities.

Having the capability to conduct reactive weaponeering provides DAS planners and aircrew a significant capability to plan for and attack time sensitive targets. Considering that time-sensitive targets are those targets that are very mobile, DAS planners can adapt ordnance loads to cover those time sensitive targets and also have the capability to attack other more stationary targets.

For example, during Operation Desert Storm, Iraqi SCUD launchers were considered to be a high priority target by the JFC; however, due to their mobility and camouflage, the SCUDs were very difficult to detect and attack prior to launching their missiles. The JFACC established SCUD-hunting missions; these were essentially AR missions that would remain on combat air patrol (CAP) until notified of a SCUD launcher in the area. If these SCUD-hunting missions were relieved on station and had not expended their ordnance, they had the capability to divert to other operating areas and expend their ordnance on other targets.

Search Pattern

AR missions may require aircrews to search for targets due to no or little target information. The three basic searches are area, route, and specific.

Area

Searches are limited to a specific area. Area AR may need to be deconflicted with other assets and forces in the area of operations. Procedural controls and ACAs may be established to control aircraft operations (as discussed in chapter 2). Area searches are normally used to find targets that may be dug in or to attack targets not precisely located prior to aircraft launch.

Route

Route AR is used to search a specific line of communications (LOC) and attack enemy activity along critical avenues of approach or targeted areas of interest (TAIs). TAIs may be specific areas that the MAGTF commander may want monitored. Further, the MAGTF commander may base operational and tactical decisions upon enemy activity in TAIs, therefore, the ACE commander should insure AR aircrew are aware of all active TAIs needed to be searched.

Specific

Specific AR is utilized to find particular targets or search specific areas or TAIs. Specific AR missions may be utilized to find and attack high value time sensitive targets.

Typical AR missions will be flown as a section (two aircraft) or a division (a maximum of four aircraft). Optimally, four aircraft are used when conducting AR because more than four aircraft conducting AR in the same area becomes difficult to control. Two aircraft would perform the reconnaissance function of searching for targets, while the other two aircraft would remain in a cover position to attack targets detected by the searching aircraft. The cover aircraft also provide force protection. Having four aircraft also maximizes mutual support and firepower while employing a manageable number of aircraft.

Formations used by AR assets are based on two simple principles, target detection capability and the threat in the area. Due to the mobility of some surface-to-air systems and targets, it is very difficult to provide complete protection from enemy air defenses. When planning AR, planners should, at a minimum, consider including an EA-6B and an escort aircraft to be available as a reactive SEAD package. The EA-6B is employed to conduct EW support over the AR area, and can suppress threats that may pop up. Aircraft capable of employing air-to-air missiles and HARMs should escort the EA-6B. This offers protection to the EA-6B while adding weapon redundancy to the reactive SEAD package.

The altitude at which fixed-wing reconnaissance aircraft conduct AR will vary based on the target size and threat. At night, if the threat is not exercising light discipline, targets can be detected many miles away with night vision goggles. When fixed wing assets fly in section, the primary search area should be between the aircraft. This allows for overlapping search sectors and also facilitates mutual support between the aircraft. If four aircraft are employed, a box formation should be used with the trail element elevated. Rotary-wing AR assets will use terrain flight altitudes and operate in a manner to provide for mutual support. Each aircraft will be assigned specific search responsibilities based on aircraft systems capabilities.

Target Attack Planning

When conducting target attack planning, the three basic options are: direct, transition, and delayed.

Direct

Targets are identified and can be attacked from the search profile. Typically for fixed-wing aircraft this will require 3 nautical miles to acquire and employ weapons. Rotary-wing aircraft will require 3 to 5 kilometers to engage targets.

Transition

Targets are identified but the aircraft are too close to attack. In this case, one fixed wing aircraft will assume a cover role as the other aircraft stays visually locked on the intended target and climbs for the attack. Rotary-wing aircraft will attempt to terrain-mask, displace, and conduct an attack from a different axis at appropriate ranges.

Delayed

This tactic is used when the target is identified but the surface-to-air threat becomes prohibitive. Aircraft will mark the target location either with aircraft systems or by marking the target location on a map, then egress the target area and return to attack targets using tactics that limit exposure to threat surface-to-air systems.

A critical factor to the effective employment of AR is communicating and distributing information via mission reports (MISREPs) or in-flight reports (IFREPs). By passing time sensitive information, aircraft can be diverted or additional aircraft assigned to exploit a critical enemy vulnerability.

SCAR Considerations

As stated in chapter 1, any airborne rotary-wing or fixed-wing attack aircraft can perform SCAR missions. The MAGTF and ACE commanders may use an assigned SCAR aircraft to coordinate the effective employment of other AR aircraft or precisely locate targets for AI missions. The SCAR platform can be an effective asset if employed properly. It may provide situational awareness of specific areas of interest while effectively and efficiently coordinating target engagements using assigned AR aircraft.

Although all AR aircraft are responsible for the search, destruction, and reporting of targets, a SCAR platform may be tasked specifically and the aircraft configured with the capability to designate targets for destruction by other DAS aircraft.

Night and Limited Visibility Considerations

Night and limited visibility DAS is demanding on aircrew and requires a high degree of training to accomplish successfully. Although night and limited visibility DAS is more demanding, it can be used as an advantage to attack enemy forces during times when they least expect. Presently, no force in the world can compare with the nighttime capabilities of U.S. forces. Specifically, the MAGTF commander has a decided advantage to impose his will on the enemy regardless of weather and environmental conditions. This advantage can only be realized with the continued development of aircraft systems and aircrew training.

Successful night and limited visibility employment depends heavily on the aircraft sensors and the aircrew's ability to utilize them. Today's developing munitions only require a precise target location as mentioned earlier and may not be affected by weather or time of day if programmed properly. However, the majority of the munitions available to the MAGTF commander require aircrews to acquire the target prior to effective delivery.

Basically, there are four ways to recognize and acquire targets during night and limited visibility: visually, sensor, IR pointer, and NVDs. The specific tactical considerations for night and limited visibility operations are essentially the same as day operations. However, some unique points must be considered, such as using aircraft navigation and formation lights to control tactical formations.

Sensor Considerations

Some of the biggest advancements in technology have been the development of aircraft sensors to recognize and acquire targets. This technology is advancing quickly and will be the foundation for new tactics and doctrinal development in the future. Today the technology available is extremely capable, as long as aircrews are trained in its employment. Listed below are some systems that may be used to recognize and acquire targets via aircraft sensors.

- Thermal or IR sensors distinguish objects via differentiating the object's temperature to the background of where the object is located (typically the earth). An example of this type of sensor is the forward-looking infrared (FLIR) employed by most U.S. attack aircraft (see appendix D for aircraft capable of employing FLIR). Thermal sensors are very ineffective when target to background temperatures vary by only a few degrees. These sensors are limited during periods of thermal crossover that typically occur near sunrise and sunset.
- Aircraft radars can be used in a variety of ways to recognize and acquire targets. They can locate radar reflective targets regardless of whether the target is moving or stationary. Most radars employed onboard U.S. aircraft have the capability to track moving vehicles. Further, stationary materials that reflect radar energy to varying degrees, specifically buildings, roads, bridges, and runways are more easily recognized and attacked using aircraft radar. Terrain and other natural features (e.g., rivers, hills, and mountains) can also be radar significant to help acquire target areas and specific targets.
- NVDs have dramatically improved the capability for U.S. forces to "own the night." With proper training and education, the use of NVDs may provide aircrew with another sensor that

can be employed throughout the flight envelope to enhance safety and tactical execution.

Night and limited visibility execution may be enhanced by using the electro-optical target decision aid (EOTDA) computer program used to predict the capability of on board aircraft sensors to detect targets. The EOTDA program uses the forecast weather prediction for the target area, the target's electromagnetic signature, the target areas cultural/natural background, and the aircraft's sensor capability to determine the range at which targets may be recognized and acquired. The EOTDA program is available to DAS planners and aircrews via the local weather office.

[**NOTE:** Certain modules of the EOTDA program are classified.]

Laser Guided Weapon Employment

Laser systems provide DAS aircrew the ability to maintain standoff distances while accurately marking or attacking point targets and moving targets. Aircraft capable of carrying laser designation devices and those capable of acquiring laser energy are listed in appendix F. The accuracy offered by laser-guided munitions give DAS aircrews greater flexibility in planning attacks. See JP 3-09.1, *Joint Tactics, Techniques, and Procedures for Laser Designation Operations*, for more information on lasers and laser employment.

CAUTION: A laser beam's intense radiation can cause serious eye damage and blindness. Alert aircrews operating close to laser designators. During laser training exercises, strict safety procedures are necessary.

Laser Employment

There are five basic requirements for using laser-guided weapons (LGWs)—

- Line of sight must exist between the designator and the target for the laser-guided weapon to operate properly.
- The laser code of the laser designator and the LGW must be the same. Laser coding permits the simultaneous use of multiple laser designators and acquisition devices in the same target area. Planners should ensure deconfliction of laser pulse repetition frequencies (PRFs) in the same target area. Some aircraft can change PRFs airborne, while others may not.
- Direction of attack must allow the laser-guided munitions ability to receive enough reflected laser energy from the target for seeker lock-on and track.
- Laser designator must designate the target at the correct time for the laser-guided weapon to achieve navigational information (typically the last 10 seconds of the laser munition's time of flight).
- The delivery system must release the weapon within the specific attack envelope, sometimes referred to as the "basket."

Environmental factors can affect laser designators and seeker head performance of laser-guided munitions. TTP must consider low clouds; fog; smoke; haze; snow and rain; solar saturation; and other visually limiting phenomena. The EOTDA program may assist DAS planners and aircrews in determining the most optimum situation to use laser-guided munitions.

Attack Headings

Attack headings must allow for aircraft sensors and munitions to acquire the reflected laser energy. The attack heading should be outside the safety zone if ground personnel or aircraft are designating the target. The safety zone is the area 10 degrees either side of the ground personnel laser designating to the target. LGWs launched within the 20-degree safety zone could receive false target indications. The safest acquisition area for an LGW is more than 10 degrees but less than 60 degrees from the laser designator to target line. This provides a 50-degree cone to either side of the laser target line for an ideal attack heading. The tactical situation may require employing LGW in the 20-degree safety area, however, this is not recommended and should only be used as a last resort due to the probability of fratricide. Figure 3-4 depicts the safety cone and optimum acquisition areas. Aircrews should release or launch LGWs so the reflected laser energy will be within the "attack zone" depicted. Remember, the 50-degree "attack zone" also extends vertically.

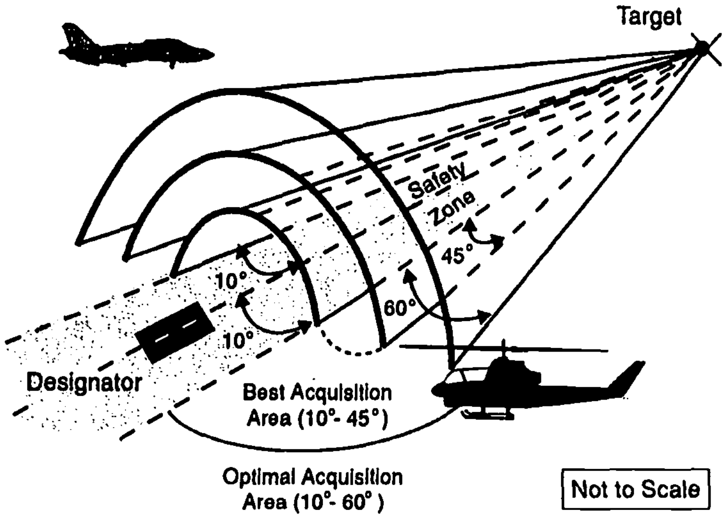

Figure 3-4. Safety Zone and Optimum Acquisition Areas.

Laser Guided Weapons

Employing LGWs in most situations will be accomplished in the same manner as unguided munitions when LGWs and lazing are conducted from the same aircraft. Increased coordination and deconfliction will be required when using one aircraft to deliver an LGW with another aircraft or ground observer lazing the target. When utilizing a fixed-wing or rotary-wing aircraft to guide LGWs delivered by another platform, it is important that the delivery platform remain in front of the lazing platform to prevent fratricide. (See figure 3-5.) For a discussion on the coordination and communication requirements for employing LGWs in close proximity to surface forces or other aircraft laser designators, refer to MCWP 3-23.1 and reference the appropriate aircraft tactics manuals.

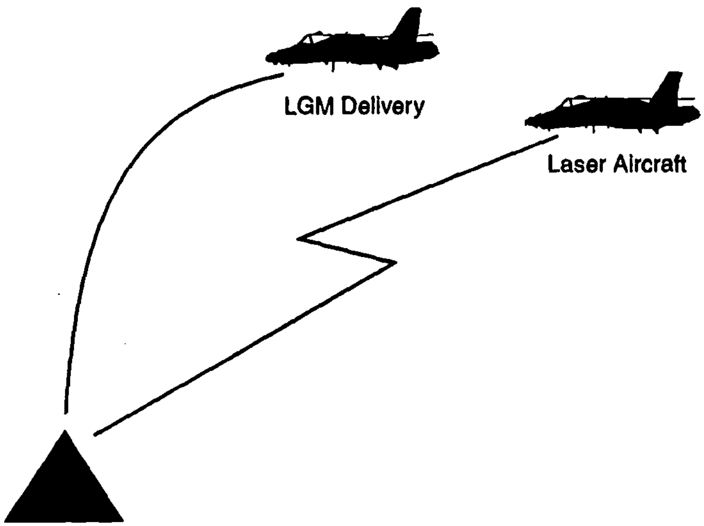

Figure 3-5. Laser Guided Weapons.

[NOTE: When planning to employ LGWs from a level or dive delivery, ensure that the lazing/designating aircraft does not directly over-fly the target prior to weapons impact. Flying directly over the top of the target may cause guidance errors due to the podium effect. The podium effect causes the laser spot (reflected energy) to disperse as the laser energy is directly atop or on the backside of the target. The LGW is unable to acquire or has a difficult time in acquiring the laser energy due to the podium effect. The podium effect is of particular concern when attacking small point targets from higher altitudes. See figure 3-5.]

Laser Guided Missiles

Laser guided missiles (LGMs) like Maverick and Hellfire provide greater standoff and launch ranges than other LGWs. Greater range provides increased survivability for aircrews operating in a high threat environment. However, DAS aircrews must be cognizant of the potential malfunction of these weapons and their ability to cause a hazard to friendly forces and noncombatants many miles from the actual target. These LGMs have splash patterns (hazard areas in case of malfunction) associated with them that may be found in the appropriate aircraft tactics manual. For specific tactical employment considerations, refer to the appropriate aircraft tactics manuals. For aircraft capable of employing these weapons, see appendix D.

Standoff Weapons Employment

The ACE and MAGTF commanders have a variety of long-range standoff weapons that can be employed by Navy and Marine Corps aircraft. These weapons have a variety of employment capabilities that provide the MAGTF commander an ability to shape the battlespace without endangering DAS aircrews. The standoff land attack missile (SLAM), JDAM, and JSOW can be employed many miles from targets. Likewise, when JDAM and JSOW are loaded with precise coordinates, they may fly many miles to attack targets via GPS navigation. Both of these weapons provide an excellent capability for the MAGTF commander to impose his will on the enemy far from friendly troops. For specific tactical employment considerations, frequency deconfliction, and jamming considerations, refer to the appropriate aircraft tactics manuals. For aircraft capable of employing these weapons, see appendix D.

Theater Battle Management Core System

The theater battle management core system (TBMCS) will be used for planning and executing air operations in the future; it was designed to replace the contingency theater automated planning system (CTAPS). TBMCS provides a complete tool kit to manage and plan the overall war and the daily air war. TBMCS is an Air Force-developed program formed by the consolidation of several existing segments: CTAPS, combat intelligence system, and the wing C2 system. CTAPS plans and executes air operations. The combat intelligence system optimizes component and unit-level intelligence functions and provides the warfighter with the most accurate and timely intelligence data available. The wing C2 system is an Air Force application used to provide a secure, accurate, timely, and automated system affording a composite view of C2 information for wing commanders and their battlestaffs. The wing C2 system supports effective decisionmaking during exercises and operational contingencies. These systems implement a consistent software architecture that integrates the flow of information among them. TBMCS will be a joint system used to—

- Build the target nomination list, the air battle plan, and the ATO.
- Monitor the execution of the air battle and adjust, as required.
- Plan routes, ensure airspace deconfliction.
- Build the ACO.
- Provide weather support.
- Manage resources (e.g., aircraft, weapons, fuel, and logistics).
- Gather information on the enemy, battle results, and friendly forces.
- Analyze information to determine strategies and constraints.
- Identify potential targets and propose an optimal weapons mix.
- Provide for support and protection of ground forces.
- Plan countermeasures and frequency assignments.

The Marine Corps plans to purchase only the CTAPS equivalent functionality and the targeting and weaponeering module within the combat intelligence system. The wing C2 system segment will not be used by the Marine Corps. See MCWP 3-25.4 for more detailed information on TBMCS and CTAPS.

SUMMARY

Paving the way for successful DAS execution is thorough planning. Commanders, staffs, and aircrew must be involved in all modes and levels of DAS planning by ensuring a constant vertical flow of information within the chain of command and laterally among staff sections. The OPT facilitates the integration of DAS planning at the MAGTF, ACE, and aircrew levels.

To succeed, the plan must be kept simple and be properly executed 100 percent of the time, rather than having an elaborate plan that covers every contingency but has a greater chance for failure. Knowing the capabilities and limitations of DAS, with either significant or limited information of the enemy, planners can effectively use AI or AR to strike the enemy and destroy his warfighting capabilities. Knowing the effects of weapons and their suitability against certain targets, planners can economically use aircraft in the MAGTF to maximize DAS effectiveness.

By striking the enemy at substantial distances from friendly forces, the enemy will be weaker and less able to impose his will on us. DAS missions require a flexible, efficient, and controlled system to ensure the assets committed to these missions are able to effectively apply their combat power in a timely manner. Detailed planning must be conducted concerning the target, threat, airspace, and coordination requirements. The proper use of SCAR platforms, a deep battle cell within the TACC, and future use of TBMCS will greatly increase the planning and responsiveness of our limited DAS assets.

Chapter 4

EXECUTION

"Decisionmaking in execution thus becomes a time-competitive process, and timeliness of decisions becomes essential to generating tempo. Timely decisions demand rapid thinking with consideration limited to essential factors. In such situations, we should spare no effort to accelerate our decisionmaking ability. That said, we should also recognize those situations in which time is not a limiting factor—such as deliberate planning situations—and should not rush our decisions unnecessarily."

—Marine Corps Doctrinal Publication 1, *Warfighting*

Although overarching doctrine does not normally change significantly over time, aircraft tactics will be constantly adapted based on the threat and our weapon systems capability. The best sources for individual aircraft tactics are aircraft tactical manuals and aircrew experience. To assist DAS planners, mission commanders, and DAS flight leaders in the execution of DAS, this publication includes additional planning information in the appendices. Appendix A is basic DAS planning checklist and appendix B is a sample DAS briefing guide.

This chapter covers execution considerations because of threat, target location, weather, munitions, and night attack considerations that effect airborne tactics. Fundamentally, DAS tactics utilized depend on the following factors:

- The enemy's air defense system and capabilities.

- Potential target types and recognizable features to friendly visual and sensor systems.
- Accuracy of the target location.
- Target location or ACA distance from friendly aircraft operating bases.
- Theater ROE and acceptable levels of collateral damage.
- Time of attack; day or night?
- Prevailing weather and environmental conditions.

The preceding list is not all-inclusive; rather it is a guide and may vary depending on the enemy and friendly situation. The following paragraphs deal with some specific execution considerations for both fixed- and rotary-wing DAS aircraft.

DAS TIMING

It is important that all participants in DAS operations have an accurate and synchronized clock. Management of time defines our ability to generate tempo and take advantage of opportunities relative to the enemy. Time is the basic means to coordinate the efforts of numerous assets that range from SEAD, escort and attack aircraft, to aerial refuelers positioning on station. Time defines our "windows" of opportunity. By using time appropriately and appreciating its impact on our ability to define tempo, it may be possible to change a disadvantage to an advantage. From strategic planning to tactical execution, all operators and commanders will be constrained by some sort of timeline. As time applies to DAS execution, it is important that all aircrews and ground crews are on a synchronized clock.

Typically, all time references are based on Greenwich Mean Time (GMT), also known as Zulu time. It is common for time on target (TOT) to be utilized as a coordinating measure when conducting DAS. Time is also used to deconflict friendly aircraft and surface fires to prevent fratricide. Further, time may be used for DAS support aircraft deconfliction and positioning. For example, the DAS mission commander determines his TOT to be 1200 and expects SEAD support 1 minute prior to 30 seconds after the TOT. The mission commander may not know all the details of the SEAD plan; however, the threat is anticipated to be neutralized during this time period.

Since DAS aircraft operate from a variety of locations, time is an important coordination and deconfliction method available for the execution of DAS missions. Time determines when tankers should be on station, SEAD windows, fighter aircraft positioning, and DAS TOTs. It is critical that mission commanders have clear, simple, and redundant ways to communicate changes to aircraft already airborne. For example, if an AI package is delayed en-route to the target, mission commanders should have a simple way to ROLEX [a pro-word for changing an established time of a particular event] all other DAS and support aircraft events. ROLEXs should be clear and may be based on TOT or whatever method of timing and control the mission commander utilizes. For example, if the TOT is 1200 and the mission commander calls "ROLEX 5" this means the new TOT is 1205. If the mission commander then calls another "ROLEX 15," it means the new TOT is now 1215 (unless the mission commander is calculating the cumulative ROLEX times for the flight). In some instances, mission commanders may choose to let other aircrew add up individual ROLEXs, meaning every time a ROLEX is given individual aircrew will have to add up the time changes. From the previous example, the new TOT would be 1220 using the cumulative method. Whatever method is used it is important that mission commanders have a simple and reliable way to communicate ROLEXs and aircrews have a clear understanding of the ROLEX method used.

[NOTE: Three methods of acquiring a time back are the Naval Observatory's automated, continuous broadcast (frequency 5.000, 10.000, 15.000, 20.000, or 25.000 MHz) of Zulu time; calling the Naval Observatory (DSN 762-1401); and the GPS.]

FIXED-WING EXECUTION

Fixed-wing aircraft have a variety of mission formations and packages that may be utilized during DAS operations (see specific aircraft tactical manuals for the latest tactics recommendations). As mentioned in previous chapters, AI missions are typically led by mission commanders and are usually composed of four or more aircraft. AR missions are usually conducted by four or less aircraft and led by division leaders. AI packages will typically be constructed as defense in depth or force concentration; mission commanders will determine the type of package to utilize depending on threat and our ability to counter the enemy's antiair capabilities. AR missions may use a variety of formations and target attacks as discussed in chapter 3. The following paragraphs contain considerations for DAS mission execution once the mission commander or flight lead has determined the AI or AR package composition.

In conjunction with the DAS planning and briefing guides in appendices A and B, respectively, some basic considerations for DAS fixed-wing aircraft employment are:

- Throughout takeoff, rendezvous, and ingress, communication should be minimized as much as possible to conceal DAS aircraft from the enemy. If able, aircraft operating bases and FARPs should establish standard operating procedures for the EMCON launch and recovery of aircraft. In most situations aircraft operating from ships at sea will operate EMCON during daylight hours.
- If a flight rendezvous is required, aircraft should join-up outside the range of the threat's early warning capability. If the airspace or theater ROE does not allow for an undetected rendezvous, aircraft should at a minimum join-up outside the threat's surface-to-air systems envelope.
- If pre-mission aerial refueling is required, mission commanders should have a simple and clear fallout plan for either tanker fallout or receiver aircraft refueling difficulties. To minimize confusion airborne it may helpful to designate specific aircraft that have priority for receiving fuel airborne.
- During ingress, formations should be flown to provide maximum lookout and individual aircraft enough room to maneuver in case of attack by enemy antiair assets. Further, during the ingress, target area, and egress, aircraft may preemptively vary altitude and heading to avoid being predictable and possibly negate enemy surface-to-air systems.
- One of the hardest decisions a DAS mission commander or flight lead may have to make airborne is aborting the package and returning home. All DAS missions should plan specific go/no-go criteria based on weather, environment, threat response, aircraft, and aircraft systems required to successfully accomplish the mission. Once abort criteria have been met, a timely abort should be executed to avoid forcing friendly aircraft into a situation that may make the risk unacceptably high.

- Upon egressing from the threat and returning to base, DAS mission commanders or flight leaders should pass in-flight reports as mentioned in earlier chapters. The passing of near real time information is critical for the ACE and MAGTF commanders' decisionmaking and situational awareness.

The following paragraphs contain general fixed-wing aircraft tactical considerations including the advantages and disadvantages of three general categories of fixed-wing tactical employment: high, medium, and low altitude tactics.

High Altitude Tactics

High altitude tactics are generally flown over 25,000 feet mean sea level (MSL). Aircrews use high altitude tactics to remain above the threat's low to medium altitude surface to air systems.

Advantages

- Reduces aircraft fuel consumption.
- Reduces aircraft navigation difficulties.
- Improves aircraft tactical formation control and employment.
- Reduces aircrew workload.
- Allows considerable airspace for aircraft maneuver for target attack and threat reactions.
- Improves communications between aircraft and control agencies.
- Increases the range of weapon deliveries because of easier recognition and acquisition of large targets (e.g., buildings or large troop and vehicle concentrations) with aircraft sensors.
- Allows flight over the threat's AAA and medium altitude SAM systems.

Disadvantages

- Enemy acquisition radar can detect the attack forces at longer ranges. This may allow the enemy to alert air defense assets of incoming DAS missions.
- May require a strong SEAD and antiair warfare support packages to degrade or suppress the enemy's air defense assets.
- Enemy high altitude SAM systems have longer-range employment envelopes to counter friendly aircraft.
- Recognition and acquisition of medium to smaller targets may be very difficult.
- Unguided munitions may not be as accurate making the attack of small point targets difficult.
- Weather or environmental conditions may prevent visual acquisition of targets or target areas.

Medium Altitude Tactics

Medium altitude tactics are flown between 10,000 to 25,000 feet MSL and have most of the same advantages and disadvantages as high altitude tactics. However, visual acquisition of some targets may be enhanced and weapons accuracy of unguided munitions may improve. In most cases, fixed-wing AR and SCAR missions will be flown at medium altitudes to prevent exposure to AAA threats and low altitude SAMs. However, in situations where the threat is negligible or the potential targets are small, a transition to low altitude may be done as required to acquire or attack smaller targets.

Low Altitude Tactics

Low altitude tactics are flown below 10,000 feet above ground level (AGL). Aircrews use low altitude tactics to keep the attack force below enemy early warning radar coverage as long as possible. Marginal weather or attacking smaller targets may cause aircrews to use low altitude target attacks. Low altitude tactics may be utilized when attacking targets within the FSCL to aid in the identification of friendly surface force and prevent fratricide.

Advantages

- May be used to surprise the enemy by reducing the enemy's reaction time due to terrain masking and late radar detection.
- Reduces the chance of attack from enemy SAM systems by using terrain for masking.
- Reduces the enemy's SAM weapons envelope and lethal zones during high-speed low altitude ingress and egress.
- Increases the aircrews' ability to recognize and acquire smaller targets.
- Improves aircraft maneuvering performance.
- Reduces the capability and range of the enemy aircraft radar to detect friendly aircraft.
- Allows aircrews to acquire targets during degraded weather or reduced visibility.
- May be utilized below an overcast or reduced visibility.

Disadvantages

- May allow enemy visual or listening posts to detect incoming aircraft.

- Visual acquisition of the target may be delayed as altitude decreases.
- Aircraft fuel consumption may be higher.
- Navigation and terrain avoidance are more demanding and require a higher level of aircrew skill.
- Exposure to small arms, AAA systems, and IR-guided weapons increases.
- Less time available for aircraft to react to enemy surface to air systems.
- Communication and control are more difficult.

During the execution of DAS operations, mission commanders or flight leads may determine it is more beneficial to use a combination of altitude profiles. For example, the target may be a great distance from aircraft operating bases, however, the target is very small or the cloud cover is low. In this case the DAS flight may use a high altitude ingress, low altitude target attack, and a high altitude egress. The combination of altitude profiles should be designed to optimize the aircrews' ability to attack targets, maximize the advantages of some profiles, and minimize the disadvantages associated with others.

The altitude profile discussed in the previous paragraph's example is typically referenced to as a high-low-high profile. Profiles may be flown as low-low-high, where the DAS mission commander desires to maintain stealth on the ingress and target attack but fuel considerations require the egress at a higher altitude. Altitude profiles are determined based on aircraft performance, threat and friendly situation, aircrew training, and experience of DAS aircrews.

Attack Tactics

The attack portion of DAS tactics is typically the phase of the mission that encompasses the initial point (IP) to munitions impact on target. The range of the IP from the target will vary depending on the type and planned release point of munitions to be delivered. For unguided munitions the IP will typically be 10 nautical miles from the target. For guided munitions, this range can be as far as 50 nautical miles or more from the target.

The point where the aircrews devote the majority of their focus to the recognition and acquisition of the target is commonly referred to as the target area. The target area will depend on the specific sensor or sensors utilized to acquire the target and type of munitions to be delivered. Once entering the target area, the DAS aircrew's situational awareness to other activities besides attacking the target is limited. Therefore, aircrews become more vulnerable to enemy surface-to-air systems in the target area as they focus on the specific attack of their targets.

To minimize loss of situational awareness in the target area, aircrews should use their best sensor, or combination of sensors, that can acquire the target at the greatest range and provide the most situational awareness for the aircrew. For example, an F/A-18 attacking a specific building may use the on board radar to initially recognize the target, then use the FLIR to confirm the appropriate target has been acquired, and last, if using unguided munitions, visually acquire the target for final weapons release. This is an example of radar-to-FLIR-to-visual target recognition to final munitions delivery. The process of recognizing and acquiring the appropriate target will depend on sensors available and the attack tactics utilized. Successful target recognition and acquisition depend upon sensor performance, mission briefing, aircrew training, and experience.

Today's family of PGMs and GPS weapons allows aircrews to perform multiple target attacks from a single attack platform while providing greater standoff from threat systems. However, GPS weapons require aircrews to load the precise (10 digit-grid) target location and elevation prior to delivery. Examples of these types of GPS weapons are the JSOW and JDAM. Appendix E is a capability list of DAS munitions employed by Navy and Marine Corps tactical aircraft. DAS fixed-wing aircraft are also capable of flying numerous attack tactics. For detailed discussions of DAS attack tactics, aircrews and planners should reference individual aircraft tactical manuals. The following paragraphs provide broad descriptions of various attack tactics.

Munitions Deliveries

Generally, munitions deliveries can be broken down into dive, level or loft delivery.

Dive Delivery

A dive delivery means the aircraft is positioned to establish a specific dive angle to attack the target. As previously mentioned, there are numerous advantages to utilizing high altitude profiles; however, important disadvantages are:

- Unguided munition accuracy.
- Target acquisition by aircrews.

A method of improving target acquisition and unguided munition accuracy is to use a dive type delivery as shown in figure 4-1. The dive angle will vary depending on the altitude from which the aircraft begins the dive. The type of munitions used will also factor into the dive angle.

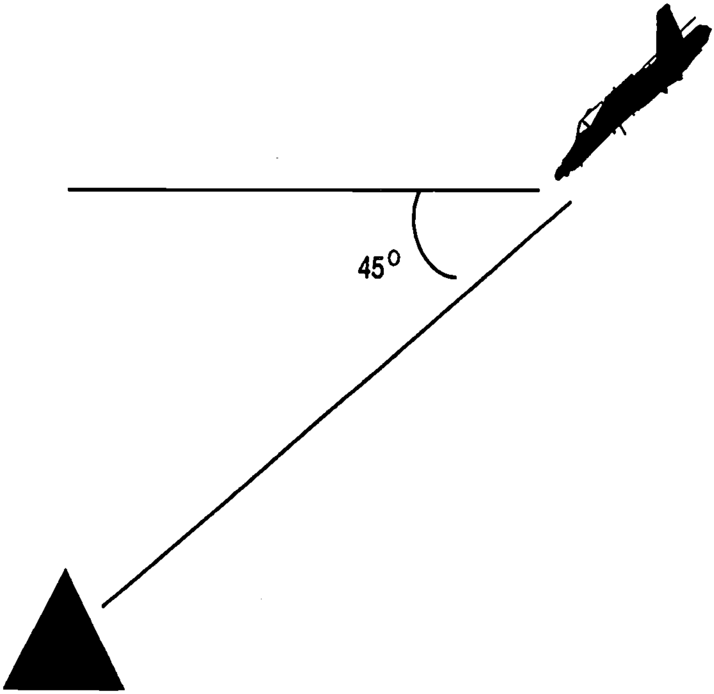

Figure 4-1. Dive Delivery.

Level Delivery

Figure 4-2 is an example of a level delivery where the aircraft may fly over or near directly over the target to deliver munitions. The level delivery can be used in a variety of circumstances. Employment considerations for level delivery are:

- Level delivery increases probability of kill (PK) because the aircraft is very stable at the release point. This also simplifies the delivery of LGWs, munitions at night, and munitions from large multiple aircraft AI packages.

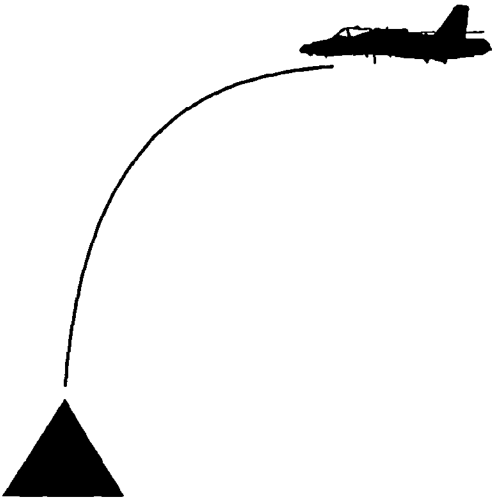

Figure 4-2. Level Delivery.

- Can be used from all altitudes as long as munitions allow level deliveries.
- Some munitions may have reduced accuracy.
- Aircrew recognition and visual acquisition may be reduced.
- Aircraft are more predictable in the target area causing aircraft to be more vulnerable to enemy surface-to-air threats.

Loft Delivery

Figure 4-3 depicts an example of a loft delivery. Although loft delivery profiles may be flown from a variety of altitudes, they are most often used in the low altitude environment. Typically, loft tactics are conducted to maximize standoff from threat weapons systems. Loft deliveries are usually high workload on aircrew due to the dynamic nature of the maneuver. The accuracy associated with this type of attack varies greatly based on ordnance, aircraft, and aircrew skill level.

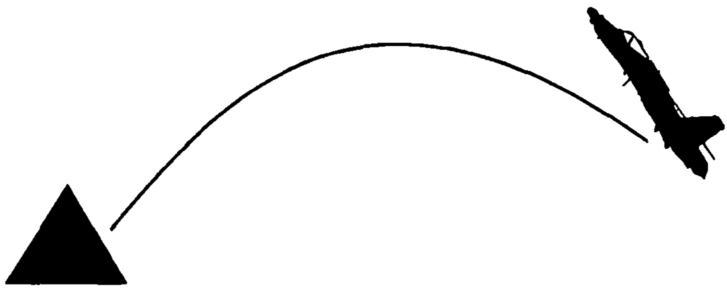

Figure 4-3. Loft Delivery.

Reattacks

Reattacks are those attacks that are conducted after the initial attack has been conducted. Typically, during the conduct of AR missions, reattacks may be required to gain the desired effect on target. Most often when conducting AI missions, attacks are conducted via a single delivery maneuver. It is imperative that flight leaders and DAS aircrews understand and coordinate reattacks prior to take-off. Reattacks expose aircraft to the threat longer and make DAS aircraft more predictable. When reattacking, aircrews should vary attack headings and altitudes to avoid predictability and limit vulnerability. Aircrews should also wait until the entire package has completed its initial attacks before reattacking targets. Most importantly, whatever surprise benefited the initial attack is lost and the SEAD sanctuary/ window support may not be available.

ROTARY-WING EXECUTION

In most cases, the advantages and disadvantages of employing fixed-wing aircraft in the low altitude environment apply to rotary-wing employment as well. However, rotary-wing assets will be employed near or inside the FSCL during DAS missions. Although rotary-wing assets are capable of operating at extended ranges, several logistical concerns require these missions to be carefully planned. Of primary concern would be rapid ground refueling assets and the ability to upload ordnance at a relatively secure forward site. FARPs play a major role in the utilization of rotary-wing assets by reducing response times and increasing their range capability. The benefit of the FARP must be weighed carefully with the MAGTF mission.

En route Tactics

The en route portion of the DAS mission for rotary-wing aircraft is critical and must be thoroughly planned. En route airspeeds should be kept relatively moderate to allow for threat detection through a vigilant sensor employment plan. The optimum element size to be employed is the division operating in either a bounding or traveling over-watch formation. This formation will allow accurate navigation while allowing mutual support. The en route portion of DAS missions will most likely require considerable time to accomplish, especially in areas that are known or expected to be hostile. In many instances, the en route portion of the mission will require objective area type attention to planning.

Attack Tactics

The overall objective during a DAS mission is early identification of potential threats and targets. This can most effectively be accomplished by thorough pre-mission planning. Regardless of whether conducting an AR mission or an AI mission, careful delineation of prospective target and threat areas is critical. The by-product of this planning will yield suitable firing points to either engage targets or record information significant to the

MAGTF commander. An equally important consideration is the terrain on which DAS missions are to be conducted. Areas void of useable terrain will require deliberate movement, with the primary concern of early threat detection. Night missions with onboard sensors will play a large role in reducing the threat.

As a rule of thumb, rotary-wing assets should be employed in areas that allow initial observation from terrain. This is not to suggest that employment should only be from terrain, but rather should highlight its importance. During missions involving both fixed-wing and rotary-wing assets, sectoring the objective area should be based on the inherent capabilities of both platforms. The most logical division will be to use fixed-wing assets to cover large open areas, while employing rotary-wing assets within roughly 10 kilometers of terrain. Planners should avoid placing battle positions throughout the anticipated objective area as control measures. A more suitable method of integration would be the use of well placed target reference points based on key geographical references. Another method of integration is to sector the objective area. If the objective area is sectored and all participating assets are aware of the method, the coordination of target hand-offs and hasty suppression and marking becomes relatively simple.

With sectoring in mind, SCAR assets must coordinate target assignments based on target priorities as well as on the current attack assets available. It is important to recognize that not all targets need to be immediately engaged. Threat dependent, SCAR assets may opt to mark targets on a map and then evaluate both the long and short-term threats these targets pose to both the airborne asset and the ground force. If the target poses no immediate threat, the targets should be monitored until a tactically sound weapon to target match is achieved. For example, it may be inappropriate to engage thin-skinned vehicles with tube-launched, optically tracked, wire-command link guided missile (TOW) and Hellfire if an AV-8B with cluster bomb unit (CBU) is expected on station within a short period of time.

Attack Profiles

The primary weapons to be employed by rotary-wing assets will be TOW and Hellfire, since they provide the greatest standoff and highest PK. The most beneficial profile from which to engage will either be from a hover or by utilizing slow running fire of approximately 30 to 60 knots. Normally, rockets 2.75 inches and 5.0 inches will be used for suppression or target marking. During DAS missions, accurate weaponeering will yield not only the optimal weapon to target match, but will also indicate the most logical number of weapons to be carried. Mission dependent, the option of downloading ordnance in favor of carrying auxiliary fuel tanks should be considered. This may allow the mission to be accomplished without setting up a FARP. Again, the employment of rotary-wing assets at night offers the greatest force protection and chance for mission accomplishment.

Reattacks

Rotary-wing reattacks follow the same logic as with fixed-wing assets. Of primary consideration is the unacceptable exposure time required. Based on the threat, and mission precedence, reattacks should involve coordinated SEAD. Since mobile targets will likely displace once attacked, rotary-wing assets should attempt to maintain observation while evaluating a reattack from a different heading. Additionally, target hand-off to an on station fixed-wing asset may be the most effective means of reattacking targets. Remember, surprise by rotary-wing assets creates the best opportunity for mission success; surprise is difficult to achieve during reattacks.

SUMMARY

Aircraft tactical manuals, and trained and experienced aircrew are the best sources of information for specific aircraft DAS execution tactics and procedures. The goal of this chapter is to educate operators and planners on the overall execution capabilities of fixed-wing and rotary-wing aircraft and the munitions that may be utilized to successfully conduct DAS operations. The successful execution of DAS operations allows the MAGTF commander to disrupt enemy operations, shape the battleships to the advantage of other MAGTF forces, and use economy of force.

Appendix A

AIRCREW PLANNING CHECKLISTS

The following aircrew planning checklists are broken into general and specific lists to aid deep air support (DAS) planners and aircrews in expediting the planning process. Mission objectives and the basic plan itself may require alteration based on information gathered during planning.

Mission planners must objectively evaluate the chances for mission success and identify possible contingencies that could affect mission success. As mission planners work through the checklist, they identify risks and weaknesses that cannot be overcome.

SECTION I. GENERAL CONSIDERATIONS PLANNING CHECKLIST

- What is the threat? What are the threat's strengths? What are the threat's weaknesses? (The threat's strengths and weaknesses are relative to the assets on hand and available to planners to counter strength and exploit weakness.) Is the threat proficient in day and night operations?
- What are the ACE commander's specified and implied tasks for this mission?
- Are the aircraft and weapons on-hand to accomplish the ACE's specified and implied tasks for this mission?
- Is the mission's timing so critical that it must go with the assets at hand? Does the mission commander have the freedom to postpone the mission if required actions are not accomplished? How does mission priority compare with go/no-go criteria?
- Has a TOT been assigned to this mission? Can the mission meet the assigned TOT? How much time between mission notification and TOT? How responsive can the mission be to target changes? What is the latest point at which major changes to the mission can be accepted?
- What is the desired PD needed to achieve the ACE commander's guidance? Will the level of available threat suppression allow the employment of weapons and delivery techniques to achieve the desired PD?
- Has the enemy exhibited any WARM countermeasures? Have collection platforms been tasked to look for that type of data?
- Do ROE and collateral damage limitations interfere with the mission plan (e.g., BVR missile shots, cluster weapons)? Are changes to ROE possible? Have requests been made?
- Is collateral damage a concern on this mission?

- Does the mission plan depend on the weather or the time of day? What if the mission cannot go at the optimum time of day?
- Is the plan based on a particular threat level? Does success hinge on an expected enemy response or a series of responses? What happens to the plan if the enemy doesn't respond as predicted? What is the backup plan?
- Is the plan centered on an unusual weapon or delivery tactic (e.g., night laser-guided bomb loft, LGW, buddy designation or high altitude release)? Have aircrews practiced this delivery tactic or used this weapon before? Can aircrews be reasonably expected to accomplish the task successfully? Should aircrews be handpicked for critical tasks?
- Which evolutions are absolutely essential (rendezvous, tanking, arrival at en route points, SEAD)?
- Which support missions (i.e., SEAD; EW; tanker; C2; TRAP) are critical to mission success/support? What can be omitted and still guarantee mission success/support? What is the affect on aircrew survivability?
- Are there enough fighters (based on the MAGTF's) defensive posture, number and type of threat aircraft, and number of aircraft requiring protection) to accomplish the mission? What is the minimum number of acceptable fighters?
- What is the minimum number of attack aircraft necessary for the mission? What if the ordnance is not loaded as planned? What if the launch, rendezvous or tanker plan falls behind? What about stragglers and spares? Are there alternative targets and target times? How is survivability affected?
- Can the FOB/flight deck handle the launch plan? Can the weapons department provide the ordnance? What about aircraft turnaround and rearm times and ordnance-ready service capacity?
- What are the expected friendly losses?

SECTION II. SPECIFIC MISSION PLANNING CHECKLIST

1. OBJECTIVE

Analyze the mission. What is the commander's intent? What are the specified or implied tasks?

A. Mission objective/desired PK, damage, result or effect

B. Primary and Secondary Targets

(1) Description/type of construction/size

(2) Location/elevation (accurate or precise)

(3) Prevailing and forecast weather/integrated refractive effects prediction system/contrail levels

(4) Radar/IR/Television/Visual Significance

(5) Topography/Terrain Features

(6) EOTDA of Target Area

C. Environment

(1) Sun Angles/Contrast/Shadows/Time of Day

(2) Terrain/Contrails/Prevailing Weather/Ground Cover

2. INTELLIGENCE SOURCES/REQUESTS

Consider all intelligence sources and assets. Submit requests for maps, charts, and documentation as soon as possible.

A. MAGTF/JTF Information

(1) Background intelligence/targeting intelligence

(a) Aircrew debriefs

(b) Naval intelligence processing system database

(c) Strategic air operations package

(d) Fleet imagery support terminal/APPs

(2) Current intelligence sources

(a) TARPS/ATARS

(b) EA-6B; test, evaluation, and monitoring system; VAQ

(c) Shipboard radio direction finder

(d) Aircraft video tape recorder tapes

B. Other Assets

(1) EP-3/RC-135 ELINT/SIGINT

(2) U-2R/satellite (imagery)

(3) National Security Agency (ELINT/SIGINT)

(4) Central Intelligence Agency/Defense Intelligence Agency/ CINCs/FOSIF/FOSIC (update sensors)

3. FRIENDLY ORDER OF BATTLE/SITUATION

Determine availability of friendly assets and disposition of friendly forces and ROE.

A. MAGTF Disposition

(1) Scheme of maneuver

(2) GCE disposition

(a) Order of battle

(b) Air defense posture

(c) Antiair ROE/IFF procedures

(3) ACE disposition

(a) Order of battle

(b) Type/location of missions

(c) Air-to-air ROE/IFF

B. Naval Disposition

(1) Fleet air defense posture

(2) Antiair/surface/subsurface ROE

(3) SSC operations

(4) Carrier air operations mode-cyclic/flex deck

(5) Antiair/surface/subsurface ROE.

C. Current Attack and Support Aircraft ROE

(1) Collateral damage limitations

(2) ROE modification request (if applicable)

D. MAGTF/JTF EMCON Condition (Current/Probable/ Desired)

E. Other Factors Competing for/Affecting Mission Assets

(1) Alerts, AAW, CAS, and other missions

(2) Attack and support aircraft availability

F. Joint Services Operations Specific Items

(1) All players need to be involved in planning

(2) Establish clear chain of command

(3) Review entire communications net

(a) Jamming considerations

(b) Channelization

(c) Modulation modes

(d) Cryptographic hardware

(4) Delineate airspace control procedures

(5) Ensure joint service time reference (synchronized clock).

(6) Ensure joint service coordinate reference geographic coordinate system or UTM.

(7) Ensure a joint service ROE is promulgated.

4. ENEMY ORDER OF BATTLE THREAT/SITUATION

Determine threats to the mission. Analyze enemy air defense capability.

A. Ocean Surveillance (Satellite/High Frequency Direction Finders/Intelligence Collection Ship/Air/Merchant Ships)

B. Overall Level of Integration of Enemy Air Defense System

(1) Demonstrated level of capability/proficiency/training

(2) Depth/integration of the air defense system

C. ES/GCI Sites

(1) Probable detection ranges (high and low)

(2) Coastal patrol ships and aircraft

(3) Tattletale ships and aircraft

(4) Coverage by HARMs/ARMs

(5) Site defense

(6) Airborne intercept control

D. Electronic Attack

(1) Naval/airborne/ground based

(2) Active jammers

(3) Chaff/decoys/smoke

(4) WARM capability

E. ES Capability

(1) Naval/airborne/ground based

(2) Tattletale

F. Fighters

(1) Base locations/type and model/number

(2) Alert posture/response time

(3) Helicopter air-to-air capability

(4) Performance relative to supported aircraft

(5) Inboard radar, detection range/azimuth/look-up and lookdown capabilities

(6) All-weather/night capability

(7) Weapons (guns and missiles)

(8) Types/load outs/guidance/ranges

(9) Combat radius/flying time

(10) Tactics/reliance on GCI-communications UHF/VHF/ secure communications

(11) Probable intercept points

(12) Pilot training levels/proficiency

(13) Integration with SAMs and AAA/ROE

G. Surface-to-Air Missiles

(1) Type/Location

(2) Naval SAMs

(3) Engagement envelopes

(4) Engagement sequences if applicable

(5) Integration with fighters/ROE

(6) Target acquisition methods

(7) Target tracking/guidance/homing (radar, optical, IR, contrast)

(8) Night/all-weather capability

(9) EP techniques and the impact on DECM

(10) Missile vulnerability (chaff, flares, maneuvering)

(11) Coverage by HARMs/ARMs

(12) WARM capability

H. Antiaircraft Artillery

(1) Caliber/location

(2) Naval AAA

(3) Engagement envelopes

(4) Integration with fighters and SAMs

(5) Target acquisition methods

(6) Target tracking (radar, optical, manual)

(7) Night/all-weather capability

(8) EP techniques and the impact on DECM

(9) Coverage by HARMs/ARMs

(10) WARM capability

i. Small Arms Location of Enemy Ground Forces

j. Psychological/Sociological Factors

(1) Political and military stability and leadership

(2) Relations with neighboring countries

(3) Support/influence of other countries

(4) Public attitude/support for current regime

(5) Race/religion

(6) Pertinent traditional customs or habit patterns

5. WEAPONEERING

Consider desired PD, delivery parameters for weapons' effectiveness, weapons' effect degradation by environment, release parameters possible within the threat envelope, and expected weather conditions.

A. Air-to-Ground

(1) Number/type weapons required

(2) Delivery parameters required.

(3) Back-up delivery parameters

(4) Fragmentation patterns/ordnance trajectories

B. Air-to-Air

(1) Integration with air-to-ground weapons

(2) Weapons envelopes

(3) Environmental effects on weapons

C. Availability of Desired Weapons and Fuzes

(1) ACE load out

(2) CSSE load and resupply time

(3) Movement/buildup times

(4) Availability of handling/support equipment and test sets

(5) Availability of MERs, TERs, and launchers.

D. Aircraft Reconfiguration

(1) Drop tank upload/download

(2) FLIR pods/TARPS pods/Walleye control pods

(3) Missile launcher rails MERs, TERs.

(4) Weapon release and control checks

(5) Ordnance loading priority

6. THREAT SUPPRESSION/NEUTRALIZATION

Determine the threats that must be neutralized and the appropriate method.

A. Remain Outside Engagement Envelope

(1) Route/altitude/terrain masking

(2) Speed/formations/mutual support/lookout

(3) Jinking/planned defensive maneuvers.

(4) Effect of weather and time of day or night

B. Surprise/Deception (Using Decoy Group, Bulk Chaff, Drones, Feints)

C. Electronic Attack

(1) Support jamming

(2) Self-protect expendables

D. Destruction

(1) SEAD suppression/WARM considerations

(2) Shore-based artillery/NSFS support

(3) Special operations

E. Fighter Integration

(1) Fighter lead/alternate lead

(2) Type mission(s)

(a) Close escort

(b) Sweep (route/off-route)

(c) Defense in depth

(3) AEW/ES

(4) Fighter communication plan

(5) Fighter radar contracts

(6) VID/BVR considerations

(7) Fighter egress plan

(8) Integration with attackers (route, SAM envelopes, etc.)

7. MISSION COMPOSITION/AIRCRAFT/ASSETS

Consider weaponeering requirements, combat range, asset availability, weapons' match with aircraft, and delivery parameters.

A. Attack Aircraft

(1) Number/type

(2) Ordnance loads (air-to-ground and air-to-air)

(3) Availability

B. SEAD Aircraft

(1) Number/type

(2) Ordnance loads

(a) Air-to-ground (seeker head availability/targeting codes)

(b) Air-to-air (self-protect)

(c) Availability

C. Fighter Aircraft Number/Type. Ordnance loads Availability ROE Considerations (specific mission/position in formation/expected threat tactics)

D. EA/Deception Group Aircraft

(1) Number/type

(2) Specific pod/jammer configuration and priorities

(3) Availability

E. C3 Aircraft (Number and Type)

F. Reconnaissance/BDA/SIGINT

G. Tanker Aircraft (Fuel Loads/Gives)

H. TRAP/RESCAP Aircraft

I. Other Assets

(1) Tomahawk/cruise missiles

(2) P-3 or B-52 Harpoon

(3) Surface or submarine-launched Harpoon

(4) Joint or multinational

(5) Special forces

J. Spares (Number/Type/Configuration)

8. LAUNCH

What is the launch plan? Are all aircraft launching from the same site? What are the rendezvous time and location?

A. Launch Sites

(1) FOB

(2) Ship (PIM/feasibility arcs)

B. Launch Plan (Primary and Weather Backup)

(1) Timing

(2) EMCON condition

(3) Communication plan

C. Rendezvous/Tanking

(1) Position/altitude/airspeed

(2) Formation

(3) Push time from rendezvous

(4) Tanking sequence/airspeed

(5) Tanking begin and end points

(6) Tanker detachment and RTF procedures

(7) Sour package backup plan

D. Stragglers/Late Arrivals

9. INGRESS

Determine ingress routes and formations for the individual flights. Determine go/no-go criteria.

A. Routes/Altitudes/Speeds

(1) Primary and secondary navigation lead

(2) Use of C2 aircraft

(3) Radar horizon/terrain masking/shadows/time of day

(4) Avoidance of enemy or unknown naval units

(5) Descent points

(6) Navigation checkpoints

(7) Coast-in points

(8) Acceleration points

(9) Timing control points

(10) Split points

(11) Deception group positioning

(12) Avoidance of enemy or unknown sea and land units

B. Formations

(1) Tactical formations/mutual support

(2) Planned and unplanned turns

(3) Enemy fighter intercept

(4) Inadvertent instrument meteorological conditions/loss of visual contact

(5) Transition points

C. Emission Control

(1) Communication plan/chattermark procedures

(2) Emitters on point

(3) Radar, UHF, IFF, doppler, and radar altimeter

(4) Communication, radar or data link jamming contingencies

(5) Data link plan/air-to-air TACAN use

(6) Intercept control/geographical reference points

(7) Radio limitations

(8) Have-quick procedures

D. EA/Iron hand/Deception Group

(1) Positioning/timing

(2) Specific sites/emitters to be jammed and when to jam

(3) Jammer on and off times

(4) Specific sites/emitters to be attacked and when to jam

(5) HARM/EA-6B/VQ interface and coordination (especially WARM, ELINT BDA)

E. Fighter Support Requirements

(1) Positioning and timing specifics

(2) Close escort/sweep

(3) Defense in depth

(4) High value unit protection

(5) Commit criteria

(6) Intercept flow

(7) ROE/BVR

(8) Merge/leakers/resume or retire

F. Go/No-go Criteria for Individual Aircraft and Entire Mission

(1) Fuel

(2) Communications/naval/weapon delivery system failure en route

(3) DECM

(4) Minimum ordnance loads

(5) Critical mission elements (threat suppression, tanker, EA)

(6) Recall points/recall procedures

(7) Single aircraft procedures (loss of wingman)

(8) Weather

(9) Threat

10. TARGET AREA

Determine attack procedures in the target area. Decide attack priorities and secondary targets. Choose appropriate delivery tactics and techniques.

A. Armament Switch Changeover from Air-to-Air to Air-to-Ground

B. IPs/APs (Radar and Visual)

C. Delivery Maneuver

(1) Pull-up points/roll-in points

(2) Release parameters

(3) Aim points (radar, FLIR, visual)

(4) Mil settings

(5) Buddy bombing

(6) Preplanned self-protect chaff and flare dispense points

(7) DECM use

D. Time on Target

(1) TOT compression

(2) Deconfliction/traffic flow

(3) Fragmentation patterns/secondaries

(4) Target obscuration by smoke, weather, shadows or glare

(5) Hung ordnance/no drops

(6) Feasibility of reattacks

E. Support Coordination

(1) Use of C2 Aircraft

(2) HARM/SEAD TOTs

(3) Fighter target area tactics (positioning/delay tactics/ROE)

(4) TARPS/ATARS/BDA

11. EGRESS AND RETURN TO FORCE

What are the egress procedures? Where are the rendezvous points? What are RTF and recovery procedures?

A. Off-Target Maneuvering

(1) Recovery maneuver/fragmentation avoidance

(2) Mutual support/formations

(3) Rendezvous points/route/speeds

(4) Jammer off time

(5) Off-target calls

B. Hung Ordnance

(1) Jettison

(2) Alternate targets

C. Fighter Support

(1) Positioning (close escort/sweep)

(2) Defense indepth

(3) Backup game plan

(4) Commit criteria

(5) Intercept/flow

(6) BVR/ROE

(7) Merge/leakers/bugout

D. Coast Out Points/Procedures (Egress Count)

E. Return to Force

(1) Routes, altitudes, airspeeds

(2) RTF/IFF procedures

(3) Delousing

(4) No communication/damaged aircraft RTF

(5) Damaged aircraft divert fields

F. Recovery

(1) FOB

(2) Ship

(a) PIM/time

(b) Carrier air operations mode (ready deck/cyclic)

(3) EMCON condition/case

(4) Sequence

(5) Minimum fuel

(6) Airborne/alert tanker

(7) Bingo/divert fields

12. TRAP/RESCAP

Determine TRAP requirements, asset availability and capability. Gather escape and evasion information.

A. Sea/Land Capabilities

B. TRAP Assets

(1) MAGTF

(2) Navy

(3) Army/Air Force

(4) Special operations forces

(5) Allied or other friendly forces

C. Staging of MAGTF/JTF Assets

D. Escape and Evasion

(1) Safe areas

(2) Headings for damaged aircraft

(3) Location of friendlies/partisans

(4) Possible pickup points

(5) Pickup/contact or broadcast times

(6) Primary and secondary frequencies

E. Authentication (Codewords)

F. RESCAP Responsibility for Each Element

(1) RESCAP relief

(2) Type aircraft/load outs

Appendix B

Briefing Guides

SECTION I. AR AND SCAR BRIEFING GUIDE

1. GENERAL

A. Mission overview

B. Mission objectives

2. FRIENDLY SITUATION

A. Ground scheme of maneuver

B. MAGTF objectives

C. Potential targets

(1) Target contrast

(2) Anticipated detection slant range (EOTDA predictions)

3. ENEMY SITUATION

A. Ground order of battle

B. Air order of battle

C. Electronic order of battle

D. SAMs

E. AAA

F. Anticipated response

4. MAP STUDY

A. FLOT

B. FSCL

C. ACAs

D. NAIs/TAIs

E. No-fire areas

F. CP

G. Key terrain

H. Target area search

(1) ACA

(2) Route

(3) Specific

(4) Waypoint sequence

5. ORDNANCE

A. Type and number

B. SMS/fuzing Codes (Aircraft Dependent)

C. Program

D. Expendables load/program

E. Carriage and jettison limitations

F. Employment limitations

G. Frag pattern

H. Jettison procedures

6. C3 PLAN

A. Frequencies/agencies

B. Code words/authentication

C. IFF plan

(1) Mode 1, 2, 3C, 4 A/B

(2) On/Off

D. Data Link

(1) Frequency

(2) 1 way or 2 way

E. Critical information flow

(1) Threats in the target area

(2) In-flight Reports (When and to Whom)

F. Routing

(1) Altitudes/airspeeds

(2) Return to force

7. SEARCH PROFILE

A. High altitude sweep

B. Search altitude/airspeed

C. Formation

D. Visual footprint

(1) Outer limit

(2) Inner limit

E. Mate search volume

(1) Inside section

(2) Outside section

8. TARGET ATTACK

A. Direct

B. Transition

C. Delayed

D. Communication

9. NIGHT ATTACK

A. Flares

B. FLIR search

C. NVG search

D. Illumination

10. SCAR

A. ATO/Mission Assets

(1) Mission number

(2) Call sign

(3) Number and type

(4) Ordnance

(5) Time on statio

(6) Marking Capability (rocket, laser, other)

B. Execution

(1) Info to supply to strike aircraft; target description

(a) Location

(b) Elevation

(c) Area weather

(d) Current threat

(2) SCAR positioning and flow

(3) Target marking/type

(4) Delivery parameters/backup

(5) Adjustments

(6) BDA

C. On station relief

(1) Threat update

(2) Aircraft on station

(3) Recommendation to oncoming SCAR platform

11. THREAT REACTIONS

A. RWR indications

B. Defensive maneuvers

C. Expendables

D. Jammers

E. Jettison criteria

12. TRAP/SERE

A. Planned response

B. Frequency

C. Call signs/terminology/authentication

13. GO/NO-GO CRITERIA

A. Weather

B. Minimum systems

SECTION II. AI BRIEFING GUIDE

1. TIME HACK

2. ROLL CALL

3. MISSION OVERVIEW

4. WEATHER

A. Local

(1) Launch.

(2) Recovery

B. Operations Area

C. Diverts

D. Sun/moon angle at TOT

E. Winds

5. SMART PACK PAGE CHECK

6. MISSION OVERVIEW

A. Strike objective

(1) Required PD

(2) Target area photo

(3) 1:50,000

(4) Secondary target

B. Operation area overview

(1) Operational navigation chart (ONC)

(2) Tactical pilotage chart

7. KEY PLAYERS

A. Strike element

(1) Mission commander

(2) Alternate mission commander

B. SEAD element

(1) SEAD lead

(2) HVAA CAP lead

C. Fighter element

(1) Fighter lead

(2) GCI/AEW lead

D. Tanker lead

8. FRIENDLY SITUATION

A. External assets

B. Concurrent missions

9. ENEMY SITUATION

A. Early warning

B. GCI

C. Air order of battle

D. SAMs

E. AAA

F. Anticipated response

10. STRIKE COMPOSITION

A. Call sign

B. Type aircraft

C. Number of aircraft

D. Mission

E. Ordnance

11. PREFLIGHT

A. SMS/fuzing codes

B. Program

C. ALE-39 load/program

12. C3 PLAN

A. Frequencies/agencies

B. Codewords

C. IFF plan

(1) Mode 1, 2, 3C, 4 A/B

(2) On/Off

D. Data link

(1) Frequency

(2) 1 way or 2 way

E. Critical information flow

(1) Off count

(2) Loss of any critical assets airborne

(3) Status of various threats.

(4) Any change in TOT

(5) Mission success

(6) Individual feet wet calls

13. LAUNCH SEQUENCE PLAN

A. Times for each element

(1) Walk

(2) Start

(3) Check-in

(4) Taxi

(5) Takeoff

B. Stragglers

C. EMCON taxi and takeoff procedures

D. Takeoff

(1) Runway

(2) Positioning

E. Rendezvous

(1) Position

(2) Time

(3) Speed

(4) Weapons/integrity checks

(5) Formation visual meteorological conditions (VMC)/ instrument meteorological conditions (IMC)

14. TANKING PLAN

A. Tanker position.

B. Tanker formation.

C. Rendezvous (VMC/IMC)

D. Element tanker assignment

E. Element aerial refueling control point

F. Comm/EMCON procedures

G. Give per aircraft

H. Element rejoin procedures

I. Timing control point

(1) Altitude assignments

(2) Deconfliction

15. NAVIGATION PLAN

A. Waypoints

B. Times

C. Fuel

(1) Fuel at each point

(2) Minimum fuel required at each point

16. FIGHTER ELEMENT

A. Position relative to strikers

B. Sweep route

(1) Formation (VMC/IMC)

(2) Altitude

(3) Airspeed

C. Type control

D. Commit criteria/authority

E. Reset criteria

F. Abort criteria/preserving BVR for strikers

G. Flow

H. PID criteria

I. Mate, meld, sort, shoot

J. Drop criteria

K. Target area

(1) Position/flow.

(2) Target area ROE.

(3) Change of fighter mission in target area/on egress

L. Required communication on strike common frequency (big picture items, commit, engagement reports, leakers, reset, abort)

17. SEAD ELEMENT

A. Position/altitude

B. Music on and off times

C. TALD plan

D. HARM plan

(1) Target

(2) Flex

(3) Launch

(4) Impact

(5) Strike Package Position

E. HVAA CAP plan

(1) Formation (VMC/IMC)

(2) Commit criteria/authority

(3) Slide/scram criteria

(4) PID criteria

(5) Mate, meld, sort, shoot

(6) Reset criteria

(7) Criteria for HVAA to return to primary track

18. STRIKE ELEMENT

A. Ingress formation/altitude/airspeed (VMC/IMC)

B. Self protect/tarcap considerations

(1) Designated fighters

(2) Commit criteria/authority

(3) Flow/Striker lean

(4) PID criteria

(5) Mate, Meld, Sort, Shoot

(6) Drop criteria

(7) Rejoin procedures

C. Threat reactions

(1) RWR indications

(2) Defensive maneuvers (SAM counter tactics, Glib, Weave, Notch)

(3) Expendables

(4) ALQ 126B

(5) Jettison criteria

D. Target area tactics

(1) Target acquisition

(2) Attack sequence

(3) Final attack headings

(4) Delivery parameters/abort criteria

(5) Attack element aim points/alternate aim points

(6) Attack element TOTs

(7) Smart bomb coordination

(8) BDA

(9) Collateral damage

(10) Target area deconfliction

(11) Alternate TOT windows for defending elements

(12) Alternate weather delivery

(13) Secondary target

E. Egress

(1) Off target headings

(2) Egress control point

(3) Altitudes

(4) Section integrity/rejoin

19. RETURN TO FORCE PROCEDURES

A. Routing

B. Lame duck

C. Break/precision approach radar

D. Hung ordnance

20. MISSION FLOW

A. Depiction of entire route

B. Snap shots

(1) Push snap shot/time

(2) Approaching target snap shot/time

(3) TOT snap shot/time

(4) Off target snap shop/time

21. TRAP/SERE

A. Safe areas

B. Planned response

C. Frequency

D. Call signs/terminology/authentication

22. GO/NO-GO CRITERIA

A. Weather

B. Minimum aircraft

C. Minimum systems

D. Threat

23. KEYS TO SUCCESS

24. QUESTIONS

Appendix C

Damage Criterion

This table is only a quick reference guide for DAS planners. JMEM/AS should be utilized for detailed DAS operation planning.

Target Type	Damage Criteria	PD	Preferred Weapon
Personnel	Harassment Neutralize Destruction	0.1 0.3-0.4 0.5-.07	CBU/GP Bombs CBU/GP Bombs CBU/GP Bombs
Armored Vehicles	K-Kill (Single) K-Kill (Area)	0.7-0.9 0.5-0.7	PGM/CBU CBU/PGM
Field Artillery	F-Kill	0.7-0.9	GP/PGM (single)
Rocket/SSM	K-Kill	0.7-0.9	PGM /CBU
AAA	K-Kill	0.7-0.9	CBU
Mobile AAA	K-Kill	0.5-0.7	PGM /CBU/GP
Airfields	MOS/MCL	0.7-0.8	GP
Aircraft	K-Kill	0.7-0.8	PGM (single Aircraft) CBU/Gun/Rocket (Multiple Aircraft)

Target Type	Damage Criteria	PD	Preferred Weapon
Aircraft Bunkers	Breach bunker and aircraft inside K-Kill	0.7-0.8	PGM/GP
Hardened Targets	Damage inside that causes complete breakdown of position	0.7-0.9	PGM
C3 Sites	K-Kill	0.7-0.9	PGM
Bridges	Collapse Span	0.7-0.8	PGM
Dams	Rupture/Collapse	0.7-0.9	PGM/GP
Locks	Buckling of gates	0.7-0.9	PGM/GP
Trains/ Trucks	K-Kill	0.5-0.7	PGM/CBU/GP
Tunnels	Damage to tunnel linings	0.7-0.8	PGM
Ships	SAM/SSM systems Sea worthiness	0.7-0.9 0.5-0.9	ARM PGM/CBU/GP
SAM Systems	K-Kill Suppress	0.7-0.8 0.7-0.8	PGM ARM
Buildings	Damage structural	0.5-0.7	PGM/GP
Communication Vans	None defined	0.7-0.9	PGM/CBU
Antennas	None defined	0.5-.7	PGM/GP
POL	Supplies in open Render unusable	0.3-0.5 0.3-0.5	GP GP

Target Type	Damage Criteria	PD	Preferred Weapon
POL	Heavy damage to critical components	0.7-0.9	PGM/GP
Ammunition Storage	Catastrophic	0.3-0.5 Open 0.5 Bldg. 0.5-0.7 Igloos	GP PGM/GP PGM/GP
Ports	Destruction of piers	0.5-.07	PGM/GP

AAA antiaircraft artillery
ARM antiradiation missile
C3 command, control, and communications
CBU cluster bomb unit
GP general purpose
MCL minimum clear length
MOS minimum operating surface
PD probability of destruction
PGM precision guided munition
POL petroleum, oil, and lubricants
SAM surface to air missile
SSM surface to surface missile

Appendix D

Aircraft Weapons and Capabilities Guide

The following notes apply to the table located on pages D-2 through D-6.

1. Though these aircraft can release carry and release guided-bomb units (GBUs), only AV-8Bs with Litening II have an onboard designation capability for terminal guidance.
2. Only AV-8B Night attack have this capability.
3. Only AV-8B with Litening II capability.
4. Only AV-8B with Radar upgrade have this capability.
5. AC-130H can only designate laser code 1688.
6. F-16 without LANTIRN capability require off-board designation for terminal guidance.
7. Only F-16 w/HARM Targeting System.
8. Only F-16 w/LANTIRN capability.
9. GPS on some aircraft (Blocks 40/41; 50/52).
10. Only FA-18 Lot 11 and above have this capability.
11. Some FA-18 Lot 16 and all FA-18 Lot 17 and above have this capability.
12. AH-1W can designate codes 1111-1788, but has maximum effectiveness from 1111-1488.
13. AH-64s can not designate codes 1711 to 1788.

Aircraft	Service	Ordnance	Laser Tracker	Laser Designator	GPS	Marking Capability	Other Systems	Comm
AV-8B	USMC	GBU (1) GP Bombs CBU AGM-65 IR & Laser Maverick 2.75"/5.0" Rockets 25mm Cannon LUU-2 Flares LUU-19 Flares	Yes (2)	Yes (3)	Yes	IR (3) Rockets	FLIR NVG Radar (4)	UHF/VHF
A/OA-10A	USAF	GBU (1) GP Bombs CBU Aerial Mines AGM-65 IR & Laser Maverick 2.75" Rockets 30mm Cannon LUU-1/-2 Flares LUU-5/-6 Flares	Yes	No	No	Rockets	NVG	UHF/VHF

Aircraft	Service	Ordnance	Laser Tracker	Laser Designator	GPS	Marking Capability	Other Systems	Comm
AC-130H/U	USAF	105mm Howitzer 40 mm Cannon 20 mm Cannon	No	Yes (5)	Yes	GLINT 105mm WP 105mm HE 40mm LTD	Beacon FLIR LLLTV Radar	UHF/VHF HF SATCOM
B-1B	USAF	GP Bombs	No	No	No	None	Radar	UHF/VHF HF SATCOM
B-52H	USAF	GP Bombs AGM-142 CBU Aerial Mines TALCM AGM-84 Harpoon	No	No	Yes	None	Beacon FLIR LLLTV NVG Radar	UHF/VHF HF SATCOM
F-14	USN	GBU GP Bombs CBU 20mm Cannon LUU- 2 Flares	No	Yes	No	Laser Rockets	FLIR NVG Radar	UHF/VHF

Aircraft	Service	Ordnance	Laser Tracker	Laser Designator	GPS	Marking Capability	Other Systems	Comm
F-15E	USAF	GBU GP Bombs AGM-130 AGM-65 IR Maverick AGM-154 JSOW CBU 20mm Cannon	No	Yes	Yes	Laser	FLIR Radar	UHF/VHF
F-16 C/D & C/J	USAF	GBU (6) GP Bombs AGM-65 IR & Laser Maverick AGM-154 JSOW CBU AGM-88 HARM (7) 20mm Cannon	Yes	Yes (8)	Yes (9)	Laser Rockets	LATRIN NVG Radar	UHF/VHF

Aircraft	Service	Ordnance	Laser Tracker	Laser Designator	GPS	Marking Capability	Other Systems	Comm
F/A-18 A/C/ D	USN A/C USMC A/C/D	GBU GP Bombs AGM-65 IR (10) & Laser Maverick AGM-84E SLAM AGM-154 JSOW (10) CBU-99 GBU-31 JDAM (11) 2.75"/5.0" Rockets AGM-88 HARM Aerial Mines 20mm Cannon LUU-2 Flares LUU-19 Flares AGM-84D Harpoon	Yes	Yes	Yes	IR pointer Laser Rockets	FLIR NVG Radar	UHF/VHF
S-3B	USN	GP Bombs CBU 2.75"/5.0" Rockets Aerial Mines LUU-2 Flares AGM-84D Harpoon	No	No	No	Rockets	FLIR Radar	UHF/VHF

Aircraft	Service	Ordnance	Laser Tracker	Laser Designator	GPS	Marking Capability	Other Systems	Comm
UH-1N	USMC	7.62mm MG .50cal MG 2.75" Rockets	No	No	Yes	IR Pointer Rockets	FLIR LRF NVG	UHF/VHF
AH-1F	USA	BGM-71 TOW 2.75" Rockets 20mm Cannon	No	No	No	Rockets	NVG	UHF/VHF
AH-1W	USMC	BGM-71 TOW AGM-114 Hellfire 2.75"/5.0" Rockets 20mm Cannon LUU-2 Flares	No	Yes (12)	Yes	IR Pointer Laser Rockets	CCDTV FLIR NVG	UHF/VHF
AH-64 A/D	USA	AGM-114 Hellfire 2.75" Rockets 30mm Cannon	Yes	Yes (13)	Yes	Laser Rockets	DTV FLIR IDM NVG Radar	UHF/VHF
OH-58D	USA	AGM-114 Hellfire	Yes	Yes	No	Laser Rockets	FLIR NVG TVS	UHF/HF

Appendix E

Naval Munitions Capabilities

Weapon	Weight	Primary Damage Mechanism	Breaching Capability	Employment Aircraft	Remarks
Mk-82	500lbs	Fragmentaion	2.8" Reinforced Concrete	FA-18A/C/D F-14A/B/D AV-8B	
Mk-83	1000lbs	Blast/ Fragmentation	4.0" Reinforced Concrete	FA-18A/C/D F-14A/B/D AV-8B	
Mk-84	2000lbs	Blast	5.0" Reinforced Concrete	FA-18A/C/D F-14A/B/D	
GBU-10	2000lbs	Same as Mk-84	Same as Mk-84	FA-18A/C/D F-14A/B/D	
GBU-12	500lbs	Same as Mk-82	Same as Mk-84	FA-18A/C/D F-14A/B/D	
GBU-16	1000lbs	Same as Mk-83	Same as Mk-83	FA-18A/C/D F-14A/B/D	
GBU-24B/B	2000lbs	Penetrator	See A/C TACMAN	FA-18C/D	

Weapon	Weight	Primary Damage Mechanism	Breaching Capability	Employment Aircraft	Remarks
Mk-20 (Rockeye)	490lbs	Penetraion (Area coverage)	Up to 8.0" Armor	FA-18A/C/D F-14A/B/D AV-8B	CBU-99 CBU-100
CBU-78/B (Gator)	490lbs	60 Mines/Container (45 Anti-Anti Tank) (15 Anti-Personnel)	3" Armor 16' Lethal Radius	FA-18A/C/D F-14A/B/D AV-8B	
Mk-52 (Mine)	1266lbs	Acoustic Magnetic Induction Pressure Influence	18' to 600' Depths	FA-18A/C/D	
Mk-55 (Mine)	2273lbs	Acoustic Magnetic Induction Pressure Influence	18' to 600' Depths	FA-18A/C/D	
Mk-56 (Mine)	2215lbs	Magnetic Induction	90' to 1200' Depths	FA-18A/C/D	
2.75"/5" (Rockets)	18-22lbs 110-125lbs	Blast/Frag		FA-18A/C/D	
AGM-65 (IR Mav)	669lbs	Penetration/Blast	See A/C TACMAN	FA-18C/D	

Weapon	Weight	Primary Damage Mechanism	Breaching Capability	Employment Aircraft	Remarks
AGM-65 (Laser Mav)	642lbs	Penetration/Blast	See A/C TACMAN	FA-18A/C/D AV-8B	
AGM-84E (SLAM)	500lbs (Warhead)	Penetration/Blast	Long stand-off MITL See A/C TACMAN	FA-18A/C/D	
AGM-154A JSOW(A)	1065lbs	145 BLU-97 bomblets Penetration/frag	GPS aided/INS Guidance See A/C TACMAN	FA-18C/D	Immensurated coordinates required
AGM-154B JSOW(B)	1065lbs	24 BLU-108 sensor fused munitions Penetration/blast frag	Midcourse GPS aided/INS guidance Terminal IR homing See A/C TACMAN	FA-18C/D	Immensurated coordinates required
AGM-154C JSOW(C)	1065lbs	BLU-111 500 lbs MK 80 series type bomb Blast frag/penetra-tion	Midcourse GPS/INS guidance Terminal IR seeker Datalink control See A/C TACMAN	FA-18C/D	Immensurated coordinates required

Weapon	Weight	Primary Damage Mechanism	Breaching Capability	Employment Aircraft	Remarks
GBU-31(V)2B JDAM GBU-31(V)4B JDAM	2046lbs 2125lbs	2000 lbs MK-84 bomb body 2000 lbs BLU-109 bomb body Blast frag/penetra-tion	GPS aided INS guided Breaches same as MK84 and BLU109	FA-18C/D	Immensurated coordinates requires
GBU-32(V)2B JDAM GBU-32(V)4B JDAM	1038lbs 1029lbs	1000 lbs MK-83 bomb body 2000 lbs BLU-110 bomb body Blast frag/penetra-tion	GPS aided INS guided Breaches same as MK83 and BLU110	FA-18C/D	Immensurated coordinates requires
AGM-114 HELLFIRE (B-F)	100lbs	Shape charge Anti-armor	See A/C TACMAN	AH-1W	
BGM-71 TOW(A-F)	50lbs	Shape charge Anti-armor	See A/C TACMAN	AH-1W	

Appendix F

In-flight Report

USMC INFLTREP	Remarks
Aircrew Transmit: _________, this is ______, in-flight report, over addressee call sign.	
*Expect or conduct authentication if on uncovered net.	
This is __________, in-flight report.	
(1) Call sign________	
(2) Mission number________	
(3) Request number (if applies)_______	
(4) Target Location_____________	
(5) Time on Target_____________	
(6) Results (BDA)____________________	
(7) Remarks_______________________	i.e., Area Wx and Enemy situation after attack.

Appendix G

GLOSSARY

Section I. Acronyms and Abbreviations

AAA . . . antiaircraft artillery
AAW . . . antiair warfare
ABCCC . . . airborne battlefield command and control center
ACA . . . airspace coordination area
ACE . . . aviation combat element
ACO . . . airspace control order
ACP . . . airspace control plan
AEW . . . airborne early warning
AGL . . . above ground level
AI . . . air interdiction
AOC . . . air operations center (USAF)
AP . . . attack position
APP . . . allied procedural publications
AR . . . armed reconnaissance
ARM . . . antiradiation missile
ATARS . . . advanced tactical airborne reconnaissance system
ATO . . . air tasking order
AWACS . . . Airborne Warning and Control System
BDA . . . bomb or battle damage assessment
BVR . . . beyond visual range
C2 . . . command and control
C3 . . . command, control, and communications
CAP . . . combat air patrol
CAS . . . close air support
CBU . . . cluster bomb unit

CCIR . . . . commander's critical information requirements
CINC . . . . commander in chief
COA. . . . . course of action
COG. . . . . center of gravity
CP . . . . control point
CSSE . . . . combat service support element
CTAPS. . . . . contingency theater automated planning system
DAS . . . . deep air support
DASC . . . . direct air support center
DASC (A) . . . . direct air support center (airborne)
DECM . . . . defensive electronic countermeasure
EA . . . . electronic attack
ELINT . . . . electronics intelligence
EMCON. . . . . emission control
EOTDA . . . . electro-optical target decision aid
EP . . . . electronic protection
ERP . . . . en route point
ES . . . . electronic warfare support
EW. . . . . electronic warfare
FAC . . . . forward air controller
FAC (A). . . . . forward air controller (airborne)
FARP. . . . . forward arming and refueling point
FFCC. . . . . force fires coordination center
FLIR . . . . forward looking infrared
FLOT. . . . . forward line of own troops
FMFM . . . . Fleet Marine Force Manual
FOB . . . . forward operating base
FOSIC . . . . fleet ocean surveillance information center
FOSIF . . . . fleet ocean surveillance information facility
FSCC. . . . . fire support coordination center
FSCL . . . . fire support coordination line
GBU. . . . . guided-bomb unit
GCE. . . . . ground combat element

GCI . . . . ground control intercept
GMT . . . . Greenwich Mean Time
GP . . . . general purpose
GPS . . . . global positioning system
HARM. . . . . high-speed anti radiation missile
HPT . . . . high-payoff target
HUMINT. . . . . human intelligence
HVAA . . . . high value airborne asset
HVT . . . . high value target
IADS . . . . integrated air defense system
IFF. . . . . identification, friend or foe
IFREP . . . . in-flight report
IMC . . . . instrument meteorological conditions
IP. . . . . initial point
IPB . . . . intelligence preparation of the battlespace
IR. . . . . infrared
JAOC. . . . . joint air operations center
JDAM . . . . joint direct attack munition
JFACC. . . . . joint force air component commander
JFC . . . . joint force commander
JMEM/AS . . . joint munitions effectiveness manual/air-to-surface
JP. . . . . joint publication
JSOW . . . . joint standoff weapon
JTF . . . . joint task force
LANTIRN . . . . low-altitude navigation and
targeting infrared for night
LGB. . . . . laser guided bomb
LGM . . . . laser guided missile
LGW . . . . laser guided weapon
LOC. . . . . line of communications
MACCS. . . . . . Marine Corps Air Command and Control System
MAGTF. . . . . Marine air-ground task force
MCDP . . . . Marine Corps doctrinal publication

MCL . . . . .minimum clear length
MCRP . . . . .Marine Corps reference publication
MCWP. . . . . .Marine Corps warfighting publication
MER . . . . .multiple ejection rack
METT-T . . . . mission, enemy, terrain and weather, troops and support available and time available
MISREP. . . . . .mission report
MOOTW . . . . military operations other than war
MOS . . . . minimum operating surface
MRR . . . . minimum risk route
MSC. . . . . major subordinate command
MSL. . . . . mean sea level
NAI . . . . named area of interest
NATO . . . . North Atlantic Treaty Organization
NVD . . . . night vision device
NVG . . . . night vision goggles
NSFS . . . . naval surface fire support
NWP . . . . naval warfare publication
OAS. . . . . .offensive air support
OPLAN . . . . .operation plan
OPORD . . . . operation order
OPT . . . . operational planning team
PD . . . . .probability of destruction
PGM . . . . precision-guided munition
PID. . . . . positive identification
PIM . . . . position and intended movement
PK . . . . probability of kill
POL . . . . petroleum. oils, and lubricants
RESCAP . . . . rescue combat air patrol
PRF . . . . pulse repetition frequency
RTF . . . . return to force
RWR . . . . radar warning receiver
ROE. . . . . rules of engagement

SAM . . . . surface-to-air missile
SCAR . . . . strike coordination and reconnaissance
SCUD . . . . surface to surface missile system
SEAD . . . . suppression of enemy air defenses
SERE. . . . . survival, evasion, resistance, and escape
SIGINT . . . . signals intelligence
SLAM . . . . standoff land attack missile
SME . . . . .subject matter expert
SMS. . . . . stores management system
SSC . . . . surface surveillance control
TAC (A) . . . . .tactical air coordinator (airborne)
TACAN. . . . . tactical air navigation
TACC . . . . .tactical air command center (USMC)
TAD . . . . tactical air direction
TADC . . . . tactical air direction center
TADL . . . . .tactical air data link
TAI . . . . .targeted area of interest
TALCM. . . . . .tactical air-launched cruise missile
TALD . . . . tactical air-launched decoy
TAOC . . . . .tactical air operations center
TARPS . . . . tactical airborne reconnaissance pod system
TBMCS . . . . theater battle management core system
TER. . . . . triple ejection rack
TLE . . . . target location error
TOT. . . . . time on target
TOW . . . . .tube-launched, optically tracked, wire-command link guided missile
TRAP . . . . tactical recovery of aircraft and personnel
TTP . . . . .tactics, techniques, and procedures
UAV . . . . unmanned aerial vehicle
UHF. . . . . ultra high frequency
UTM . . . . .universal transverse mercator
VAQ . . . . Navy tactical EW squadron

VHF .... very high frequency
VID .... visual identification
VMC .... visual meteorological conditions
VQ .... Navy fleet air reconnaissance squadron
WARM .... wartime reserve modes

Section II. Definitions

air operations center—The principal air operations installation from which aircraft and air warning functions of combat air operations are directed, controlled, and executed. It is the senior agency of the Air Force Component Commander from which command and control of ar operations are coordinated with other components and Services. Also called AOC. (JP 1-02)

airspace control authority—The commander designated to assume overall responsibility for the operation of the airspace control system in the airspace control area. Also called ACA. (JP 1-02)

airspace control order—An order implementing the airspace control plan that provides the details of the approved requests for airspace control measures. It is published either as part of the air tasking order or as a separate document. Also called ACO. (JP 1-02)

airspace control plan—The document approved by the joint force commander that provides specific planning guidance and procedures for the airspace control system for the joint force area of responsibility. Also called ACP. (JP 1-02)

airspace coordination area—A three dimensional block of airspace in a target area, established by the appropriate ground commander, in which friendly aircraft are reasonably safe from friendly surface fires. The airspace coordination area may be formal or informal. Also called ACA. (JP 1-02)

air interdiction—Air operations conducted to destroy, neutralize, or delay the enemy's military potential before it can be brought to bear effectively against friendly forces at such distance from friendly forces that detailed integration of each air mission with the fire and movement of friendly forces is not required. (JP 1-02)

air superiority—That degree of dominance in the air battle of one force over another which 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)

antiair warfare—A US Navy/US Marine Corps term used to indicate that action required to destroy or reduce to an acceptable level the enemy air and missile threat. It includes such measures as the use of interceptors, bombers, antiaircraft guns, surface-to-air and air-to-air missiles, electronic attack, and destruction of the air or missile threat both before and after it is launched. Other measures which are taken to minimize the effects of hostile air action are cover, concealment, dispersion, deception (including electronic), and mobility. Also called AAW. (JP 1-02) Note: antiair warfare is one of the six functions of Marine aviation.

antiradiation missile—A missile which homes passively on a radiation source. Also called ARM. (JP 1-02)

armed reconnaissance—A mission with the primary purpose of locating and attacking targets of opportunity, i.e., enemy materiel, personnel, and facilities, in assigned general areas, or along assigned ground communications routes, and not for the purpose of attacking specific briefed targets. Also called AR. (JP 1-02)

aviation combat element—The core element of a Marine air-ground task force that is task-organized to conduct aviation operations. The aviation combat element provides all or a portion of the six functions of Marine aviation necessary to accomplish the Marine air-ground task force's mission. These functions are anti-air warfare, offensive air support, assault support, electronic warfare, air reconnaissance, and control of aircraft and missiles. The aviation combat element is usually composed of an aviation unit headquarters and various other aviation units or their detachments. It can vary in size from a small aviation detachment of specifically required aircraft to one or more Marine aircraft wings. The aviation combat element may contain other Service or foreign military forces assigned or attached to the Marine air-ground task force. The aviation combat element itself is not a formal command. Also called ACE. (JP 1-02)

battle damage assessment—The timely and accurate estimate of damage resulting from the application of military force, either lethal or non-lethal, against a predetermined objective. Battle damage assessment can be applied to the employment of all types of weapons systems (air, ground, naval, and special forces weapon systems) throughout the range of military operations. Battle damage assessment is primarily an intelligence responsibility with required inputs and coordination from the operators. Battle damage assessment is composed of physical damage assessment, functional damage assessment, and target system assessment. Also called BDA. (JP 1-02)

battle position—1. In ground operations, a defensive location oriented on an enemy avenue of approach from which a unit may defend. 2. In air operations, an airspace coordination area containing firing points for attack helicopters. (MCRP 5-12C)

bounding overwatch—A tactical movement technique used when contact with enemy ground forces is expected. The unit moves in bounds. One element is in position to overwatch the other element's move. The overwatching element is always positioned to support the moving unit by fire or by fire and maneuver. This is the slowest but most secure movement technique. (MCRP 5-12C)

close air support—Air action by fixed- and rotary-wing aircraft against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces. Also called CAS. (JP 1-02)

combat service support element—The core element of a Marine air-ground task force that is task-organized to provide the combat service support necessary to accomplish the Marine air-ground task force mission. The combat service support element varies in size from a small detachment to one or more force service support groups. It provides supply, maintenance, transportation, general engineering, health services, and a variety of other services to the Marine air-ground task force. It may also contain other Service or foreign military forces assigned or attached to the MAGTF. The combat service support element itself is not a formal command. Also called CSSE. (JP 1-02)

combined arms—The full integration of combat arms in such a way that to counteract one, the enemy must become more vulnerable to another. (MCRP 5-12C)

command element—The core element of a Marine air-ground task force that is the headquarters. The command element is composed of the commander, general or executive and special staff sections, headquarters section, and requisite communications support, intelligence and reconnaissance forces, necessary to accomplish the MOTIF's mission. The command element provides command and control, intelligence, and other support essential for effective planning and execution of operations by the other elements of the Marine air-ground task force. The command element varies in size and composition and may contain other Service or foreign military forces assigned or attached to the MAGTF. Also called CE. (JP 1-02)

concept of operations-A verbal or graphic statement, in broad outline, of a commander's assumptions or intent in regard to an operation or series of operations. The concept of operations frequently is embodied in campaign plans and operation plans; in the latter case, particularly when the plans cover a series of connected operations to be carried out simultaneously or in succession. The concept is designed to give an overall picture of the operation. It is included primarily for additional clarity of purpose. (JP 1-02)

deep air support—Air action against enemy targets at such a distance from friendly forces that detailed integration of each mission with fire and movement of friendly forces is not required. Deep air support missions are flown on either side of the fire support coordination line; the lack of a requirement for close coordination with the fire and movement of friendly forces is the qualifying factor. Also called DAS. Note: the acronym DAS stands for deep air support and not direct air support. (MCRP 5-12C)

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)

electronic warfare—(DOD) Any military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. Also called EW. The three major subdivisions within electronic warfare are: electronic attack, electronic protection, and electronic warfare support a. electronic attack. That division of electronic warfare involving the use of electromagnetic, directed energy, or antiradiation weapons to attack personnel, facilities, or equipment with the intent of degrading, neutralizing or destroying enemy combat capability. Also called EA. EA includes: 1) actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum, such as jamming and electromagnetic deception, and 2) employment of weapons that use either electromagnetic or directed energy as their primary destructive mechanism (lasers, radio frequency weapons, particle beams). b.electronic protection.That division of electronic warfare involving actions taken to protect personnel, facilities, and equipment from any effects of friendly or enemy employment of electronic warfare that degrade, neutralize, or destroy friendly combat capability. Also called EP. c. electronic warfare support.That division of electronic warfare involving actions tasked by, or under direct control of, an operational commander to search for, intercept, identify, and locate sources of intentional and unintentional radiated electromagnetic energy for the purpose of immediate threat recognition. Thus, electronic warfare support provides information required for immediate decisions involving electronic warfare operations and other tactical actions such as threat avoidance, targeting, and homing. Also called ES. Electronic warfare support data can be used to produce signals intelligence, both communications intelligence and electronics intelligence. See also command and control warfare; communications intelligence; directed energy; directed-energy device; directed-energy warfare; directed-energy weapon; electromagnetic compatibility; electromagnetic deception; electromagnetic hardening; electromagnetic jamming; electromagnetic spectrum; electronics intelligence; frequency deconfliction; signals intelligence; spectrum management; suppression of enemy air defenses. (JP 1-02)

fire support coordination center—A single location in which are centralized communications facilities and personnel incident to the coordination of all forms of fire support. See also supporting arms coordination center. Also called FSCC. (JP 1-02)

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 (FSCLs) facilitate the expeditious attack of surface targets of opportunity beyond the coordinating measure. An FSCL does not divide an area of operations by defining a boundary between close and deep operations or a zone for close air support. The FSCL applies to all fires of air, land, and sea-based weapon systems using any type of ammunition. Forces attacking targets beyond an FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid fratricide. Supporting elements attacking targets beyond the FSCL must ensure that the attack will not produce adverse effects on, or to the rear of, the line. Short of an FSCL, all air-to-ground and surface-to-surface attack operations are controlled by the appropriate land or amphibious force commander. The FSCL should follow well defined terrain features. Coordination of attacks beyond the FSCL is especially critical to commanders of air, land, and special operations forces. In exceptional circumstances, the inability to conduct this coordination will not preclude the attack of targets beyond the FSCL. However, failure to do so may increase the risk of fratricide and could waste limited resources. Also called FSCL. (JP 1-02)

forward air controller (airborne)—A specifically trained and qualified aviation officer who exercises control from the air of aircraft engaged in close air support of ground troops. The forward air controller (airborne) is normally an airborne extension of the tactical air control party. Also called FAC (A). (JP 1-02)

forward air controller—An officer (aviator/pilot) member of the tactical air control party who, from a forward ground or airborne position, controls aircraft in close air support of ground troops. Also called FAC. (JP 1-02)

forward 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)

ground combat element—The core element of a Marine air-ground task force that is task-organized to conduct ground operations. It is usually constructed around an infantry organization but can vary in size from a small ground unit of any type, to one or more Marine divisions that can be independently maneuvered under the direction of the MAGTF commander. It includes appropriate ground combat and combat support forces and may contain other Service or foreign military forces assigned or attached to the Marine air-ground task force. The ground combat element itself is not a formal command. Also called GCE. (JP 1-02)

immediate air support—Air support to meet specific requests which arise during the course of a battle and which by their nature cannot be planned in advance. (JP 1-02)

intelligence preparation of the battlespace—An analytical methodology employed to reduce uncertainties concerning the enemy, environment, and terrain for all types of operations. Intelligence preparation of the battlespace builds an extensive database for each potential area in which a unit may be required to operate. The database is then analyzed in detail to determine the impact of the enemy, environment, and terrain on operations and presents it in graphic form. Intelligence preparation of the battlespace is a continuing process. Also called IPB. (JP 1-02)

joint air operations center—A jointly staffed facility established for planing, directing and executing joint air operations in support of the joint force commander's operation or campaign objectives. Also called JAOC. (JP 1-02)

joint force air component commander—The joint force air component commander derives authority from the joint force commander who has the authority to exercise operational control, assign missions, direct coordination among subordinate commanders, redirect and organize forces to ensure unity of effort in the accomplishment of the overall mission. The joint force commander will normally designate a joint force air component commander. The joint force air component commander's responsibilities will be assigned by the joint force commander (normally these would include, but not be limited to, planning, coordination, allocation, and tasking based on the joint force commander's apportionment decision). Using the joint force commander's guidance and authority, and in coordination with other Service component commanders and other assigned or supporting commanders, the joint force air component commander will recommend to the joint force commander apportionment of air sorties to various missions or geographic areas. Also called JFACC. (JP 1-02)

list of targets—A tabulation of confirmed or suspect targets maintained by any echelon for informational and fire support planning purposes. (JP 1-02)

maneuver warfare—A warfighting philosophy that seeks to shatter the enemy's cohesion through a variety of rapid, focused, and unexpected actions which create a turbulent and rapidly deteriorating situation with which the enemy cannot cope. (MCRP 5-12C)

Marine air command and control system—A system which provides the aviation combat element commander with the means to command, coordinate, and control all 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)

Marine air-ground task force—A task organization of Marine forces (division, aircraft wing, and service support groups) under a single command and structured to accomplish a specific mission. The Marine air-ground task force (MAGTF) components will normally include the command, aviation combat, ground combat, and combat service support elements (including Navy support elements). Three types of Marine air-ground task forces which can be task organized are the Marine expeditionary unit, Marine expeditionary brigade, and Marine expeditionary force. Also called MAGTF. (JP 1-02)

offensive air support—Those air operations conducted against enemy installations, facilities, and personnel to directly assist the attainment of MAGTF objectives by the destruction of enemy resources or the isolation of the enemy's military forces. Also called OAS. (MCRP 5-12C) Note: Offensive air support is one of the six functions of Marine aviation.

operational planning team—A group built around the future operations section which integrates the staff representatives and resources. The operational planning team may have representatives or augmentation from each of the standard staff sections, the six war fighting functions, staff liaisons, and/or subject matter experts. Also called OPT. (MCRP 5-12C)

preplanned air support—Air support in accordance with a program, planned in advance of operations. Also called air support. (JP 1-02)

rules of engagement—Directives issued by competent military authority which 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)

sea basing—The employment of aircraft from naval platforms, to include carriers and amphibious shipping. Applies only to aircraft organizations.

sortie—In air operations, an operational flight by one aircraft. (JP 1-02)

strategic mission—A mission directed against one or more of a selected series of enemy targets with the purpose of progressive destruction and disintegration of the enemy's warmaking capacity and his will to make war. Targets include key manufacturing systems, sources of raw material, critical material, stockpiles, power systems, transportation systems, communication facilities, and other such target systems. As opposed to tactical operations, strategic operations are designed to have a long-range, rather than immediate, effect on the enemy and its military forces. (JP 1-02)

strike coordination and reconnaissance—A mission flown for the purpose of acquiring and reporting deep air support targets and coordinating armed reconnaissance or air interdiction missions upon those targets. Also called SCAR. (MCRP 5-12C)

supporting arms coordination center—A single location on board an amphibious command ship in which all communication facilities incident to the coordination of fire support of the artillery, air, and naval gunfire are centralized. This is the naval counterpart to the fire support coordination center utilized by the landing force. Also called SACC. (JP 1-02)

suppression of enemy air defenses—That activity which neutralizes, destroys, or temporarily degrades surface-based enemy air defenses by destructive and/or disruptive means. Also called SEAD. (JP 1-02)

tactical air command center—The principal United States Marine Corps air command and control agency from which air operations and air defense warning functions are directed. It is the senior agency of the US Marine air command and control system which 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)

tactical air control center—The principal air operations installation (ship-based) from which all aircraft and air warning functions of tactical air operations are controlled. Also called Navy TACC. (JP 1-02)

tactical air control party—A subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft. Also called TACP. (JP 1-02)

tactical air coordinator (airborne)—An officer who coordinates, from an aircraft, the action of combat aircraft engaged in close support of ground or sea forces. Also called TAC (A). (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)

tactical level of war—The level of war at which battles and engagements are planned and executed to accomplish military objectives assigned to tactical units or task forces. Activities at this level focus on the ordered arrangement and maneuver of combat elements in relation to each other and to the enemy to achieve combat objectives. (JP 1-02)

tactical recovery of aircraft and personnel—A mission performed by an assigned and briefed archer for the specific purpose of the recovery of personnel, equipment, and/or aircraft when the tactical situation precludes search and rescue (SAR) assets from responding and when survivors and their location have been confirmed. Also called TRAP. (MCRP 5-12C)

target list—The listing of targets maintained and promulgated by the senior echelon of command; it contains those targets that are to be engaged by supporting arms, as distinguished from a "list of targets" that may be maintained by any echelon as confirmed, suspected, or possible targets for informational and planning purposes. (JP 1-02) time on station-The time that an aircraft can actually spend performing its assigned mission. It does not include the time transiting to and from the operating site. Also called TOS. (MCRP 5-12C)

time on target—1. Time at which aircraft are scheduled to attack/photograph the target. 2. The actual time at which aircraft attack/photograph the target. 3. The time at which a nuclear detonation is planned at a specified desired ground zero. Also called TOT. (JP 1-02)

traveling overwatch—A movement technique used when contact with enemy forces is possible. The lead element and trailing element are separated by a short distance which varies with the terrain. The trailing element moves at variable speeds and may pause for short periods to overwatch the lead element. It keys its movement to terrain and the lead element. The trailing element overwatches at such a distance that should the enemy engage the lead element, it will not prevent the trailing element from firing or moving to support the lead element. (MCRP 5-12C)

weaponeering—The process of determining the quantity of a specific type of lethal or nonlethal weapons required to achieve a specific level of damage to a given target, considering target vulnerability, weapon effect, munitions delivery accuracy, damage criteria, probability of kill, and weapon reliability. (JP 1-02)

Appendix H

References and Related Publications

Joint Publications (JPs)

1-02	DOD Dictionary of Military and Associated Terms
3-01.4	Joint Suppressions of Enemy Air Defenses (J-SEAD)
3-03	Doctrine for Joint Interdiction Operations
3-09.1	Joint Tactics, Techniques, and Procedures for Laser Designation Operations
3-52	Doctrine for Joint Airspace Control in the Combat Zone
3-56.1	Command and Control of Joint Air Operations

Naval War Publication (NWP)

3-09.11M	Supporting Arms in Amphibious Operations

Fleet Marine Force Manual (FMFM)

5-70	MAGTF Aviation Planning

Marine Corps Doctrinal Publications (MCDPs)

1	Warfighting
5	Planning

Marine Corps Warfighting Publications (MCWPs)

3-2	Aviation Operations
3.22.2	Suppression of Enemy Defense
3.23	Offensive Air Support
3.23.1	Close Air Support
3-25	Control of Aircraft and Missiles
3-25.2	Multi-Service Procedures for Theater Air-Ground System
3-25.3	Marine Air Command and Control System Handbook
3-25.4	Marine Tactical Air Command Center Handbook
3-25.5	Direct Air Support Center Handbook
3-25.7	Tactical Air Operations Center Handbook
5-1	Marine Corps Planning Process
5-11.1	MAGTF Aviation Planning (under development)

Marine Corps Reference Publications (MCRPs)

3-16A	Tactics, Techniques, and Procedures for the Targeting Process
3-16B	The Joint Targeting Process and Procedures for Targeting Time-Critical Targets
5-12C	Marine Crops Supplement to the DOD Dictionary of Military and Associated Terms

Miscellaneous

Joint Munitions Effectiveness Manual/Air to Surface (JEME/AS)
JMEM/AS Weaponeering Guide
JEME/AS Target Acquisition Manual