CHAPTER 4. COMMAND AND CONTROL

Command is the authority that a commander in the military service lawfully exercises over subordinates by virtue of rank or assignment. (JP 1-02) Control is the physical or psychological pressures exerted with the intent to assure that an agent or group will respond as directed. (JP 1-02). Command and control is the means by which a commander recognizes what needs to be done and sees to it that appropriate actions are taken (MCDP 6, *Command and Control*). Command and control provides unity and purpose to the myriad of actions performed by a military unit.

Command and control consists of people, information, and a support structure. Blending these elements takes advantage of each element's attributes and builds a comprehensive picture of the battlespace. Those involved in planning and execution of AAW operations can decide what actions will compel the enemy to do our will.

The ACE commander is responsible to the MAGTF commander for the conduct of AAW operations. Other element commanders provide planning, resources, and logistics support to the ACE commander. All element commanders must be involved to lend unity of effort to the MAGTF commander's single battle.

The ACE commander normally delegates authority for the detailed planning and execution of AAW operations to the Marine air command and control system (MACCS). From his command post at the tactical air command center (TACC), the ACE commander or his designated agent provides centralized command and decentralized control over the execution of AAW operations.

Varying degrees of control and operations can exist within AAW operations and depend on particular situations. Several types of control exist that can be used exclusively or combined to achieve the desired degree of autonomy in operations.

AIR CONTROL

Air control is the authority delegated to MACCS subordinate elements to direct the physical maneuver of in-flight aircraft or to direct an aircraft or surface-to-air weapons unit to engage a specific target. Tasks that maneuver aircraft or direct a surface-to-air weapons unit to engage a particular target are air control tasks. An air controller performs air control when he directs an aviator to maneuver his aircraft. A missile controller performs air control when he directs a surface-to-air weapons unit to engage a particular target. Agencies and individuals that perform air control functions include the—

- Tactical air operations center (TAOC) and its early warning and control (EW/C) sites.
- Direct air support center (DASC).
- Marine air traffic control detachments (MATCDs).
- Designated controllers and coordinators, e.g.; tactical air coordinators (airborne), assault support coordinators, forward air controllers (airborne), forward air controllers, and in some instances, the aircraft flight leader.
- Surface-to-air weapons unit leaders. They perform air control when they direct subordinate elements to engage a particular target.

Air control information is usually single-mission related. Communications occur between the aircrew/surface-to-air weapons unit and the air/weapons controller. Air control consists of airspace control and airspace management. See figure 4-1.

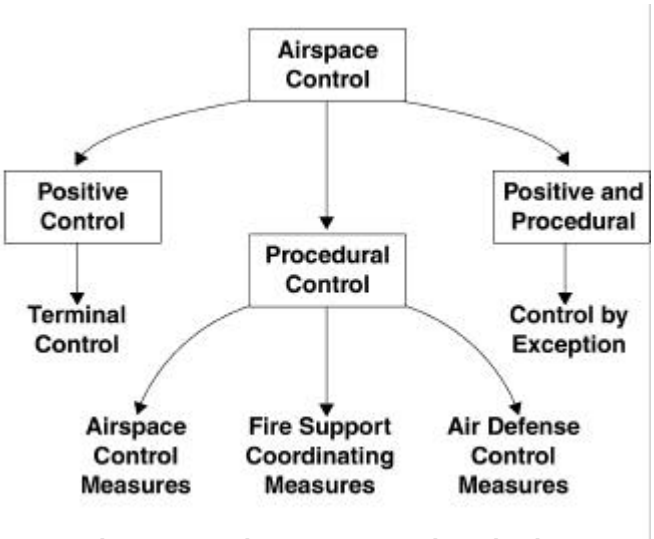

Figure 4-1. Airspace Control Methods.

Airspace Control Methods

Airspace control is the authority given to a commander to direct airspace users so that airspace is used efficiently and effectively. The unit commander

responsible for a particular block of airspace, type of mission, or type of aircraft has airspace control authority. Airspace control coordinates, integrates, regulates, and uses a defined airspace and aids in identifying all airspace users. Coordination is that degree of authority necessary to achieve effective, efficient, and flexible use of airspace without providing command authority. Integration is the need to combine requirements for the use of airspace in the interest of achieving a common goal at the lowest possible level. Regulation is the requirement to supervise activities in the airspace to provide for flight safety and denotes the authority required for such safety. Identification produces timely engagement of enemy aircraft while reducing the potential for fratricide.

Airspace control measures are published in the airspace control order, airspace control plan, and special instructions to the air tasking order (ATO). Airspace control measures and procedures are disseminated to all airspace users and control agencies. Airspace control does not include the authority to approve, disapprove, deny, or delay aviation operations.

Positive Control

Positive control relies on positive tracking, direction, and identifying aircraft to exercise airspace control. It is conducted electronically by agencies equipped with radar; identification, friend, or foe (IFF) interrogators and receivers; beacons; computers; digital data links; and communications equipment. Generally, two conditions must exist for a commander to exercise positive control: the means to identify and locate airspace users and the ability to maintain continuous communications with them. Agencies that exercise positive control include the TAOC, EW/C sites, and MATCDs.

Positive control facilities are subject to attack and sabotage. They may be restricted by line of sight coverage, electronic interference, and limited communications. Positive air control agencies must have back-up procedures to compensate for failure of part or all of their positive control systems.

Terminal control is the authority to direct the maneuver of aircraft which are delivering ordnance, passengers, or cargo to a specific location or target. Terminal controllers require specialized training that differs from other air controllers. The TAOC, EW/C sites, MATCDs, forward air controllers, forward air controllers (airborne), and other designated agencies, units, and individuals perform terminal control of AAW operations.

Procedural Control

Procedural control relies on previously agreed upon and promulgated orders and procedures. Included in these orders and procedures are airspace control measures, fire support coordinating measures, and air defense control measures. Procedural control divides the airspace by volume and time and uses weapons control statuses to manage aviation operations. It is less vulnerable to interference by electronic and physical attack and ensures continuity of operations under adverse environmental conditions. It also serves as a backup system if positive control is used. The TACC, tactical air direction center (TADC), SAAWC, TAOC, EW/C sites, DASC, MATCDs, base defense zone (BDZ), low altitude air defense (LAAD) units, controllers, and coordinators exercise procedural control in support of AAW operations.

Typically, aircraft operating in the main battle area provide a rapid and flexible response to meet the MAGTF maneuver forces' requirements. The freedom of movement required to conduct AAW operations makes individual control of aircraft extremely difficult. To control and direct the movement of aircraft in the main battle area, the MAGTF commander establishes procedural control by assigning sectors of responsibility for each MAGTF air defense unit and publishing rules of engagement (ROE) that specify target engagement conditions. Air defense units, particularly those operating in the main battle area, are managed by procedural control techniques to facilitate this freedom of movement.

Combined Control Methods

In the absence of unlimited command and control assets, the optimal method of controlling aircraft and missiles conducting AAW operations is by combining positive and procedural control. Usually, procedural control is implemented to cover positive control limitations.The vision of an established procedural control system augmented by positive control capabilities allows for a different combination control technique; i.e., positive control by exception. Under positive control by exception, control agencies provide positive control to aviation assets not as a normal process but in exceptional cases where the positive control agency's information is better (or more current) than that of the aviation asset conducting AAW operations. See MCWP 3-25, *Control of*

Aircraft and Missiles, for more information on airspace control methods.

AIRSPACE CONTROL MEASURES

Airspace control measures exercise the procedural control measures of airspace control, air defense, and fire support coordinating measures. Used with air defense and fire support coordinating measures, airspace control measures maximize the effectiveness of combat operations by promoting safe, efficient, and flexible use of airspace. Airspace control measures can outline or modify hostile criteria or serve as a tool for identifying targets and coordinating fires.

Airspace control measures are normally published in the operation order, airspace control order, airspace control plan, and special instructions to the ATO. Airspace control measures should be disseminated to the appropriate MACCS agencies; fire support coordinating agencies; aircraft units; and surface-to-air weapons units to ensure coordination and integration of the airspace, supporting arms, and AAW operations.

Requests for establishing airspace control measures are forwarded to the joint force commander or his designated agent (the airspace control authority) for implementing through the airspace control order. Typical airspace control measures used by a MAGTF follow.

Amphibious Objective Area

The amphibious objective area (AOA) is a geographical area that includes the amphibious task force's (ATF's) objectives and the sea, air, and land required to conduct operations, secure objectives, and accomplish the ATF's mission.The combatant commander, Service component commander or the joint force commander identifies the AOA in the initiating directive. As part of an ATF, the landing force (MAGTF) conducts aviation operations, including AAW, within the AOA by using MACCS capabilities to conduct airspace control of its aviation operations.

Airspace Control Area and Sector

An airspace control area is airspace that is laterally defined by the boundaries of a component's area of operations. Typically, the joint force commander assigns airspace control areas to the MAGTF that correspond to the MAGTF's area of operations. An airspace control sector is a subdivision of an airspace control area. The joint force commander may also assign an airspace control sector to the MAGTF. The MAGTF commander is responsible for all aviation operations within his assigned airspace control area or sector.

Air Control Points

Air control points route aircrews to their targets and provide a ready means of conducting fire support coordination. They must be easily identified from the air and support the MAGTF's scheme of maneuver. If possible, air control points should be used by a variety of aircraft. The TACC determines each control point's intended use based on the tactical situation and promulgates that information through the daily ATO. Air control points can serve one or more functions simultaneously. They are not specifically limited to AAW functions; i.e., multiple use control points. Air control points can be designated as—

- Entry/exit.
- En route.
- Orbit/holding.
- Contact.
- Initial.
- Rendezvous.
- Egress control.
- Penetration.

Ingress, Egress, and Return to Force Control Procedures

The most difficult aspect of air defense is planning for friendly aviation operations that support the MAGTF but protect it from air attack. Friendly aircraft en route to and returning from combat missions need to avoid enemy air defense systems yet be visible to friendly air defense systems. These control procedures must allow friendly aircraft to move safely throughout the MAGTF airspace by utilizing predictable flight paths for positive identification of friendly aircraft by friendly air defense units and agencies.

Control procedures must be disseminated to all appropriate units and agencies (MACCS agencies, air controllers and coordinators, aircraft, and SAW units). They must be thoroughly examined, especially for safe passage of friendly aircraft through restricted areas. Control procedures should maximize the safety of the defended area while minimizing the possibility of fratricide. When planning control procedures, the planner must understand the MAGTF's capabilities and the enemy's air defense surveillance, weapon

platforms, and friendly aircraft. Ingress, egress, and return to force (RTF) control procedures use—

- Ingress/egress corridors and routes; e.g., low-level transit routes (LLTRs) and MRRs.
- Control points.
- Visual identification (VID).
- Tactical air navigation (TACAN) system.
- IFF equipment.
- Altitude and airspeed restrictions.
- Lame duck procedures (when aircraft have no communications, no IFF, are battle damaged, etc.).
- Positive control procedures.
- Airspace coordination areas (ACAs).

Joint Airspace Control Measures

Effective integration of MAGTF aviation operations in joint operations is based on coordinating altitude, high density airspace control zone (HIDACZ), restricted operations area (ROA)/restricted operations zone (ROZ), minimum risk routes (MRR), and standard use Army aircraft flight route (SAAFR). See JP 3-52, *Joint Doctrine for Joint Airspace Control in the Combat Zone*; MCWP 3-25; MCWP 3-25.1, *Integrated Combat Airspace Command and Control (ICAC2)*; and MCWP 3-25.2, *Multi-Service Procedures for Theater Air-Ground Systems (TAGS) Multiservice Manual* for more information on joint airspace control and joint airspace control measures.

FIRE SUPPORT COORDINATING MEASURES

Fire support coordinating measures assign responsibilities for the control officers and for the coordination of fires with maneuver. If used properly, these measures allow a commander to open areas of the battlespace for rapid engagement of targets or to restrict and control fires. Fire support coordinating measures also safeguard friendly forces and impact directly on AAW operations, especially OAAW and SEAD. See chapter 2. Fire support coordinating measures are either permissive or restrictive.

Permissive Fire Support Coordinating Measures

Permissive fire support coordinating measures facilitate the attack of targets. Permissive measures permit the target engagement beyond the line or into an area without further coordination. An example of a permissive fire support coordinating measure is the FSCL. In OAAW, the rapid conduct of a surface attack against an enemy airfield or surface-to-air missile unit lying beyond the FSCL would not require detailed coordination with ground maneuver units. Thus, planning and execution of the mission is facilitated by the relatively limited coordination required to conduct the surface attack.

Restrictive Fire Support Coordinating Measures

Restrictive fire support coordinating measures provide safeguards for friendly forces. A restrictive measure imposes certain requirements for specific coordination prior to the engagement of those targets affected by the measure. An example of a restrictive fire support coordinating measure is a no-fire area. The no-fire area serves to protect friendly resources (or other assets) from attack by friendly forces or their affects, including OAAW missions. Permission for OAAW operations within a no-fire area must be obtained from the establishing authority except in cases of self-defense. See MCWP 3-25, appendix D.

AIR DEFENSE CONTROL MEASURES

Air defense control measures refer to airspace control measures that involve areas and zones used specifically for air defense actions. They are established to maximize the effectiveness of air defense operations while minimizing interference with other operations. Air defense control measures complement airspace control and fire support coordinating measures.

Air defense control measures within the MAGTF's airspace are normally recommended by the SAAWC to the TACC concurrently with recommendations to the sector, regional, or area air defense commander. The area air defense commander is the establishing authority for air defense control measures in joint operations. He submits proposed air defense control measures to the airspace control authority for deconfliction with other airspace control measures and subsequent inclusion in the airspace control order. Air defense control measures follow.

Air Defense Action Area

The air defense action area and the airspace above it are areas within which friendly aircraft or surface-to-air weapons are normally given preference to conduct air defense operations except under specific conditions (MCWP 3-25.1). An air defense action area is an engagement area used for preference of a specific weapons system over another without excluding the other from use under certain operational conditions. From an airspace control perspective, an air defense action area provides airspace users with location of air defense areas for mission planning purposes. The air defense action area is designated by the area air defense commander.

Air Defense Area

An air defense area is a specifically defined airspace for which air defense must be planned and provided (MCWP 3-25.1). It defines, in an area of operations, the area to be defended. An air defense area is a planning (division of responsibility) aid; it is not an airspace control measure. The air defense area is delineated by the area air defense commander.

Air Defense Identification Zone

An air defense identification zone (ADIZ) consists of airspace of defined dimensions that require ready identification, location, and control of airborne vehicles. This zone is normally the transition between procedural control (outside) and positive control (inside) in an area of operations (MCWP 3-25.1). Typically, an ADIZ is used for sovereign national boundaries or in the case of areas of operations, for identification into the rear areas.

Air Defense Operations Area

An air defense operations area is an area and the airspace above it within which procedures are establish to minimize mutual interference between air defense and other operations. It may include one or more air defense areas, air defense action areas, ADIZs, or firepower umbrellas (MCWP 3-25.1). Air defense operations areas are not used for airspace control, but to aid in planning and division of responsibility. From an airspace control perspective, these areas provide airspace users with the location of air defense operations for mission planning.

Weapons Engagement Zone

The weapons engagement zone (WEZ) consists of defined dimensions of airspace within which the responsibility for engagement normally rests with a particular weapon system. These include fighter engagement zones (FEZs), various types of missile engagement zones (MEZs), and joint engagement zones (JEZs). Design of the WEZ depends on specific weapons system capabilities. The area air defense commander defines the WEZ.

Fighter Engagement Zone

In air defense, a fighter engagement zone (FEZ) is that airspace of defined dimensions within which the responsibility for engagement normally rests with fighter aircraft. FEZs are an alternative type of engagement operation if the detailed control aspects of joint engagement operations cannot be met. The FEZ is an air defense control measure. From an air defense perspective, the FEZ is normally used when fighter aircraft have the clear operational advantage over surface-based systems.

These advantages could include range, density of fire, ROE, or coordination requirements. From an airspace control perspective, FEZs provides airspace users with engagement zone location for fighter aircraft for mission planning. Coordination and flexibility within the combat airspace control system may be a limiting factor. Surface-to-air missile systems will not be allowed to fire weapons into a FEZ unless targets are positively identified as hostile, identified and/or assigned by a higher authority or firing in self-defense. All fires must be in accordance with the ROE. The area air defense commander establishes the FEZ.

Missile Engagement Zone

A MEZ is an airspace of defined dimensions within which the responsibility for engagement normally rests with missiles. In joint doctrine, MEZs are divided into high-altitude and low-altitude MEZs.The principal differences between the two are the type of missile system being employed and the altitude limits of the MEZ. The area air defense commander designates the MEZ.

Short-Range Air Defense Engagement Zone

A short-range air defense engagement zone (SHORADEZ) is that airspace of defined dimensions

within which multiple air defense systems (surface-to-air missiles and aircraft) are simultaneously employed to engage air threats.

Joint Engagement Zone

A JEZ is airspace of specified dimensions within which multiple air defense weapon systems (surface-to-air weapons and aircraft) are simultaneously employed to engage air threats. JEZs are highly dependent on correct differentiation between friendly, neutral, and enemy aircraft. The area air defense commander establishes the JEZ.

Base Defense Zone

The base defense zone (BDZ) is an air defense zone established around an air base (or forward operating base) and limited to the engagement envelope of short-range air defense weapons systems defending that base. Base defense zones have specific entry, exit, and identification, friend or foe procedures established. (JP 1-02) In the MAGTF, low altitude air defense (LAAD) assets employ at BDZs. LAAD assets will integrate with the MATCD operating at the forward operating base around the BDZ. Pre-planned BDZs are published in the airspace control plan; requests for activating these zones are made to the ACE or MAGTF commander. Three critical elements are required to establish a BDZ:

- Controlling agency; e.g., MATCD, TAOC or a joint/multinational air traffic control system.
- Radar.
- Weapons system.

Vital Area

A vital area is a designated area or installation to be defended by air defense units. (JP 1-02) It contains facilities, units, and installations for the MAGTF to accomplish its mission. More than one vital area can exist, depending on the scope of the operation. Vital areas include airfields, command and control systems, CSS units, GCE units, and the MAGTF command element. The MAGTF commander identifies vital areas through his air defense priorities.

Air Direction

Air direction is the authority delegated to subordinate MACCS agencies to regulate employment of aircraft and surface-to-air weapons units to balance their availability and priority of use. The TACC, TADC, SAAWC, TAOC, EW/C site, DASC, tactical air coordinators (airborne), and assault support coordinators (airborne) exercise air direction. Air direction achieves a balance between the MAGTF's finite aviation assets; e.g., aircraft, surface-to-air weapons units, and control agencies, and the ACE's accomplishment of its mission. Ineffective air direction results in poorly used resources and excessive response times. A large volume of information and an extensive communications network is required for the ACE and MACCS to provide effective air direction. The communications network must incorporate information from the ACE and the MAGTF. Air direction tasks include—

- Developing ATOs.
- Fulfilling ATO requirements; i.e., tasking aircraft to perform specific missions.
- Diverting aircraft from its original mission.
- Processing air support requests.
- Collecting information on mission status.
- Moving ground-based air defense fire units to new firing positions.
- Adjusting mission assignments for aircraft/surface-to air weapons units due to changes in the air or ground situation.

Emission Control

Emission control (EMCON) regulates the use of electromagnetic, acoustic, and other emitters to optimize command and control capabilities. EMCON achieves this regulation by minimizing the detection of AAW assets by enemy sensors and reducing mutual interference among friendly command and control systems. EMCON also aids in executing a military deception plan.

Weapons Control and Coordination

Although the following forms of control and operations exist for AAW operations, planners and operators should strive to achieve decentralized control of AAW assets in most situations to allow the maximum flexibility to attack or counter threat aircraft and missile targets.

Centralized Control

Centralized control occurs when the controlling agency directs target engagements. It minimizes the likelihood of engaging friendly aircraft while

permitting engagements of hostile aircraft but only if specific orders are issued to initiate the engagement. An example of centralized control is a controlling agency that requires a firing unit to request permission to engage a target. However, even under centralized control, the right of self-defense is never denied.

Decentralized Control

Decentralized control occurs when controlling agencies monitor unit actions and only make direct target assignments to units when necessary for proper fire distribution, to prevent engagement of friendly aircraft, or to prevent simultaneous engagements of hostile aircraft. Decentralized control is the normal wartime mode of control for air defense. It increases the chance of engaging a hostile aircraft in a high-density environment because the firing unit can engage targets without requesting permission from the controlling agency. Silence is consent.

Autonomous Operation

An autonomous operation is a mode of operation assumed by a surface-to-air missile unit after it has lost all communication with its controlling agency. The surface-to-air missile unit commander assumes full responsibility for control of weapons and engagement of hostile targets within the established ROE. Operation orders must define specific actions and procedures for autonomous operations.

RELATIONSHIP BETWEEN AIRSPACE CONTROL AND AIR DEFENSE

The objective of airspace control is to maximize the effectiveness of combat operations without adding undue restrictions and with minimal adverse impact on the capabilities of any [component]. (JP 3-52) This relationship stresses close coordination must exist between airspace control, air traffic control, and area air defense units to *reduce the risk of fratricide and balance those risks with the requirements for an effective air defense.*

The balance required between restrictions on airspace control and flexibility provided to air defense operations is determined by the ACE commander and between the airspace control authority and area air defense commander at the joint level. These commanders and their staffs design or provide input to the design of the airspace control plan and area air defense plan. The airspace control plan specifies airspace control procedures used in the joint force's area of responsibility or operations area. The area air defense plan specifies joint force procedures for integrating weapons and other air defense actions that occur within the joint force's area of responsibility or joint operations area.

When drafting the area air defense plan, detailed engagement procedures that are integrated with airspace control measures are essential to provide maximum flexibility and responsiveness to all airspace users equally. Air defense interface is critical to effective combat zone airspace control. (JP 3-52) Geographic arrangement of air defense weapons within the battlespace and procedures for identification and engagement impact on all joint aviation operations and must be integrated into the airspace control plan. See JP 3-52, MCWP 3-25, and chapters 6 and 7 of this MCWP.

MARINE AIR COMMAND AND CONTROL SYSTEM

The MAGTF commander normally delegates the authority for aviation operations to the ACE commander. The ACE commander exercises his authority through the MACCS. The MACCS provides the ACE commander with the means for effective command, coordination, and control of all MAGTF aviation operations and the effective functioning of the MAGTF's IADS. Appendix A shows various communications data link architecture that enables this process. These relationships are shown in figure 4-2, page 4-8.

The MACCS task-organizes its resources based on the mission, enemy, terrain and weather, troops and support available-time available (METT-T). Although all MAGTF elements provide personnel and control agencies that comprise the MACCS, the ACE provides the majority of functionality. See MCWP 3-25.3, *Marine Air Command and Control System Handbook*.

Tactical Air Command Center

The TACC is the senior MACCS agency and the focal point for command and control of MAGTF aviation. It is the ACE commander's operational command post. To avoid confusion with its Navy counterpart, the Navy tactical air control center, the TACC is often referred to as the Marine TACC.

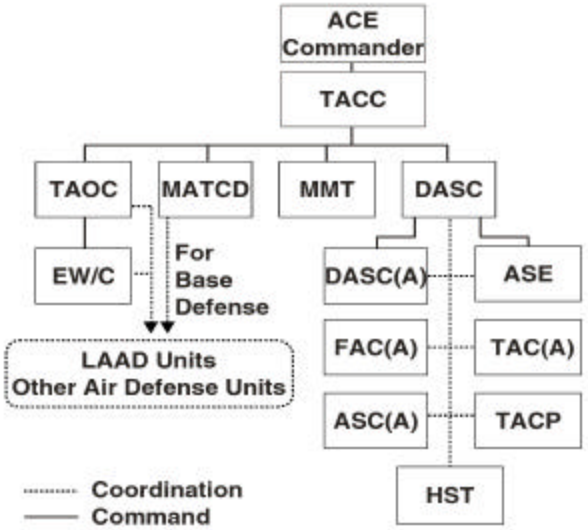

Figure 4-2. Marine Air Command and Control System.

The TACC consists of three mutually supporting, cross-functional operational organizations supported by a centralized intelligence organization. The TACC does not provide facilities for all ACE staff functions. It provides a facility for the ACE commander and staff to plan and execute MAGTF aviation and aviation support operations. TACC organizations are—

- Future plans.
- Future operations (future operations).
- Current operations (current operations).
- Air combat intelligence (ACI).

Future plans conducts aviation and aviation support planning for the next MEF mission change. Future operations develops future ATOs and prepares operation orders or fragmentary orders for the next ACE mission change. Current operations executes the daily ATO and assesses its effectiveness. ACI is embedded within the TACC. Timely and tailored and fused intelligence is integral to the functioning of future plans, future operations, and current operations. ACI is the focus of all aviation intelligence activities supporting the ACE. It produces and disseminates aviation-specific all-source intelligence, including assessments of adversary capabilities and vulnerabilities, target analysis, battle damage assessment (BDA), and the current status and priority of assigned targets to assist in execution day changes. See MCWP 3-25.4, *Marine Tactical Air Command Center Handbook*, and chapter 5 of this MCWP.

Tactical Air Direction Center

A TADC can be established by the commander, landing force (CLF) during amphibious operations. It coordinates between MACCS agencies ashore and the commander, ATF's (CATF's) Navy tactical air control center afloat. Once the CLF is ashore and ready to assume control of aviation operations and airspace management functions, the CATF transfers control of all aviation operations within the AOA to the CLF. The CLF's Marine TADC then becomes the Marine TACC ashore, and the Navy's tactical air control center reverts to a Navy TADC. The Marine TADC normally mirrors the Marine TACC in organization, facilities, and capabilities.

The essential difference between the Marine TACC and TADC is the amount of responsible airspace and the scope of assigned tasks. A TADC is typically assigned specific aviation operations tasks in the landward sector of the AOA. A TADC may be delegated the authority to coordinate landward sector air defense operations, OAAW operations or both. See NWP 3-09.11, *Supporting Arms in Amphibious Operations*, and chapter 6 of this MCWP for more information on passage of control ashore.

Sector AAW Coordinator

The SAAWC is the MAGTF commander's air defense battle manager. The ACE commander determines the extent of his authority. The SAAWC coordinates and manages all active air defense weapons (aircraft and surface-to-air weapons) within his assigned sector. In amphibious operations, the Marine SAAWC may also be known as the landing force SAAWC.

The SAAWC does not exercise real time control of aviation operations. His responsibilities focus on coordinating and planning air defense and some OAAW operations. Within these guidelines, the SAAWC and his staff typically provide the interface between TAOC controllers and the ACE commander's battlestaff.

Normally, the Marine SAAWC's operations facility collocates or integrates with the TAOC to provide the SAAWC and his battlestaff with a greater capability to coordinate with the TAOC. Representatives from various units of the Marine air control group and the ACE battlestaff also man the Marine SAAWC operations facility. See MCWP 3-25.6, *Sector Antiair Warfare Coordinator Handbook*.

SAAWC functions in AAW operations typically include—

- Managing air defense resources, including aircraft and surface-to-air weapons within his assigned sector.
- Managing airborne tankers.
- Recommending air defense control measures to the TACC, airspace control authority, and regional/area air defense commander, as appropriate.
- Recommending employment of AAW resources to support future operations.
- Recommending air defense warning and weapons release conditions to the TACC and/or area air defense commander.
- Recommending air defense priorities to the MAGTF commander via the ACE commander.
- Launching alert aircraft or diverting airborne aircraft to attack time critical targets, when authorized.
- Functioning as a sector or regional air defense commander for theater air defense operations, when directed.

Tactical Air Operations Center

The TAOC is subordinate to the TACC. It is the primary AAW agency within its assigned sector. The TAOC, along with the SAAWC and his staff, may perform alternate TACC functions (current operations section only) for limited periods.

The TAOC provides positive airspace control, management, and surveillance for its assigned airspace. Personnel detect, identify, and control the intercept of hostile aircraft and missiles by aircraft and surface-to-air weapons. They also provide en route air traffic control and navigational assistance for friendly aircraft. The TAOC has three types of organic surveillance radars: the AN/TPS-59, the AN/TPS-63, and the AN/MPQ-62.

The AN/TPS-59 radar provides long-range air surveillance for the TAOC. It operates in the following modes.

Theater Ballistic Missile Mode

The radar can detect and track the launch of theater ballistic missiles out to 400 nautical miles and at altitudes over 500,000 feet without external cueing. The AN/TPS-59 also provides data on launch and impact circular probability ellipses, projected missile trajectory, and missile time to impact.

Air Breathing Target Mode

The AN/TPS-59 can track traditional air breathing targets out to 300 nautical miles and up to 100,000 feet.

Combined Mode

The combined mode tracks air breathing and theater ballistic missile targets; the former at distances to 300 nautical miles and altitudes to 80,000 feet for air breathing targets.

The AN/TPS-63 radar provides mid-range (up to 160 nautical miles) two-dimensional radar coverage. It is usually used as an early warning or gap filler radar.

The AN/MPQ-62 continuous wave acquisition radar (CWAR) provides close-in, low-altitude, two-dimensional radar coverage. The CWAR is typically used with ground-based data link (GBDL) to provide early cueing to LAAD.

The TAOC shares the air picture built by its organic radars with data link-equipped aircraft, missile units, MACCS, and joint air defense agencies and facilities. See appendix A for further information on digital data links. For units not capable of receiving information via data link, the TAOC provides voice reports (manual cross-tell) for early warning and situational awareness.

The TAOC detects, identifies, and controls intercepts for air defense operations within its assigned sector. It provides close, broadcast, tactical or data link control to DCA missions and assigns targets to surface-to-air weapons units. For OAAW missions, the TAOC can provide control for sweeps and escort missions and routing or coordination for SEAD or surface strikes. With information from the AN/TPS-59 radar, the TAOC can provide organically-derived location data for the guidance of aircraft conducting theater ballistic missile attack operations. See MCWP 3-25.7, *Tactical Air Operations Center Handbook.*

Marine Air Traffic Control Detachment

The MATCD is the principal MACCS organization responsible for terminal air traffic control. It uses its organic radars to provide airspace control, management, and surveillance within its designated air defense sector. The MATCD contributes to the MAGTF's IADS by exchanging air traffic control

information with command and control units by digital data link and voice reports (manual cross-tell). The MATCD is normally responsible for activating a designated BDZ and providing early warning and cueing to surface-to-air weapons units within the BDZ. See MCWP 3-25.8, *Marine Air Traffic Control Detachment Handbook*.

Low Altitude Air Defense Battalion

The LAAD battalion consists of a headquarters and service battery and two LAAD firing batteries. The LAAD battalion uses the Stinger missile to provide close-in, low-altitude air defense of forward combat areas, installations, and vital areas. It also provides surface-to-air weapons support for units engaged in special operations and independent operations. The LAAD battalion typically establishes a combat operations center collocated with the SAAWC's operations facility.

The AN/UPS-3 tactical defense alert radar is organic to the LAAD battalion. It has a short-range (10 nautical miles), low-altitude (under 10,000 feet), early warning, alerting, and cueing capability. The firing section employs the AN/UPS-3.

LAAD units are usually assigned in general support of the MAGTF or in direct support of a specific unit. Depending on its size, a LAAD unit can provide both general and direct support close-in air defense by task-organizing its assets. In general support, LAAD units typically receive tasking from the MAGTF commander via the ACE commander and are positioned to provide close-in, point defense of MAGTF vital areas and or designated maneuver elements. In direct support, LAAD units provide defense of those resources designated by the supported unit commander. See MCWP 3-25.10, *Low Altitude Air Defense Handbook*, and MCWP 3-25.11, *Low Altitude Air Defense Battalion Gunner's Handbook* (under development).

Direct Air Support Center

The DASC is subordinate to the Marine TACC. It directs aviation operations that directly support ground forces. It may be ground-based (DASC) or airborne (DASC[A]). The DASC coordinates the execution of preplanned air support; responds to requests for immediate air support; and controls and directs close air support, assault support, and certain air reconnaissance missions. It provides up-to-date information on friendly assets and the scheme of maneuver as well as OAAW coordination, routing, and targeting. The DASC normally collocates with the senior FSCC within the GCE to coordinate direct air support missions with other supporting arms. The DASC does not have organic sensors to track aircraft; it uses procedural control. The DASC can provide ground-based air defense units and surface-to-air weapons systems with the location of friendly aircraft. It can also coordinate with forward air controllers and the fire support coordination center for SEAD missions. The DASC may be the designated control agency for OAAW missions, including time critical target missions, conducted in or near the proximity of friendly troops. See MCWP 3-25.5, *Direct Air Support Center Handbook*.

Marine Wing Communications Squadron

The Marine wing communications squadron (MWCS) provides communications support and coordination for the ACE and the MACCS. It also provides interagency communications to establish and maintain an integrated MACCS, thus linking elements of the MAGTF's IADS.

Air Coordinators and Air Controllers

Ground-based and airborne coordinators and controllers; e.g., forward air controllers; forward air controllers (airborne); tactical air coordinators; and strike control and reconnaissance missions can contribute significantly to the overall AAW effort. They help control OAAW strikes and defensive counterair missions; conduct visual surveillance, and provide intelligence input. See MCWP 3-25.3 for more information.

CAPABILITIES

Command and control is a force multiplier. However, in AAW, it carries specific capabilities and limitations.

The command and control agencies that perform AAW functions are not limited in performing single tasks. The TAOC, DASC, and others perform air control and air direction functions that impact on all functions of Marine aviation.

Air command and control capabilities can be easily task-organized to perform very specific missions or to cover a broad range of requirements, including

providing joint force enabling functions for area air defense coordination. The ability to scale-up or scale-down capabilities provides a flexible option to the joint force commander for the capability he needs to add to his area of responsibility.

The principal command and control agencies that perform control and direction of AAW operations have organic, redundant communication means, including voice and data communications using various carriers.

The TACC and TAOC can interface and share air defense information with joint and multinational partners via digital data links and voice communications.

Redundant capabilities in the air command and control system allow continuous operations to support AAW and other aviation operations.

The ACE has a robust communications capability but limited organic satellite communications equipment. It is often necessary to facilitate communications and liaison with joint force air command and control agencies and commands. This limitation can be minimized by proper prioritization of the MAGTF's limited satellite communications resources.

The MACCS's ground-based radars are susceptible to line of sight acquisition caused by terrain features and curvature of the Earth. Optimizing radar siting for covering the designated surveillance area and augmenting radar coverage with gap filler/early warning radars and airborne radars can minimize this limitation.

Passing AAW-related information and receiving radar data depends highly on the electromagnetic spectrum. AAW command and control systems are susceptible to electronic attack (jamming) and electronic warfare support (deception, intrusion, and interference) operations. Effective training in recognizing and acting on electronic warfare actions, along with proper employment of active and passive measures; i.e., electronic protection, deception, and operations security can minimize or negate enemy electronic warfare affects.