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# Direct Air Support Center Handbook




## U.S. Marine Corps

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# FOREWORD

The Marine air command and control system (MACCS) provides the Marine aviation combat element commander with the means to exercise control of those organic and nonorganic aviation assets necessary to support Marine air-ground task force (MAGTF) operations. Marine Corps Warfighting Publication (MCWP) 3-25, *Control of Aircraft and Missiles*, addresses basic planning considerations for MACCS operations, employment, and interoperability among MACCS and joint Service agencies.

MCWP 3-25.5, *Direct Air Support Center Handbook*, complements and expands on the information in the MCWP 3-25 by focusing on the details of direct air support center (DASC) operations and the role that the DASC plays in integrated MAGTF operations. Written for MAGTF, naval expeditionary force, and joint force commanders and their staffs, MCWP 3-25.5 highlights DASC organization, equipment, planning considerations, operational fundamentals, and employment options. This publication provides commanders and their staffs with the information they need to understand and evaluate the operational principles and capabilities of various DASC employment options.

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BY DIRECTION OF THE COMMANDANT
OF THE MARINE CORPS



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# Chapter 1

# Fundamentals

The direct air support center (DASC) is the principal Marine air command and control system (MACCS) air control agency, responsible for the direction of air operations directly supporting ground forces. It functions in a decentralized mode of operation, but is directly supervised by the Marine tactical air command center (TACC) or the Navy tactical air control center (TACC). During amphibious or expeditionary operations, the DASC is normally the first MACCS agency ashore and usually lands in the same serial (i.e., scheduled wave or on-call wave) as the ground combat element's (GCE's) senior fire support coordination center (FSCC). The DASC's parent unit is the Marine air support squadron (MASS) of the Marine air control group (MACG).

## ROLE

The DASC processes immediate air support requests; coordinates aircraft employment with other supporting arms; manages terminal control assets supporting GCE and Marine logistics group forces; and procedurally controls assigned aircraft, unmanned aircraft systems (UASs), and aircraft transiting through the DASC controlled airspace. The DASC controls and directs air support activities that affect the GCE commander's focus on close operations and air missions that require integration with the ground combat forces, offensive air support (OAS), assault support, electronic warfare (EW), and designated air reconnaissance.

The DASC is one of several agencies that can provide aviation command and control (C2) of deep air support (DAS) operations. While detailed coordination of DAS missions is not required with the ground forces for "clearance of fires," there is a significant amount of coordination required for command and control of assigned aircraft. Because of their location on the battlefield, the DASC is sometimes the best agency to coordinate the actions of aircraft involved in the DAS operations. Regardless of who is controlling DAS, the DASC will assist by forwarding bomb hit assessments and in-flight reports (INFLTREPs) from DAS aircraft to the GCE's senior FSCC and the Marine TACC or the Navy TACC, when required.

## TASKS

The DASC is tasked with the following:

- Receiving the air tasking order (ATO) from the Marine TACC or the Navy TACC and coordinating preplanned direct air support.
- Receiving, processing, and coordinating requests for immediate direct air support.
- Adjusting preplanned schedules, diverting airborne assets, and launching aircraft as necessary when delegated authority by the aviation combat element (ACE) commander and in coordination with the GCE senior FSCC.
- Coordinating the execution of direct air support missions with other supporting arms through the appropriate force fires coordination center (FFCC)/FSCC and, as required, with the appropriate MACCS agencies.
- Receiving and disseminating pertinent tactical information reported by aircraft that are performing direct air support missions.

- Providing aircraft and air C2 agencies with advisory and threat information that assists in the safe conduct of flight.
- Monitoring records and displaying information on direct air support missions.
- Maintaining friendly and enemy ground situation displays that are necessary in the coordination of direct air support operations.
- Providing direct air support aircraft and other MACCS agencies with information concerning friendly and enemy situations.
- Referring unresolved conflicts in supporting arms to the FFCC/FSCC fire support coordinator.

## ORGANIZATION

The DASC crew is task-organized to meet operational requirements. Crewmembers are assigned positions based on their level of qualification, experience, and mission criteria.

### Officer in Charge

The DASC officer in charge (OIC) is a commissioned officer and is not normally assigned to a crew as a watch stander. The DASC OIC is designated by the MASS commanding officer for a specific operation and is responsible for the following:

- Embarkation and logistics.
- DASC operations.
- Configuration of DASC communications.
- Coordination with joint, multinational, and other external agencies.
- Evaluation and supervision of training for the DASC crew.
- Accountability for classified materials.

### Staff Noncommissioned Officer in Charge

The DASC staff noncommissioned officer in charge (SNCOIC) is not normally assigned to a crew as a watch stander. The DASC SNCOIC responsibilities include the following:

- Assisting the DASC OIC as required.
- Coordinating the DASC's embarkation and logistics.
- Evaluating and supervising training for enlisted crewmembers.
- Accounting for personnel assigned to the detachment.

### Senior Watch Officer

The DASC senior watch officer is normally a senior officer who is not assigned as a crewmember, but who is responsible to the commanding officer for the following:

- Assisting in coordination with joint, multinational, and other external agencies.
- Providing situation briefings and coordinating the future efforts of DASC operations.
- Evaluating, supervising, and assisting in the training of DASC crewmembers.

### Senior Air Director

The senior air director (SAD) is a commissioned officer and is the most qualified DASC watch stander. The SAD is responsible for the following:

- Executing the DASC mission.
- Receiving, disseminating, and posting fire support information in the DASC.

- Coordinating deconfliction between aircraft and supporting arms with the appropriate fire support agencies.
- Coordinating the efforts of the DASC, jump DASCs, air support liaison teams (ASLTs), and airborne extensions of the DASC.
- Coordinating with external agencies to the DASC.
- Maintaining a log of significant events that occur during the crew's watch.
- Ensuring the logs of the tactical air director, helicopter director, and crew chief (CC) are complete, reviewed for clarity, and properly signed in and out.
- Assigning appropriate aircraft to immediate air support requests.

## Crew Chief

The DASC CC, normally a staff noncommissioned officer or noncommissioned officer and the most qualified enlisted watch stander, is responsible to the SAD for the following:

- Displaying tactical information in a timely and accurate manner.
- Maintaining a log of significant events that occur during the crew watch.
- Maintaining files that contain required forms and records.
- Ensuring the net operators' logbooks are completed, checked for clarity, and properly signed in and out.
- Coordinating the DASC's internal and external information flow.
- Supervising the enlisted members of the crew.

- Ensuring intelligence information received by the DASC is disseminated to the appropriate air control, air defense, and supporting arms elements.
- Coordinating and directing the DASC's communications restoration priorities and the upkeep of the DASC's communications status.

### Tactical Air Director

The tactical air director is responsible to the SAD for—

- Coordinating and controlling all fixed-wing aircraft, regardless of the mission.
- Coordinating and deconflicting direct air support missions with fire support assets (e.g., naval surface fire support [NSFS], artillery, and mortars).
- Briefing aircrews on assigned missions, threat information, and fire support coordination measures (FSCMs).
- Reviewing requests for fixed-wing aircraft and recommending the most efficient use of available assets.
- Maintaining status information on fixed-wing aircraft under the control of the DASC or terminal air controllers.
- Coordinating with the helicopter director to eliminate conflicts between rotary-wing and/or UAS and fixed-wing missions that are operating in the same area.
- Advising and directing fixed-wing aircraft as to changes in the air defense warning condition (ADWC) and weapons control status (WCS).
- Maintaining appropriate logs and records.
- Coordinating with tactical air coordinators (airborne) (TAC[A]s) for the control of assigned aircraft.

## Helicopter Director

The helicopter director is responsible to the SAD for—

- Coordinating and controlling all helicopters and UASs, regardless of the mission.
- Coordinating and deconflicting designated rotary-wing and unmanned aircraft (UA) missions with fire support assets (e.g., NSFS, artillery, and mortars).
- Briefing aircrews on assigned missions, threat information, and FSCMs.
- Reviewing requests for helicopters and UASs and recommending the most efficient use of available assets.
- Maintaining status information on helicopters and UASs under control of the DASC or terminal controllers.
- Coordinating with the tactical air director to eliminate conflicts between fixed-wing missions and helicopter and/or UAS missions operating in the same area.
- Coordinating with the assault support coordinator (airborne) (ASC[A]) for control of assigned aircraft.
- Advising aircrews of the current ADWC/WCS and directing helicopter actions specific to the particular air defense alert condition.
- Maintaining appropriate logs and records.

## Air Support Operations Operators

Air support operations operators are enlisted personnel who are specially trained in air control procedures and terminology and operate the various radio nets within the DASC. Normally, this will include the tactical air request/helicopter request (TAR/HR) net operator, fire support coordination net operator, tactical air command net operator and the direct air support net operator.

Some of the net operator functions may be combined depending on the DASC's task organization. Air support operations operator's responsibilities include the following:

- Knowing net names, frequencies, and types of communications equipment being used.
- Knowing the call sign, name, and unit location for stations operating on their assigned communications net(s).
- Knowing the type of information expected to be transmitted and received over the net.
- Understanding the forms/records required to record information or to pass information over the net.
- Understanding the air/ground situation, including boundaries, scheme of maneuver (SOM), control points, and control/coordination measures that are necessary to effectively operate and understand information passed over the net.
- Managing net operations if assigned as a net control station.
- Maintaining a log of significant events that occur during the watch.
- Operating various data systems that include, but are not limited to, the following:
  - Theater Battle Management Core System.
  - Advanced Field Artillery Tactical Data System.
  - Command and Control Personal Computer.
  - CAC2S [Common Aviation Command and Control System] (proposed future system).
- Understanding and executing the correct information flow within the DASC.

### Air Support Plotters

Air support plotters are enlisted personnel who, under the supervision of the DASC SAD and the CC, maintain the situation displays within the DASC. They are specially trained in air control procedures, terminology, and symbology. Air support plotters are responsible for the following:

- Plotting information directed by the DASC supervisory personnel.
- Receiving, recording, displaying, and disseminating information received over the appropriate net(s).

### Communications-Electronics Maintenance Coordinator

The communications-electronics (C-E) maintenance coordinator assigned to the crew is responsible for the following:

- Monitoring communications nets.
- Monitoring the status of the DASC's cryptographic instruments.
- Providing liaison with other C-E Marines, internally and externally, operating the associated C-E equipment.
- Ensuring that the appropriate cryptographic fill equipment is on hand to maintain covered communications.

### Intelligence Net Operator

The intelligence net operator is assigned to the crew and is responsible for passing intelligence information received by the DASC to the Marine TACC or the Navy TACC and also to the appropriate air control, air defense, and supporting arms elements.

### Liaison Officer

At times, the use of a liaison officer (LNO) or a team of LNOs may be required to provide subject matter expertise to agencies other than the FSCC. Possible units/agencies that may require an LNO from the DASC could include air support operations center (ASOC), FFCC, JSTARS [Joint Surveillance Target Attack Radar System], AWACS [Airborne Warning and Control System], helicopter direction center (HDC), or host nation agencies.

## CAPABILITIES

The flexibility, mobility, scalability, and echelon capabilities of the DASC make it an effective C2 agency in support of direct air support operations.

### Flexibility

The MASS is capable of task-organizing to provide a variety of direct air support control options. Mission flexibility is demonstrated by the DASC's capability to operate from ground sites or an airborne platform.

### Mobility

MASS equipment is transportable via conventional air, ground, rail, or surface shipping means. The MASS table of equipment provides organic motor transportation equipment that is capable of moving organic DASC equipment. The DASC equipment that is required to support a Marine expeditionary force (MEF)/Marine expeditionary brigade (MEB)

can be set up and operational in approximately 1 hour after it arrives on site. However, for direct air support center (airborne) (DASC[A]) operations, materials handling equipment (10K [10,000 pound lift capacity] loader and forklift) support not organic to the MASS is required to move shelters when loading the AN/UYQ-3B into a KC-130T aircraft.

### Scalability

The MASS can tailor its equipment and personnel to provide the requisite support based on the mission, as well as the ability to add or remove layers of support as the mission changes.

### Echelon Capability

The DASC has the capability of moving to alternate locations without interrupting operations. During such movements, the DASC would delegate its functions to another DASC, an air support element (ASE), or a DASC(A).

## LIMITATIONS

The DASC's limitations include procedural control, line of sight communications, and the potential for a large electronic signature.

### Procedural Control

The DASC does not possess radar or tactical data link capabilities; it relies on procedural control of aircraft and units in the operational area. Situational awareness depends on pilot/terminal

controller reports regarding the aircraft's position, along with situational awareness tools resident in the automated data systems that may be operational in the DASC.

### Line of Sight Communications

The DASC is susceptible to ultrahigh frequency (UHF) and very high frequency (VHF) line of sight communications limitations. The curvature of the earth, terrain, and urban interference can preclude effective communications, especially with low flying aircraft. Therefore, the DASC must understand these limitations and employ extensions to overcome the potential deficiencies.

### Electronic Signature

The DASC may produce a large electronic signature generated by its communications equipment. Effective planning and employment of transmission security procedures is paramount to maximizing survivability.

# Chapter 2

# System Description

The DASC may be configured to support a variety of tactical situations. As a radio-intensive procedural air control agency, the DASC uses manual and/or digital information displays, procedural control, and voice communications systems to direct and coordinate direct air support activities.

## MRQ-12v1, MRQ-12v3 COMMUNICATIONS AIR SUPPORT CENTRAL

The primary DASC communications/operations platform is the MRQ-12v1 and MRQ-12v3 Communications Air Support Central. The suite consists of five identical hardware-configurable, lightweight, multipurpose shelters and associated support equipment mounted on high mobility, multipurpose wheeled vehicles (e.g., environmental control units, quick erect tents, antennas, cables, and computer equipment). Each vehicle tows a M116A3 trailer that carries a tent and a generator, along with a combination of cables and antennas.

Each MRQ-12v3 provides rack space, antennas, and signal and power distribution for the high frequency (HF), VHF, UHF, satellite communications (SATCOM), and rack space and antennas for telephone and requisite encryption assets organic to the MASS.

## Communications Distribution

The C2 distribution system is comprised of a system called MESHnet that allows the operator to interface the following items:

- User control device (UCD) allows the operator access to the radios, intercom, and telephone. With the UCD, the operator can monitor four nets at one time and remotely switch cryptological devices on and off.
- Network access unit is the heart of the MESHnet, it routes traffic among UCDs and interfaces with radios, telephones, and an ethernet computer network.
- Ethernet interface unit connects the ethernet local area network with the network access unit.

## System Configuration

The MRQ-12v3 suite can be configured to support any size Marine air-ground task force (MAGTF). Each MASS maintains 10 suites of equipment consisting of 10 high-power, rack-mounted AN/PRC-117Fs and 3 AN/PRC-150 Harris radios that can be cabled and routed to support the desired level of MAGTF. Based on mission requirements, the AN/PRC-117F radios can be utilized in any of their modes of operations: VHF (single channel or single channel ground and airborne radio system), UHF (single channel or Have Quick II), or SATCOM (dedicated or demand assigned multiple access). Additionally, several external radios can be wired into the suite to increase communications capability: two HF radios, and three UHF/VHF/SATCOM radios. A MEF DASC can provide—

- 50 radios (multiband).
- 9 (32 kB) or 18 (16 kB) telephone lines.
- 20 UCDs.

## AN/UYQ-3B MOBILE DIRECT AIR SUPPORT CENTER (AIRBORNE SYSTEM)

The AN/UYQ-3B mobile direct air support center (airborne system) (DASC[AS]) provides an echelon capability in MEF or MEB operations or as an independent airborne platform. In addition to airborne operations aboard the KC-130T, it can also be ground operated from a 7-ton vehicle. AN/UYQ-3B employment options provide the MAGTF with flexible direct air support control options.

### Operator Positions

The DASC(AS) contains seven crew positions. Inside the AN/UYQ-3B, UCDs identical to those employed with the MRQ-12v3 are located at each crew position allowing access to the shelter's radios and internal communications system, as well as the capability to connect to data systems. Additional gear is required for data operations.

### Communications

The DASC(AS) contains three UHF, one single-channel VHF, and two HF radios. Each radio has its own associated cryptographic device and the ability to connect up to three external radios. Due to airframe limitations, the DASC(AS) cannot frequency hop on VHF aboard the KC-130T model. The DASC(AS) has the ability to use external radios when in the airborne operational configuration, however, special arrangements must be made with the supporting KC-130T squadron to employ external (hatch mount) antennas to the host airframe.

When operating the AN/UYQ-3B in the ground configuration, the limitations encountered on board the KC-130T aircraft do not apply as long as the DASC has the appropriate equipment (i.e., antennas and a power source).

### Situation Displays

The DASC(AS) has one primary map display for plotting aircraft position, FSCMs, friendly and enemy ground situations, and airspace coordinating measures (ACMs). Smaller situation displays are available at operator positions for use by individual operators.

### Data

The AN/UYQ-3B is capable of limited data connectivity when operating in the airborne configuration. Utilizing the AN/PRC-150 radios, operators with Viasat cards can participate in a Viasat channel for limited texting capability. There is no broadband capability currently existing in the airborne configuration. There are no limitations when operating in the ground configuration.

## AN/MRC-145/138 AND PERSONALLY-CARRIED RADIOS

During low intensity operations (e.g., stability operations, Marine expeditionary unit [MEU]), the DASC provides personnel to mobile ground forces in order to perform limited air support control functions for limited durations. In these situations, the personnel typically employ a mobile configuration that operates from mobile radio communication (MRC) vehicles and/or personally-carried radios. When MRC vehicles are used to support DASC functions, a 60-hertz generator is the preferred power

source because it provides radio power and the ability to support tents, lights, or automated data systems. However, the MRC vehicle is capable of powering all of the radios as long as it has battery power (which requires running the vehicle for 5 to 15 minutes every hour to maintain the battery's charge).

## MOBILE ELECTRIC POWER

The MASS provides its own 60-hertz mobile electric power to support DASC operations.

# Chapter 3

# Planning

Close coordination for the delivery of surface- and air-delivered weapons is crucial to the ability to maximize the effects of those weapons and ensure the safety of the Marines operating within the delivery area. The DASC's planning efforts contribute significantly to the efficiency by which these assets are employed. Marine Corps Order 3501.9B, *Marine Corps Combat Readiness Evaluation System (MCCRES)*, volume VIII, *The Marine Air Command and Control System (MACCS)*, outlines specific planning requirements for the DASC. Although the planning of direct air support activities may occur in sequence, most steps will be conducted concurrently with one another. Appendix A, addresses other considerations.

## INITIAL PLANNING

After receipt of an initiating directive (amphibious operation), an operation plan's initiating order, or an establishing order (support relationship), the DASC begins the initial planning phase. Considerations for the initial planning phase include, but are not limited to, the following:

- Establishing early liaison with the expeditionary strike group and/or joint force planners and control agencies for relevant phases of operations.
- Providing air support and aircraft control input to the aviation estimates of supportability for operations assigned and

identifying limitations or problem areas. The input to the aviation estimates of supportability should summarize significant aviation aspects of the situation as they might influence any course of action (COA) proposal. The aviation estimates of supportability include a recommended COA for the ACE commander. At a minimum, aviation estimates of supportability will include the following:

- Proposed COA that can best be supported by the ACE.
- Pronounced disadvantages of less desirable COAs.
- Significant aviation (to include air command and control) limitations and logistical problems.
- Measures that resolve aviation problems (to include requesting additional theater assets).
- Coordinating relevant communications requirements for subordinate, adjacent, and higher-level circuits with the ACE/MAGTF communications planners. These requirements should include the following:
  - Identification of desired connectivity.
  - Encryption hardware and software.
  - Communications requirements that are beyond the capabilities (or assets) of the MASS.
  - Authentication materials.
- Establishing coordination with the local regional automated services center.
- Reviewing the initial force list and/or MACG/ACE planning guidance to determine the role of UASs in the operation.
- Advising the MACG/ACE planning staff of the required UAS mission data and format and how it should appear on the ATO.
- Ensuring that air support requirements are coordinated and integrated with planned air defense measures.

## INTELLIGENCE

The DASC requires updated and complete intelligence information to carry out its support efforts. The DASC's intelligence planning is primarily concerned with the enemy order of battle, capabilities, and tactics. Intelligence planning considerations may include the following:

- Surface-to-surface missiles.
- Surface-to-air missiles (SAMs).
- Antiaircraft artillery (AAA).
- Aviation assets.
- Air-to-surface ordnance.
- Air-to-air ordnance.
- EW.
- Ground forces and doctrinal employment.
- Space assets.
- Off-road trafficability.
- Terrain limitations not delineated on maps.
- Weather projections.
- Detailed rear area threat assessment for the MASS detachment.
- Possible site selections to support the friendly SOM.

## SITE SELECTION

The site selection planning process begins once the MAGTF's area of operations (AO) is identified. During the site selection pro-

cess, planners must ensure that adequate space for site establishment is identified and sufficient access to the site is afforded. Planners will also ensure that communications connectivity can be maintained with other MACCS agencies (specifically the Marine TACC or the Navy TACC); the senior FSCC; airborne aircraft; UAS ground control station (GCS); and (as required) appropriate elements of the GCE, Marine logistics group, forward operating bases (FOBs), and forward arming and refueling points (FARPs). Site selection planning must address the following:

- Coordinating with the FSCC to ensure that the following DASC siting considerations are included in the FSCC's site selection:
  - Communications connectivity.
  - Cover and concealment.
  - Trafficability.
  - Sufficient space for the DASCs tactical deployment (dispersion).
  - ASLT requirements.
  - C-E protection supportability.
- Identifying alternate operational sites, echelon gear, and the number of personnel required.
- Determining the required DASC equipment and staffing requirements (including DASC forward or other subordinate agencies) based on the MAGTF SOM and projected locations of MACCS/terminal control agencies within the AO.
- Establishing priorities for the emplacement of equipment.
- Conducting a physical reconnaissance of the site with FSCC personnel.

- Determining and recommending to the ACE/MAGTF communications planners any requirements for ground radio relay/ retransmission sites to support DASC operations.
- Determining communications capabilities from prospective sites based on electromagnetic compatibility analysis center or other radio-frequency studies.

## SPECIFIC AIR SUPPORT

The ACE staff normally augments several air support specialists to assist in the preparation of the MAGTF operation order. Crucial decisions, including ACE apportionment of assets for direct air support, should be addressed during this planning phase. Air support planning efforts should include the following:

- Providing input to the preparation of the ACE/MAGTF communications plan to include which DASC communications are required for effective coordination and control of direct support aircraft, encryption hardware and software, and authentication materials.
- Recommending ACMs to the ACE/MAGTF planning staff.
- Remaining cognizant of the planning and coordination that is involved in establishing airspace management/control procedures.
- Planning for the DASC's tactical redeployment to alternate sites, along with the FSCC, in response to changes in the MAGTF's requirements, the threat, or the ground force positions.
- Recommending UAS control measures for deconfliction/integration with direct air support aircraft and other supporting arms.

- Determining communications paths and radio in/out (RIO) procedures required for the control of aircraft along with the UAS GCS.
- Determining the requirement to employ airborne extensions, ensuring that communications connectivity and air control with direct air support aircraft and other air control agencies are appropriately maintained.

## ELECTRONIC WARFARE

In situations where the enemy has a known EW and electronic intelligence collection capability, the unit S-6 communications system officer will assume an active role in the DASC's EW planning. Electronic warfare planning considerations involve the following:

- Obtaining from the ACE/MAGTF EW officer a detailed intelligence assessment of the enemy's electronic order of battle.
- Developing an emission control (EMCON) plan for the DASC that supports the ACE/MAGTF EMCON plan. DASC personnel should consider the following factors:
  - Minimum communication/no communication procedures.
  - Brevity code and authentication table usage.
  - Communications security materials usage.
  - Signal security.
  - Circuit discipline.
  - Reporting procedures.
- Determining the locations of radios and radio antenna farms.
- Planning for the maximum use of secure communications.

- Providing input to the MAGTF EW plan.
- Ensuring that planners, operators, and users of electronic equipment thoroughly understand the EW threat and the EMCON/ electronic protection techniques used to counter the threat.

## EXTERNAL SUPPORT

When determining the support required from external units, planners should consider the DASC's method of employment and the need for mobility. External support planning considerations for the DASC will also include distribution points for food, water, batteries, petroleum, oils, and lubricants. The DASC may also require externally sourced personnel to augment their site security or tactical requirements.

# Chapter 4

# Operations

The DASC responds to the GCE commander's requirements for direct air support by processing immediate air support requests, coordinating aircraft employment with other supporting arms through the GCE's senior FSCC, and directing designated air operations. The DASC's role in direct air support provides a crucial link between the ACE and the other elements of the MAGTF.

## EMPLOYMENT OPTIONS

The MASS commander may employ an entire DASC, DASC(A), ASE, an ASLT, or a combination of these organizations, to support the MAGTF. See figure 4-1 for an example of the DASC command hierarchy.

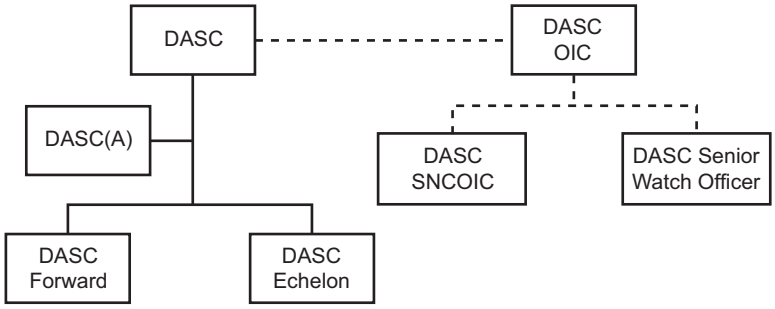



**Figure 4-1. Notional DASC Command Hierarchy.**

### Direct Air Support Center

As the MAGTF's primary direct air support control facility, the configuration illustrated in figure 4-1 provides the operational capability to perform the DASC mission on a large scale for extended periods of time, and it is normally employed with a MEB or larger MAGTFs. The DASC, when practical, collocates with the GCE's senior FSCC. An electronic link may be an acceptable alternative in situations where DASC siting requirements differ from the FSCCs. See figure 4-2 for an example of a DASC crew organization.

### Direct Air Support Center (Airborne)

Consisting of an AN/UYQ-3B employed in a KC-130R/T aircraft, the DASC(A) can be employed as an independent air control agency, but normally serves as an airborne extension of the DASC (see fig. 4-3 on page 4-4). Air superiority is essential in the area where a DASC(A) is to be employed and the operational period is limited by the host aircraft's time on station capabilities. Normally used during MEB and larger MAGTF operations, the DASC(A) is flexible and adaptable to a variety of operational situations including the following:

- Extending overland displacement.
- Supplementing the DASC's communications coverage while it displaces or when communications become degraded.
- Operating in geographic areas where terrain adversely affects DASC communications.
- Performing amphibious operations to aid in phasing direct air support control functions from the Navy TACC to the DASC.
- Performing missions as directed by the MAGTF commander, ACE commander, or MASS commanding officer.

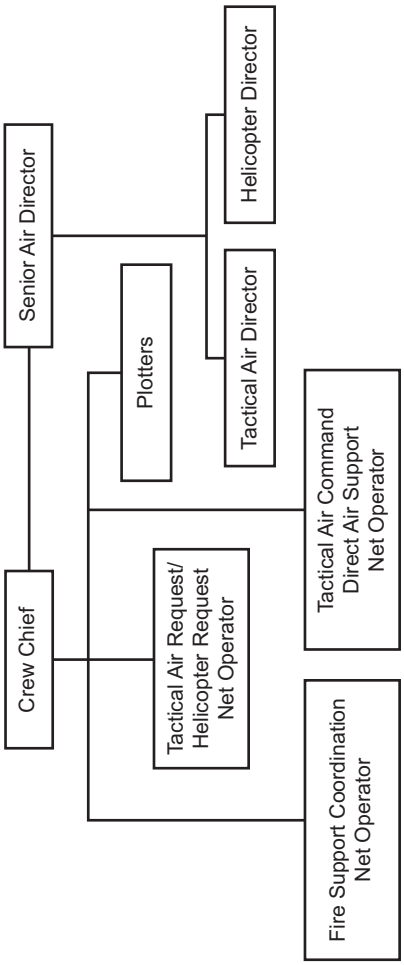



**Figure 4-2. Notional DASC Crew Configuration.**

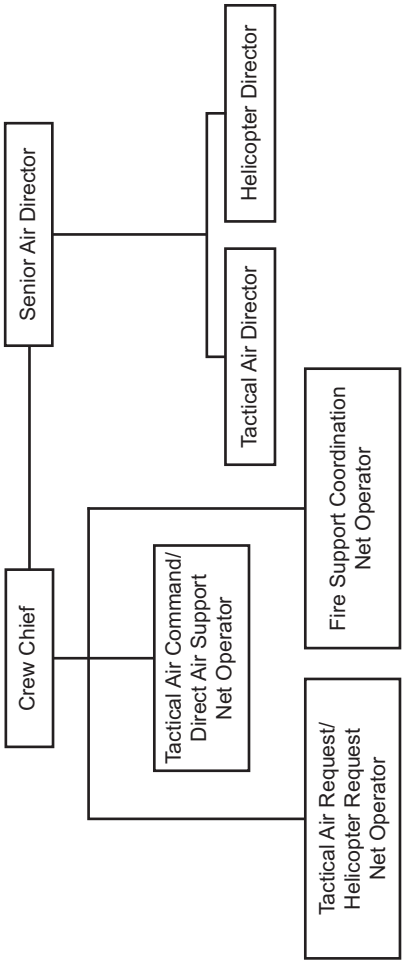



**Figure 4-3. Notional DASC(A) Crew Configuration.**

## Air Support Element

An ASE is a task-organized element employed by the MASS to perform various air support control functions. Employment options can range from MEU-level operations that are typically characterized by limited assets and endurance, to a multi-division operation where the echelon is almost, if not identical, in capability but set apart in responsibilities and subordinate to the DASC. The echelon can function as an extension of the Navy TACC/HDC, in conjunction with the battalion tactical air control party (TACP).

If supporting multiple major subordinate commands, the echelon may be augmented with assets and personnel to support continuous control of direct air support over an extended period of time. The DASC would be employed in a central location (i.e., MEF) to coordinate the efforts of a forward positioned DASC entity in support of the multiple Marine units.

The ASE can also be used as a forward or jump package to displace with the FSCC and take over control functions while the main DASC tears down, displaces, and sets up. See figure 4-4, on page 4-6, for notional DASC ASE crew configuration.

## Air Support Liaison Team

The ASLT is task-organized by the MASS to maintain face-to-face liaison between the DASC and the FSCC, and it is normally employed where the DASC cannot remain physically collocated with the senior FSCC or subordinate FSCCs during MEF-level operations. Depending on the nature of operations, the MASS commander or the supported commander could determine that it is in their best interest to have an ASLT collocated with the supported unit. In these instances, the DASC will provide an ASLT to main-

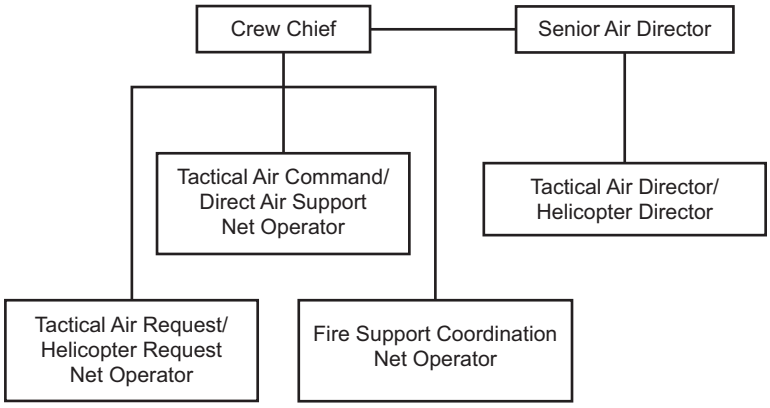



**Figure 4-4. Notional DASC Forward or Echelon Crew Configuration.**

tain face-to-face liaison with the supported unit in an effort to enhance direct air support for those forces. An ASLT typically varies in size from a single Marine with a personally-carried radio or field telephone to a few Marines operating from MRC vehicles. Mission requirements identified during planning determine the size of this entity. See figure 4-5 for notional ASLT crew configuration.

## CONCEPT OF EMPLOYMENT

While a particular DASC configuration may be identified with a MEF, MEB, or MEU, the specific requirements for a given situation dictate the actual configuration that is needed for a successful mission. One DASC is capable of providing direct air support control functions to a single division in support of the division's main effort. The DASC's support of multiple divisions requires

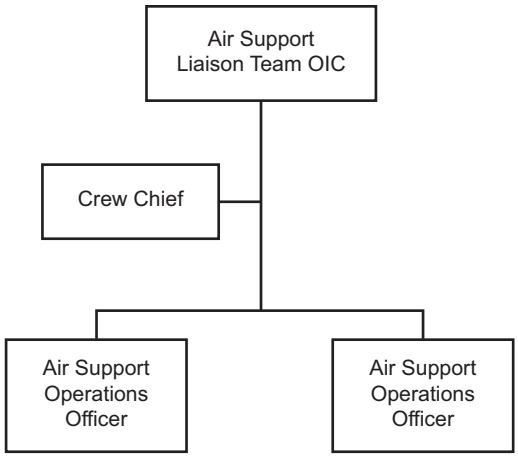



**Figure 4-5. Notional ASLT Crew Configuration.**

employment of assets beyond those that are normally found in a single MASS.

### Marine Expeditionary Force

Coordination and control of direct air support functions for MEF operations require a substantial DASC capability that is based on the communications requirement and SOM, as well as the number of aircraft anticipated to provide the GCE with direct air support. The DASC must maintain, at a minimum, an echelon capability that will provide continuous air control and communications during movement periods. A DASC(A) may also be required to assist the DASC in its functioning or to augment their communications. A typical MEF-level configuration consists of the following:

- Two AN/MRQ-12v3, consisting of five vehicles and trailers.

- Access to 50 radio channels (workstation and UCD dependent: HF, VHF-amplitude modification/frequency modification [AM/FM], UHF, and SATCOM).
- Access to 9 (32kB) or 18 (16kB) telephone circuits.
- Twenty operator workstations.
- Tent space, environmental control, and power to support a sustained configuration.
- Approximately 35 MOS 7208s/7242s and 15 support Marines required for 24-hour operations.

### Marine Expeditionary Brigade

In MEB operations involving one or two regiments, the DASC will normally collocate with the FSCC that is responsible for coordinating GCE supporting arms. The DASC must maintain an echelon capability (ASE or DASC[A]) in order to provide continuous air control and communications during movement periods. A typical MEB-level configuration consists of the following:

- One AN/MRQ-12v1 and one AN/MRQ-12v3, consisting of five vehicles with trailers.
- Access up to 50 radio channels (HF, VHF-AM/FM, UHF, and SATCOM).
- Access to 3, 6, or 12 phone lines (depending on how many network access units are used).
- Ten operator workstations.
- Tent space, environmental control units, and power to support a mobile configuration.
- Approximately 20 MOS 7208s/7242s and 15 support Marines required for 24-hour operations.

### Marine Expeditionary Unit

The MEU ASE contains task-organized aviation C2 agencies and equipment under the cognizance of the MACG detachment. The MASS normally employs an ASE that will support battalion to regimental size operations for a limited period of time before personnel and/or equipment augmentation is required. A typical MEU ASE configuration will consist of the following:

- One AN/MRC-148B (high power HF and UHF).
- One MRC-145.
- Extra packed radios and cryptological equipment, as required.
- Other gear deemed necessary for mission accomplishment.
- Typically consists of four to six MOS 7208s/7242s and two C-E Marines.

## EXTERNAL OPERATIONAL RELATIONSHIPS

### Tactical Air Command Center

The DASC is subordinate to the Marine TACC, the Navy TACC, or the tactical air direction center (TADC) depending on the command relationships and the phase of passing air C2 functions ashore during amphibious operations. The Marine TACC, Navy TACC, or the TADC provide centralized command of air operations within a designated AO or amphibious objective area (AOA). The DASC provides for decentralized control of OAS, assault support, EW, and air reconnaissance missions within their designated area.

### Offensive Air Support

The ACE commander decentralizes the control of OAS by delegating authority to the DASC in an effort to divert airborne assets to missions with higher priority as coordinated/approved by the senior FSCC and/or to launch on-call close air support (CAS) aircraft. This ensures minimum response time to the MAGTF's direct air support requirements. The DASC keeps the Marine TACC, Navy TACC, or the TADC informed of the direct air support mission progress, the effectiveness of the OAS effort, and the friendly and enemy air/ground situation.

### Assault Support

The ACE commander decentralizes control of the assault support missions and allows the DASC to divert and/or launch on-call assault support aircraft to ensure minimum response time to requests for assault support. Assault support aircraft will normally maintain communication with a MACCS agency throughout their mission in order to maintain the flexibility for immediate diversion of airborne assets. The Marine TACC, Navy TACC, or the TADC should assume a supervisory mode and respond to the DASC when additional assets are required to continue the assault support effort. The DASC must also provide its senior agency with timely information regarding the status of assault support missions and the overall effectiveness of the assault support effort.

### Electronic Warfare

The DASC is required to coordinate direct support EW missions with the senior FSCC to ensure that airborne EW is effectively integrated as a combined arm. Coordination of airborne EW efforts includes, but is not limited to, electronic surveillance, tar-

geting, jamming, electronic INFLTREPs, and offensive antiair warfare (AAW). The DASC ensures that the necessary coordination is made to protect friendly ground units and equipment from the effects of electronic attack (EA) and antiradiation missile attack. Immediate requests for EW are submitted by the appropriate FSCC to the DASC and preplanned requests are submitted by the appropriate FSCC to the Marine TACC or the Navy TACC.

### Air Reconnaissance

The DASC does not normally coordinate the MAGTF's long-range air reconnaissance efforts as they execute the current ATO. However, in cases where detailed integration with the GCE's SOM is required, the DASC coordinates with tasked aircrews and the UAS GCS to facilitate their conduct of air reconnaissance in direct support of the MAGTF. The DASC will provide safety of flight information that will be passed on to the Marine TACC or the Navy TACC and the senior FSCC. Any requests for air reconnaissance missions should be submitted by the G-2/S-2 (intelligence staff officer) to the DASC for immediate requests or to the Marine TACC or the Navy TACC for preplanned requests.

## Fire Support Coordination Center

The FSCC is the final arbitrator of fires and supporting arms integration conflicts and makes decisions in cases of conflicting requests for fire support assets. The FSCC provides the DASC with updates to unit boundaries, FSCMs, maneuver control measures, friendly and enemy unit positions, pertinent intelligence data, and other prearranged data items as they are received at the FSCC. The FSCC also provides the DASC with information on

the firing units' gun positions, gun target lines, and gun trajectories near aircraft flight routes.

The DASC is responsible to the FSCC and provides timely information on the following:

- Predicted flight paths for aircraft under the DASC's control.
- INFLTREPs.
- Status of outstanding requests.
- Pertinent intelligence data.
- Delays or cancellations to the ATO.
- Status of ongoing missions.
- Other prearranged data items.

The FSCC is responsible to the DASC and provides timely information on the following:

- Location of friendly forces and artillery and associated FSCMs and ACMs.
- Location and capabilities of enemy forces.
- TACP locations.
- Target lists.
- Overlays of the GCE SOM.
- Priority of fires/effort.
- Approval of joint tactical air strike requests (JTARs)/assault support requests (ASRs) (typically under a silence is consent model).
- Plans to displace/echelon.
- Plans for large-scale helicopter/ground movements.

## Air Support, Reconnaissance, and Electronic Warfare Requests

Immediate air support requests that are sent directly from the requesting unit to the DASC are approved by the FSCC. Various forms that are used when requesting air support include the following:

- JTAR for immediate OAS.
- ASR for immediate assault support.
- Joint tactical electronic warfare request (JTEWR) for airborne EW.
- Joint tactical air reconnaissance/surveillance (JTAR/S) request for air reconnaissance.
- Joint tactical airlift request (may be required in joint operations instead of the ASR to request assault support).
- Immediate air evacuation, to include casualty evacuation (CASEVAC).

Upon receiving the request, the DASC clarifies any needed portions and assigns a request number for reference purposes. For JTARs, JTAR/Ss, and JTEWRs, the request number is based on the date that the JTAR was received, followed by a consecutive odd number (e.g., 11-1, 11-3). For ASRs, the request number is based on the date that the ASR was received, followed by a consecutive even number (e.g., 11-2, 11-4). For CASEVAC, the request numbers are based on the date that the request was received and a consecutive letter of the alphabet (e.g., 11-A, 11-B).

The senior FSCC monitoring the TAR/HR net may approve, disapprove, or modify the request. Normally, the senior FSCC approves the request by remaining silent (silence is consent unless the previous commander's guidance requires positive approval). However, for the purpose of confirmation or when there is doubt concerning the validity of the request, the

DASC SAD should coordinate with the FSCC for clarification of the request.

### Diverting Aircraft

The ACE commander may delegate authority to the DASC to divert airborne aircraft or launch on-call aircraft. However, even when this authority is delegated, DASC personnel will not normally make divert/launch decisions without consulting with the appropriate FSCC personnel when possible. This coordination of fires is performed to limit duplication of effort, ensure appropriate use of the assets, and enhance situational awareness and safety. It also serves as another check and balance to ensure that the aircraft is diverted in concert with the established priorities for direct air support.

### Antiair Warfare Agencies

The DASC disseminates air defense control measures received from the Marine TACC, the Navy TACC, and/or tactical air operations center (TAOC) to the applicable MAGTF elements, SAM units, and aircraft under DASC control. The DASC provides friendly aircraft positions to air defense units/agencies (i.e., ground-based air defense [GBAD] units, TAOC) in order to assist in the aircraft identification process. The DASC coordinates the movement and allocation of aircraft under its control with the appropriate AAW agency, normally the TAOC. A Stinger unit commander may establish a command post or liaison at the DASC to build situational awareness on the location of friendly direct air support and assault support aircraft.

### Tactical Air Coordinator (Airborne)

The TAC(A), is an airborne extension of the DASC, the FSCC, the Marine TACC, or the Navy TACC. The TAC(A)'s authority over aircraft that operate within an assigned area will be specified by the DASC, the Marine TACC, the Navy TACC, or the TADC as appropriate. The TAC(A)'s principal responsibilities are to deconflict aircraft under their control and to coordinate the employment of air assets with other supporting arms. The TAC(A) coordinates with TACPs, FSCCs, forward air controller (airborne) FAC(A)s, ASC(A)s, and artillery and NSFS fire direction centers as necessary. Employment of a TAC(A) depends on the mission requirements and resource availability.

### Assault Support Coordinator (Airborne)

The ASC(A) is an airborne extension of the DASC or HDC. The ASC(A) supports the air C2 system and assists in airspace coordination and integration of assault support operations when the HDC/DASC is degraded or requires additional augmentation. The ASC(A) is normally used when numerous assault support operations are being conducted or when the scope and complexity of the operations mandates this capability. The ASC(A) coordinates with TAC(A)s and FAC(A)s to deconflict assault support operations.

### Terminal Controllers

The DASC receives and processes immediate direct air support requests from terminal controllers: TACP, forward air controller (FAC), joint terminal attack controller (JTAC), and FAC(A). The DASC keeps the terminal controller and senior FSCC/FFCC advised of the status of aircrew filling their request. The DASC provides aircraft direction and mission updates to the aircraft

prior to executing a procedural turnover to the terminal controller, which necessitates free information exchange to provide aircrews with the most complete and up-to-date information possible.

### Unmanned Aircraft

The DASC controls the UA's in-flight coordination to and from working areas and monitors the UA's activities while in its working area. After receiving a handoff from the air traffic control element, the DASC provides routing and altitude clearance for the UA. The UAS controllers keep the DASC advised of the UA's working area (using control points and established routes) and altitude from the GCS to ensure deconfliction with other aircraft and friendly surface delivered fires. The UA controllers may also supply the DASC with near-real-time surveillance information. This information is forwarded to the Marine TACC and FSCC for use in the intelligence and targeting effort.

### Patient Evacuation Team

The landing force medical regulating control officer (LFMRCO) normally assigns a patient evacuation team (PET) to physically or electronically collocate with the DASC. The LFMRCO establishes a medical regulating control center that the PET will remain in contact with to keep the DASC advised on the availability of primary and alternate medical treatment facilities and recommends the facility that is best suited for a casualty's medical needs. The DASC, through the PET, keeps the LFMRCO advised of the status of available CASEVAC aircraft and current missions and provides communications assets for the PET. Upon receiving a CASEVAC request, the DASC coordinates with the PET to determine adequate evacuation of the casualties. Movement is based on casualty location, triage conducted on the scene,

severity of the injuries, nationality of the patient, threat in the area, medical treatment facility, medical treatment facility capabilities, and aircraft availability. See Marine Corps Warfighting Publication (MCWP) 4-11.1, *Health Service Support Operations*, for additional information on the PET.

### Rear Area Operations Center

Immediate air support requests from the MAGTF rear area are cleared through the air officer in the rear area operations center. These requests may be relayed to the DASC for processing depending on many factors: physical location of the agencies, operational employment considerations, and the ability for both agencies to communicate. When the geographical location and communications connectivity reduce response time, immediate air requests may be forwarded to the Marine TACC for action (if the Marine TACC is located in the rear area). The Marine TACC close battle coordinator will then coordinate mission specifics with the DASC.

## DIRECT AIR SUPPORT CENTER IN AMPHIBIOUS OPERATIONS

### Phasing Ashore

During the buildup of combat power ashore, the MACCS employs its assets incrementally. During MEF and MEB operations, the initial DASC capability introduced ashore normally consists of theminimum requirements to control and deconflict the aircraft supporting the initial buildup.

As the operation matures, additional equipment and personnel will arrive to expand the DASCs capabilities and echelon requirements. In MEU-level operations, an ASE will typically be the first direct air support element to arrive ashore.

### Responsibility

The command relationship options available to the establishing authority of an amphibious operation include operational control, tactical control, and support. Typically, a support relationship is established between the supporting and supported commanders, based on their capabilities. Normally, the supporting commander exercises the initial, overall control and coordination responsibility for the delivery of NSFS, air support, and coordination of artillery fires. When the supported commander is ashore and has established the necessary facilities and the tactical situation permits, this coordination responsibility is then phased to the supported commander. Thereafter, the landing force coordinates supporting arms fires with maneuver forces.

### Amphibious Operations Supporting Arms Agencies

The supporting commander provides two principal agencies that will control and coordinate supporting arms fires during amphibious operations: the Navy TACC and the supporting arms coordination center (SACC).

### Navy Tactical Air Control Center

The Navy TACC is the primary air control agency within the AOA or designated AO from which supporting air operations are controlled. The Navy TACC controls both air support and AAW aircraft.

## Supporting Arms Coordination Center

The SACC is a single location on an amphibious ship where the required communications facilities for the coordination of fire support of the artillery, air, and NSFS are centralized. The SACC is the naval counterpart to the supported commander's FSCC.

## Transfer of Control and Coordination of Supporting Arms

The supported commander exercises responsibilities for the coordination of supporting fires through the senior FSCC and MACCS agencies. Every agency must ensure that it has the required information and requisite communications before supporting arms coordination responsibilities are passed from the supporting commander to the supported commander. Since most of the operational coordination occurs in the FSCC, the establishment and functioning of the FSCC(s) is critical to passing supporting arms coordination functions ashore. Once ashore, the FSCC(s) and the DASC begin preparing for the passage of supporting arms coordination and control functions ashore. This preparation includes ensuring—

- Communications are established with the appropriate control agency afloat.
- Communications are established with the aircraft.
- Communications are established with terminal controllers/spotting teams ashore.
- Target lists are on-hand.
- Current ATO is on-hand.

The operational functions that must be completed before passing supporting arms coordination functions ashore are normally outlined in a checklist. The checklist will dictate the order in which

air support control functions need to be phased ashore. Completion of the checklist is often coordinated between the FSCC, DASC, SACC, and the Navy TACC.

As prerequisites are met for passing supporting arms control and coordination functions ashore, supporting arms coordination functions are phased ashore. Formal messages mark the completion of each step in the sequence of passing coordination and control of supporting arms from afloat to ashore. Often, the actual transfer of responsibility is requested and granted by voice radio transmission followed with formal messages.

## DIRECT AIR SUPPORT CENTER IN JOINT/ MULTINATIONAL/COMBINED OPERATIONS

The DASC will likely be involved to some degree with joint and/or multinational operations. Joint operations are those operations conducted with other Service Departments (US Air Force and US Army). Multinational (coalition) forces are those of friendly/allied nations with whom the United States is conducting operations. Combined operations are the combination of joint and multinational forces. Each type of operation requires special considerations for the DASC.

### Joint Operations

Working with other Services requires DASC crewmembers to be familiar with the structure and employment considerations of other Services' equipment, agencies, doctrine, and personnel. Before joint service aviators, control agencies, and terminal controllers conduct operations in the DASC airspace, they must be

briefed on the control procedures for the DASC's airspace control area (or sector). Procedures must be in place for those operations in which the DASC is to hand over aircraft from one joint agency (or airspace control authority) to another. The DASC must also obtain and be familiar with communications plans and orders that may affect their airspace control procedures.

## Direct Air Support Center and the Air Support Operations Center

Of the other Services, the Air Force's ASOC is the most similar to the DASC. The ASOC is located at the Army brigade level and higher and facilitates immediate requests for air support submitted by Air Force TACPs embedded with the Army. Requests for air support are submitted over the Air Force joint air request net that functions similar to the Marine Corps TAR/HR net.

Once the request reaches the ASOC, the aircraft that are needed to support the mission are requested from the Air Force air operations center. The ASOC is a counterpart to the Marine TACC and normally serves as the combat operations center for the joint/combined forces air component commander. The air operations center directs the ASOC on how to fill out the request (e.g., launch or divert), the aircraft supporting the request then checks in with the ASOC to be passed to the appropriate TACP. Like the DASC, the ASOC is a procedural control agency. While it is a procedural control agency, the ASOC differs from the DASC in that it does not control the airspace. It should also be noted that the ASOC does not control rotary-wing aircraft, but will coordinate their requirements with their respective air liaison officers at Army divisions.

### Direct Air Support Center and Navy Counterparts

The DASC does not have a direct counterpart in the Navy's organizational structure. However, the DASC does perform similar functions to parts of the Navy's HDC for coordination of helicopter missions and the Navy TACC for coordination of direct air support missions. See MCWP 3-31.6, *Supporting Arms Coordination in Amphibious Operations*, for details on naval air control agencies.

### Multinational Operations

The DASC's considerations for conducting joint operations can also be applied to multinational operations. In multinational operations, there is an absolute requirement to traverse the language barrier, not only in terms of the language used, but also the terminology. The DASC's personnel must also become familiar with various formats for the ATO/NATO [North Atlantic Treaty Organization] air tasking message and air support requests procedures and forms. If possible, liaison personnel from the host nation/allied country should be included in the DASC, an LNO from the DASC should be included with the host nation/allied country.

### Special Considerations

Members of air/naval gunfire liaison company (ANGLICO) will typically provide terminal control services to CAS aircraft working with joint and multinational forces. It is important that DASC personnel make liaison with each ANGLICO team leader prior to the onset of joint/multinational operations.

Communications frequencies, airspace control procedures, DASC location, and alternate and tertiary communications capabilities must be briefed and understood by both ANGLICO and DASC

Marines. ANGLICO, in turn, must keep the DASC apprised of their locations and intentions throughout the operation.

## PROCEDURAL CONTROL OF DIRECT AIR SUPPORT AIRCRAFT

Procedural control is defined as "a method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures." (Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*) Controlling procedures include, but are not limited to control points; minimum-risk routes; return to force procedures; formal and informal airspace coordination areas (ACAs); and positive, two-way communications between the DASC and the aircrew. Although the aircrew is ultimately responsible for the safety of their aircraft, the DASC assists the aircrews with continuous updates on all matters within the airspace that may affect their mission. The DASC will also route aircraft in a manner that best deconflicts all users within the airspace without interrupting the friendly SOM.

There are three ways in which the DASC can deconflict aircraft in the airspace: time, altitude, and lateral separation (space). Depending on the tactical situation, the DASC uses one or more of these during the routing of each mission/sortie. Deconfliction of aircraft, whether by time, altitude, or lateral separation, is an important aspect of procedural control and is designed to allow freedom of movement for friendly aircrews. The aircrews can then focus on their aircraft and their mission. Because these methods of deconfliction are procedural, the DASC must be aware of the entire 3-dimensional battlespace and assist aircrews

by gaining their confidence, providing concise and safe routing, and maintaining situational awareness.

The aircrews assist the DASC by relaying their intentions, radioing the DASC at their designated control point (or while inbound to the control point), adhering to the DASC's routing/control, and providing accurate position/location information. The DASC relies on the information that it receives from aircrews and other agencies to manage and control their designated AO. If the information the DASC receives is accurate and timely, the DASC will be better able to provide other aircrews and agencies with useful information.

# Appendix A

# Crew Briefing Guide/Format

## OPERATIONS BRIEF

The DASC operations brief incorporates elements of information that are essential to DASC employment. The operations brief is most appropriate for planners and is not intended to supplant the DASC crew brief. It focuses on a different level and timeframe well before final preparations for execution.

Unlike other MACCS agencies, the DASC shares its planning focus with GCE issues. The below outlined issues represent only the most vital topics and are not intended to be an all-inclusive list as GCE issues vary depending on the particular exercise or operation.

### Intelligence

- Chemical, biological, radiological, and nuclear capability.
- Night capability.
- Unconventional warfare capability.
- Ground order of battle:
  - Force composition/locations/potential axes of advance.
  - Surface-to-surface missile threat.
  - SAM threat.
  - AAA threat.
  - Overall ground threat capabilities assessment.

- Air order of battle:
  - Location/disposition/likely attack axes.
  - AAW capabilities.
  - Offensive air support capabilities.
  - Air-to-surface missile capabilities.
  - UA capabilities.
  - Satellite overflight information (e.g., capabilities, time).
  - Overall air threat capabilities assessment.
- Electronic order of battle:
  - EA capabilities.
  - Electronic warfare support capabilities.
  - Overall threat EW capabilities assessment.
  - Naval order of battle.
  - Centers of gravity.
  - Key vulnerabilities.
  - Key strengths.
- Most likely and most dangerous COAs.

### Marine Air-Ground Task Force

- MAGTF commander's intent/concept of operations.
- AOA/AO description:
  - Sector limits.
  - Mobility/trafficability.
  - Weather considerations.
- Rules of engagement.
- Adjacent/supporting units.
- Multinational forces issues.

- National asset (electronic intelligence) support:
  - Joint forces issues.
  - Liaison requirements.
  - Connectivity.

### Ground Combat Element

- Force composition.
- GCE commander's intent/SOM.
- FSCMs/ACMs.
- Named areas of interest/target areas of interest/high-value targets/high-payoff targets.
- Priority of fires and locations:
  - Artillery.
  - NSFS.
  - Aviation.

### Aviation Combat Element

- ACE commander's intent/concept of employment.
- Vital areas.
- Critical asset list/defended asset list.
- Launch, divert, delay, and abort authority:
  - CAS.
  - Assault support.
  - Air defense.

- OAS:
  - Priority of CAS.
  - Strip launch/airborne alert availability.
  - Location of assets.
- Assault support:
  - Priorities of assault support.
- CASEVAC:
  - Procedures/connectivity.
  - Medical facility location and priority.
- Tactical recovery of aircraft and personnel (TRAP):
  - Procedures/connectivity.
  - TRAP zones and safe areas.
  - Isolated personnel report data.
- Combat search and rescue (CSAR):
  - Procedures/connectivity.
  - Responsibility.
- Strip alert aircraft availability, procedures, and locations.
- FARP and FOB locations and connectivity.
- Landing zone locations and status.
- Tanker plan.
- Air reconnaissance, UA employment plan:
  - RIO procedures.
  - Routing/deconfliction plan.
  - Connectivity with the GCS.
- Air control procedures:
  - Minimum-risk route/orbit areas.
  - Control points.

  - Weapon engagement zones.
  - Return to force/lame duck procedures.
  - ACAs.
  - Fade/bug out plan.
  - UA loiter area.
  - Hung ordnance jettison area.
  - RIO sequence.
  - Terminal control information.
  - Airborne C2 availability/employment.
  - Air defense warning condition/state of alert/weapons control status information.
- ATO dissemination.
- MACCS agency casualty procedures.

### Communications

- Communications architecture.
- EMCON procedures.
- Chattermark procedures.
- Prowords/codewords.
- Execution checklists.
- Cryptography:
  - Required hardware/software.
  - Changeover times.
  - Current period for the C-E operating instructions.
  - Challenges and passwords.
  - Required reports.
  - Communications net prioritization/restoration.
  - Intelligence connectivity.

### Logistics Resupply

- Water/fuel/ready to eat meals/batteries for personal equipment.
- Repair parts/batteries/expendables/replacement of major items.
- Personnel/administrative issues.
- Transportation (e.g., airlift, sealift) considerations.

## CREW BRIEF

Crew briefs are designed to pass mission critical information, discuss pertinent procedures, and critique/recap significant events. Crew briefs should be as detailed as practical but may be abbreviated to meet mission requirements and normally occur in three phases:

- Pre-watch brief.
- Crew change brief.
- Post watch debrief.

### Pre-Watch Brief

*Time Hack*

*Introduction*

- Identifies alternate SAD and crew leaders.
- Identifies briefers.
- Mission statement priorities.
- Status of controllers' responsibilities in the AOA/AO.

*Intelligence*

- Weather:
  - Local weather.
  - Ingress/egress route weather.
  - Target weather.
  - Weather, location, and capabilities.
  - Light data:
    - Beginning of morning nautical twilight.
    - End of evening nautical twilight.
    - Sunrise/sunset.
    - Moonrise/moonset.
    - Moon phase.
  - Forecast.
- Enemy order of battle:
  - Electronic order of battle:
    - EA/EW support capabilities.
    - Joint spectrum interference report (JSIR) considerations.
  - Ground-controlled intercept capability.
  - Air order of battle.
  - SAM capabilities and locations.
  - AAA capabilities and known locations.
  - Naval order of battle.
  - Enemy capabilities, weaknesses, and likely COAs.

- CSAR/TRAP/survival, evasion, resistance, and escape information:
  - Safe areas:
    - Location.
    - Description.
  - CSAR/TRAP availability/call sign/frequency/location.
  - TRAP launch/divert authority.
  - Isolated personnel report data.

*Friendly Forces*

- Ground units:
  - Locations:
    - Forward edge of the battle area/forward line of own troops.
    - NSFS stations and gun-target lines.
    - Artillery batteries and gun-target lines.
    - Other known location of friendly activity.
  - SOM/main effort:
    - Primary and alternate landing zones.
    - Ingress/egress routes.
    - Control points.
    - Escorts.
    - On-call and preplanned CAS in support of—
      - TAC(A)s.
      - ASC(A)s.
      - FAC(A)s.
      - FACs/JTACs.
      - TACPs.

- Priority of fires and locations:
  - NSFS.
  - Artillery.
  - Aviation.
  - Senior FSCC and location.
- Communications.
- Echelon procedures.
- FSCMs include—
  - Hung ordnance jettison area.
  - ACAs.
  - Fire support coordination line.
  - Battlefield coordination line.
  - No-fire areas.
- Ground terminal controllers.

- Air:
  - Launch and divert authority:
    - CAS.
    - Assault support.
    - Air defense.
  - Strip alert aircraft:
    - Time/location.
    - Ordnance.
    - Communications.
  - Tanker plan:
    - Tanker tracks.
    - Time on station.
    - Giveaway.

- Helicopters:
  - Requests.
  - FARP locations.
  - Communications.
  - Control procedures.
  - Naval platforms.
- TAC(A)/ASC(A).
- UAS employment plan.

*Air Defense*

- Threat/alert and weapons conditions:
  - Indicators.
  - Tactics.
  - Early warning detection points.
- TAOC and early warning/control location(s)/status.
- Critical asset list/defended asset list.
- Communications with air defense elements/agencies.
- Rules of engagement/identification criteria:
  - Routes of flight.
  - Entry/exit points.
- GBAD units:
  - Missile engagement zones.
  - Location and status of GBAD units.
  - Communications.
- High value airborne asset slide scram and retrograde plan:
  - Supporting communications plan.
  - Slide/scram/retrograde.

- Station reset criteria and authority.
- Visual combat air patrol concerns/coordination.

*Direct Air Support Center Status*

- Communications:
  - Nets:
    - Locations, radio/antenna type, and configuration.
    - Encryption devices available.
    - Hot lines.
    - EMCON/electronic protection procedures.
    - Restoration priorities.
  - Communications materials system considerations:
    - Authentication codes.
    - Numerical codes.
    - Location.
    - Responsibility.
- Crew functioning:
  - Positions and locations.
  - Relief and casualty procedures.
  - Net responsibilities.
- Reports required and routing:
  - JSIR/frequency interference report.
  - JTAR, JTAR/S, JTEWR, ASR, CASEVAC.
  - INFLTREP.
  - Pilot reports.
  - MACCS status.
  - DASC equipment status.

  - Joint/multinational forces reports.
  - Information routing procedures.
- Codeword/communications security:
  - Mission:
    - Continue.
    - Change.
    - Cancel.
    - Abort.
  - Challenge/reply.
  - Mission specific code words and procedures.

*Airspace*

- Range available:
  - Altitudes.
  - Airspace restrictions.
  - Ordnance areas/restrictions.
- Airfield operations:
  - Ground-controlled approach facilities.
  - Divert fields.
  - Navigation aids.
  - Frequencies/communications.
  - Fuel and ordnance availability.
  - Emergency recovery procedures.
  - Lost communications procedures.

*Summary*

- MACCS agencies casualty procedures.
- Additional information germane to operations.

  - Medical facilities:
    - Landing zone and frequencies.
    - Care provided and available bedspace.
    - Landing zone and frequencies.
- Crew change:
  - Time.
  - Order of relief.
  - Procedures.
- Crew debrief:
  - Time.
  - Location.
- Questions.

## Crew Change Brief

The order of crew relief is a decision made by the oncoming and off going SADs. Information exchanged between the off going and oncoming crews include, but are not limited to, the following:

### *Communications Personnel*

- Equipment problems experienced during the watch.
- Suspected equipment failures.
- Frequency disparity.
- Status of communications links.
- Cryptographic device software changeovers.

### *Plotters*

- Fixed-wing aircraft currently airborne and their location.
- Rotary-wing aircraft currently airborne and their location.

- Current numbering for JTAR, JTAR/S, JTEWR, ASR, and CASEVAC forms.
- Active ACAs and missile engagement zones.
- Location of FOBs.
- Location of UA.
- Scheduled major helicopter lifts.
- Updates/changes to the SOM.
- Active artillery positions.

*Fire Support Coordinator Net Operators*

- Recent changes to FSCMs.
- Location of NSFS/artillery units.
- Active ACAs.
- Latest information on enemy location(s).
- Location of GBAD units.
- Free fire areas/ordnance jettison areas.

*Tactical Air Traffic Control Net Operator (As Required)*

- Missions, which are airborne, on alert status, late for launch or time on target, etc.
- Changes to RIO sequence/information passed.
- Changes to air control procedures.
- Safety of flight issues.
- Location(s) of UA.
- Active ACAs.

*Tactical Air Director and Helicopter Director*

- Status of ongoing events (airborne, on alert, late RIO, or diverted, etc).
- Status of preplanned/immediate missions.

- Status of diverted aircraft (if applicable).
- Location of TAC(A)s, ASC(A)s, FAC(A)s, FACs/JTACs, and TACPs.
- Call signs of terminal controllers and which controller(s) are working airborne aircraft.
- Pending INFLTREPs.
- Status of current JTARs JTAR/Ss, JTEWRs, CASEVACs, and ASRs.
- Next JTAR, JTAR/S, JTEWR, ASR, and CASEVAC number.
- ADWC/WCS.
- Safety of flight information.
- Location of UA.
- Pending 9-line briefs.
- FSCMs/ACMs in effect.
- Location and status of preplanned CSAR, CASEVAC, and TRAP package(s).

*Tactical Air Command Net Operator*

- ADWC/WCS.
- Expected responses to late mission queries.
- Ongoing significant events.
- Weather status.

*Direct Air Support Net Operator*

- ADWC/WCS.
- Pending responses from the Marine TACC or Navy TACC (e.g., launches).
- Latest INFLTREP passed to the Marine TACC or Navy TACC.
- Friendly positions.

- Changes to enemy locations.
- Current weather information.

*Tactical Air Request/Helicopter Request Net Operators*

- Next JTAR, JTAR/S, JTEWR, ASR, and CASEVAC numbers to be assigned.
- Status of current JTARs, JTAR/Ss, JTEWRs, CASEVAC and ASRs requests.
- Expected INFLTREPs to receive or mission status to pass.
- Units not answering on net including station call signs.
- Status of troop lifts.
- Status of incomplete requests for mission information.

*Crew Chief*

- Pertinent information regarding DASC crewmembers.
- Status of ongoing missions.
- Changes and updates in FSCMs.
- Communications support/equipment status.
- Changes of radios/nets/positions due to equipment problems.
- Significant events.
- Outstanding JTARs, JTAR/Ss, JTEWRs, CASEVACs and ASRs.
- Changes/updates available from intelligence representatives.

*Senior Air Director*

- Communications support/equipment status.
- ATO information.
- Aircraft significantly late to radio in or radio out.
- Aircraft assignments for upcoming missions (e.g., diverted, strip alert).

- Pending immediate requests for support.
- Changes to SOM.
- Changes to priority of fires.
- JSIR incidences reported.
- Downed/distressed aircraft.
- Any significant past, present, or future events that could impact operations.
- Status of diverted aircraft.
- Availability of strip alert aircraft.
- Current CASEVAC procedures.

### Post Watch Debrief

The post watch debrief contains elements from each significant event that occurred during the watch. The debrief serves as an important learning tool for all and a constructive critique of each crewmember's performance should be included. Significant events to discuss include the following:

- Information flow internal and external to the DASC.
- Control procedures.
- Position information problems, recommended remedies, etc.
- Use of forms within the DASC.
- Effectiveness and proper use of radio/transmission procedures.
- Reviewing the amount of radio traffic for possible consolidation or breakout of duties for future watches/operations.
- Other items deemed necessary by the crew.

# Appendix B

# Glossary

## Section I. Acronyms and Abbreviations

AAA ..... antiaircraft artillery
AAW ..... antiair warfare
ACA ..... airspace coordination area
ACE ..... aviation combat element
ACM ..... airspace coordinating measure
ADWC ..... air defense warning condition
AM ..... amplitude modification
ANGLICO ..... air/naval gunfire liaison company
AO ..... area of operations
AOA ..... amphibious objective area
ASC(A) ..... assault support coordinator (airborne)
ASE ..... air support element
ASLT ..... air support liaison team
ASOC ..... air support operations center
ASR ..... assault support request
ATO ..... air tasking order

C2 ..... command and control
CAS ..... close air support
CASEVAC ..... casualty evacuation
CC ..... crew chief
C-E ..... communications-electronics
COA ..... course of action
CSAR ..... .combat search and rescue

DAS ..... deep air support
DASC ..... direct air support center
DASC(A) ..... direct air support center (airborne)
DASC(AS) ..... direct air support center (airborne system)

EA ..... electronic attack
EMCON ..... emission control
EW ..... electronic warfare

FAC ..... forward air controller
FAC(A) ..... forward air controller (airborne)
FARP ..... forward arming and refueling point
FFCC ..... force fires coordination center
FM ..... frequency modulation
FOB ..... forward operating base
FSCC ..... fire support coordination center
FSCM ..... fire support coordination measure

GBAD ..... ground-based air defense
GCE ..... ground combat element
GCS ..... ground control station

HDC ..... helicopter direction center
HF ..... high frequency

INFLTREP ..... in-flight report

JSIR ..... joint spectrum interference report
JTA ..... joint terminal attack controller
JTAR ..... joint tactical air strike request
JTAR/S ..... joint tactical air reconnaissance/surveillance
JTEWR ..... joint tactical electronic warfare request

kB ..... kilobyte

LFMRCO ..... landing force medical regulating control officer
LNO ..... liaison officer

MACCS ..... Marine air command and control system
MACG ..... Marine air control group
MAGTF ..... Marine air-ground task force
MASS ..... Marine air support squadron
MEB ..... Marine expeditionary brigade
MEF ..... Marine expeditionary force
MEU ..... Marine expeditionary unit
MRC ..... mobile radio communication

NSFS ..... naval surface fire support

OAS ..... offensive air support
OIC ..... officer in charge

PET ..... patient evacuation team

RIO ..... radio in/out

SACC ..... supporting arms coordination center
SAD ..... senior air director
SAM ..... surface-to-air missile
SATCOM ..... satellite communications
SNCOIC ..... staff noncommissioned officer in charge
SOM ..... scheme of maneuver

TAC(A) ..... tactical air coordinator (airborne)
TACC ..... tactical air command center (USMC);
tactical air control center (USN)

TACP .....tactical air control party
TADC ..... tactical air direction center
TAOC .....tactical air operations center
TAR/HR..... tactical air request/helicopter request
TRAP..... tactical recovery of aircraft and personnel

UA .....unmanned aircraft
UAS .....unmanned aircraft system
UCD..... user control device
UHF ..... ultrahigh frequency
US ..... United States

VHF .....very high frequency

WCS ..... weapons control status

# Section II. Definitions

**air support element**—An element task-organized by the Marine air support squadron to perform various air support control functions. Employment options can range from Marine expeditionary unit level operations characterized by limited assets and endurance, to a multi-division operation where the air support element is almost if not identical in capability but set apart in responsibilities and subordinate to the direct air support center. The air support element can function as an extension of the Navy tactical air control center/helicopter direction center, in conjunction with the battalion tactical air control party. Also called **ASE**.

**air support liaison team**— A team task-organized by the Marine air support squadron to maintain liaison between the direct air support center (DASC) and the fire support coordination center (FSCC). The air support liaison team is not a DASC, but may augment an echelon capability during displacement of the DASC. An air support liaison team may be used to provide a team to the senior FSCC when the DASC is not able to physically collocate with the FSCC because of mobility or communications requirements with other agencies and supporting aircraft. Also called **ASLT**. (MCRP 5-12C)

**area of operations**—An operational area defined by the joint force commander for land and maritime forces. Areas of operation do not typically encompass the entire operational area of the joint force commander, but should be large enough for component commanders

to accomplish their missions and protect their forces. Also called **AO**. (JP 1-02)

**area of responsibility**—The geographical area associated with a combatant command within which a geographic combatant commander has authority to plan and conduct operations. Also called **AOR**. (JP 1-02)

**battlefield coordination line**—A fire support coordinating measure, similar to a fire support coordination line (FSCL), which facilitates the expeditious attack of targets with surface indirect fires and aviation fires between this measure and the FSCL. To facilitate air delivered fires and deconflict air and surface fires, an airspace coordination area will always overlie the area between the battlefield coordination line (BCL) and the FSCL. BCL location is graphically portrayed on fire support maps, charts, and overlays by a solid black line with the letters ìBCLî followed by the establishing headquarters in parentheses above the line and effective date-time group below the line. Also called **BCL**. (MCRP 5-12C)

**casualty evacuation**—The unregulated movement of casualties that can include movement both to and between medical treatment facilities. Also called **CASEVAC**. (JP 1-02)

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

**combined arms**—1.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, Part 1 of a 2 part definition)

**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**. (MCRP 5-12C)

**direct air support**—Air support flown in direct response to a specific request from the supported unit. (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)

**direct air support center (airborne)**—An airborne aircraft equipped with the necessary staff personnel, communications, and operations facilities to function as a direct air support center. Also called **DASC(A)**. (JP 1-02)

**emission control**—The selective and controlled use of electromagnetic, acoustic, or other emitters to optimize command and control capabilities while minimizing, for operations security: a. detection by enemy sensors; b. mutual interference among friendly systems; and/or c. enemy interference with the ability to execute a military deception plan. Also called **EMCON**. (JP 1-02)

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

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

**helicopter direction center**—1. In amphibious operations, the primary direct control agency for the helicopter group/unit commander operating under the overall control of the tactical air control center. (Joint Pub 1-02) 2. The helicopter direction center is an agency within the Navy tactical air control system and is positioned afloat. The helicopter direction center is not a Marine air command and control system agency, but it interacts closely with the direct air support center in the control of helicopter operations between ship and shore. The helicopter direction center also interacts closely with the air support element of the Marine expeditionary unit aviation combat element. Also called **HDC**. (MCRP 5-12C)

**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 enemyís military forces. Offensive air support is one of the six functions of Marine aviation. Also called **OAS**. (MCRP 5-12C)

**positive control**—1. A method of airspace control that relies on positive identification, tracking, and direction of aircraft within an airspace, conducted with electronic means by an agency having the authority and responsibility therein. (JP 1-02) 2. The tactical control of aircraft by a designated control unit, whereby the aircraft receives orders affecting its movements which immediately transfer responsibility for the safe navigation of the aircraft to the unit issuing such orders. (MCRP 5-12C under **Marine air command and control system**)

**procedural control**—A method of airspace control that relies on a combination of previously agreed and promulgated orders and procedures. (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)

**sector**—1. An area designated by boundaries within which a unit operates, and for which it is responsible. (JP 1-02, Part 1 of a 2 part definition)

**serial**—2. A serial can be a group of people, vehicles, equipment, or supplies and is used in airborne, air assault, amphibious operations, and convoys. (JP 1-02, Part 2 of a 2 part definition)

**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 that 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 US Marine Corps air command and control agency from which air operations and air defense warning functions are directed. It is the senior agency of the Marine air command and control system that serves as the operational command post of the aviation combat element commander. It provides the facility from which the aviation combat element commander and his battle staff plan, supervise, coordinate, and execute all current and future air operations in support of

the Marine air-ground task force. The tactical air command center can provide integration, coordination, and direction of joint and combined air operations. Also called Marine TACC. (JP 1-02)

**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 direction center**—An air operations installation under the overall control of the tactical air control center (afloat)/ tactical air command center, from which aircraft and air warning service functions of tactical air operations in an area of concern are directed. Also called **TADC**. (JP 1-02)

**tactical air operations center**—The principal air control agency of the US Marine Corps 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)

**terminal control**—1. The authority to direct aircraft to maneuver into a position to deliver ordnance, passengers, or cargo to a specific location or target. Terminal control is a type of air control. (JP 1-02, Part 1 of a 2 part definition).

**unmanned aircraft**—An aircraft or balloon that does not carry a human operator and is capable of flight under remote control or autonomous programming. Also called **UA**. (JP 1-02)

**unmanned aircraft system**—That system whose components include the necessary equipment, network, and personnel to control an unmanned aircraft. Also called **UAS**. (JP 1-02)

# Appendix C

# References and Related Publications

## Joint Publication (JP)

| | |
|---|---|
| 1-02 | Department of Defense Dictionary of Military and Associated Terms |

## Marine Corps Warfighting Publications (MCWPs)

| | |
|---|---|
| 3-31.6 | Supporting Arms Coordination in Amphibious Operations |
| 4-11.1 | Health Service Support Operations |
| 5-12C | Marine Corps Supplement to the DOD Dictionary of Military and Associated Terms |

## Marine Corps Order (MCO)

| | |
|---|---|
| 3501.9B | Marine Corps Combat Readiness Evaluation System (MCCRES), volume VIII, *The Marine Air Command and Control System (MACCS)* |

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