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Antiair Warfare

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FOREWORD

Antiair warfare within the U. S. Marine Corps was forged in combat primarily during World War II when Marine aircraft and antiaircraft artillery were stationed throughout the Pacific basin. Campaigns for Guadalcanal and the Marshall Islands and other operations shaped today's concepts. Marine defense battalions employed ground-based air defense assets. Congressional Medal of Honor recipients Lieutenant Colonel Gregory "Pappy" Boyington, Captain Joe Foss, and other Marine aviators flew fighter sweep, combat air patrol, escort, and assorted offensive antiair warfare missions. They were among the first aviators to perform multirole antiair warfare tasks designed to protect friendly forces and gain air superiority.

Today's Marine air-ground task force (MAGTF) has a unique antiair warfare capability. Multimission-capable aircraft and a robust Marine air command and control system (MACCS) that includes ground based air defense systems are tremendous force multipliers for MAGTF, naval, and joint force commanders.

Marine Corps Tactical Publication (MCTP) 3-20C *Antiair Warfare*, focuses on the tactics, techniques, and procedures of antiair warfare operations. It details how the MAGTF accomplishes antiair warfare tasks at the operational and tactical levels of war and how antiair warfare capabilities tie into naval and joint force operations. From this publication, Marines of all ranks and military occupational specialties will understand how antiair warfare operations are conducted and how they impact MAGTF operations. Further, they will comprehend their role in antiair warfare operations and grasp the nature and contributions of antiair warfare to combined arms operations.

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Reviewed and approved this date.

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Antiair Warfare

Table of Contents

Page

CHAPTER 1 – FUNDAMENTALS 1
1001. TYPES OF ANTI AIR WARFARE OPERATIONS 1
1002. PRINCIPLES 2
1003. INTEGRATED AIR AND MISSILE DEFENSE 3
1004. THREAT LEVELS 3
1005. CAPABILITIES 4
CHAPTER 2 - OFFENSIVE COUNTERAIR 5
2001. TASKS 5
2002. PRINCIPLES 8
2003. INTELLEGENCE REQUIREMENTS 10
2004. TYPES OF OCA MISSIONS 10
2005. TYPES OF ANTI AIR WARFARE OPERATIONS 11
2006. WEAPONS EMPLOYMENT 11
2007. REQUEST PROCEDURES 12
2008. TASKING 12
2009. COMMAND AND CONTROL REQUIREMENTS 13
2010. ASSESSMENT 14
2011. CAPABILITIES 15
CHAPTER 3 - DEFENSIVE COUNTERAIR 16
3001. ACTIVE AIR AND MISSILE DEFENSE 17
3002. PASSIVE AIR AND MISSILE DEFENSE 19
3003. PRINCIPLES 20
3004. INTELLIGENCE REQUIREMENTS 21
3005. ACTIVE AIR AND MISSILE DEFENSE APPLICATIONS 21
3006. WEAPONS EMPLOYMENT 22
3007. WEAPONS MANAGEMENT 22
3008. REQUEST PROCEDURES 22
3009. TASKING 22
3010. COMMAND AND CONTROL REQUIREMENTS 23
3011. ASSESSMENT 24
3012. CAPABILITIES 24
CHAPTER 4 – COMMAND AND CONTROL 26
4001. AIR CONTROL 26

4002. AIRSPACE CONTROL METHODS 27
4003. AIRSPACE COORDINATING, MANEUVER CONTROL, AND AIR REFERENCE MEASURES 28
4004. FIRE SUPPORT COORDINATION MEASURES 30
4005. AIR DEFENSE MEASURES 30
4006. RELATIONSHIP BETWEEN AIRSPACE CONTROL AND AIR AND MISSILE DEFENSE 35
4007. MARINE AIR COMMAND AND CONTROL SYSTEM 35
4008. CAPABILITIES 38
CHAPTER 5 - PLANNING 40
5001. DELIBERATE PLANNING 40
5002. PLANNING FACTORS 41
5003. PLANNING RESPONSIBILITIES 41
5004. THE ACE BATTLESTAFF 44
5005. THE AIR TASKING ORDER 45
CHAPTER 6 - OPERATIONS 47
6001. MAGTF ANTIAIR EMPLOYMENT 47
6002. DEFENSIVE COUNTERAIR PRIORITIES 48
6003. AIR AND MISSILE DEFENSE EMPLOYMENT PRINCIPLES 49
6004. AIR AND MISSILE DEFENSE EMPLOYMENT GUIDELINES 49
6005. SELECTING AND POSITIONING AIR AND MISSILE DEFENSE WEAPONS 50
6006. EMPLOYMENT OF GROUND BASED AIR DEFENSE WEAPONS 51
6007. EMPLOYMENT OF FIGHTER AIRCRAFT 51
6008. WEAPONS ENGAGEMENT ZONE 52
6009. WEAPONS MANAGEMENT 53
6010. AMPHIBIOUS OPERATIONS 55
CHAPTER 7 – JOINT AIR AND MISSILE DEFENSE OPERATIONS 60
7001. THE JOINT FORCE COMMANDER 60
7002. THE AREA AIR DEFENSE COMMANDER 60
7003. THE AREA AIR DEFENSE PLAN 61
7004. THE REGIONAL AND SECTOR AIR DEFENSE COMMANDERS 62
7005. NOTIONAL JOINT AIR AND MISSILE DEFENSE OPERATIONS 62
7006. THE MAGTF AND JOINT AIR AND MISSILE DEFENSE OPERATIONS 63
CHAPTER 8 – MARINE LITTORAL REGIMENT 66
8001. MISSION 66
8002. MLR COMPOSITION 66
8003. LITTORAL ANTI AIR BATTALION 67
8004. COMPOSITE WARFARE COMMANDER CONSTRUCT 68
8005. INTEGRATION 69

APPENDIX A – TACTICAL DATA LINKS **73**
APPENDIX B – DEFENSIVE COUNTERAIR PLANNING CHECKLIST **74**
APPENDIX C – OFFENSIVE COUNTERAIR PLANNING CHECKLIST **77**
APPENDIX D– GLOSSARY **81**
SECTION I. ACRONYMS 81
SECTION II. DEFINITIONS 86
APPENDIX E – REFERENCES AND RELATED PUBLICATIONS **90**

Antiair Warfare

Chapter 1
FUNDAMENTALS

Anti-air warfare is a U.S. Navy/U.S. Marine Corps term used to indicate that action required to destroy or reduce to an acceptable level the enemy air and missile threat. (Joint Publication [JP] 1-02, Department of Defense Dictionary of Military and Associated Terms) Anti-air warfare (AAW) integrates all offensive and defensive actions against enemy aircraft, surface-to-air weapons, and theater missiles into a singular, indivisible set of operations. AAW, along with assault support, offensive air support, air reconnaissance, electronic warfare, and control of aircraft and missiles, is one of the six functions of Marine aviation. AAW is sometimes incorrectly considered an exclusive responsibility of the Marine air-ground task force's (MAGTF) aviation combat element (ACE). Each member of the MAGTF participates directly or indirectly in AAW.

AAW serves two purposes: force protection and air superiority. Force protection is those actions taken to guard friendly forces from attack or disruption by enemy forces. In AAW, it concerns those actions taken to defend the MAGTF against enemy air and missile attacks. Air superiority is that degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea, and air forces at a given time and place without prohibitive interference by the opposing force. (JP 1-02)

Force protection and air superiority are complementary goals of anti-air warfare. They provide the MAGTF with defense against enemy air and missile attacks and a reasonable level of confidence so maneuver can be conducted without interference from the enemy's air and missile capabilities.

Force protection and air superiority actions form a cycle. A strong defense against enemy air attack lends to local air superiority. Considering peer adversary capabilities, air superiority cannot be assumed. Our goal is to ensure forces are reasonably protected from enemy air and missile attack through anti-air warfare operations.

1001. TYPES OF ANTIAIR WARFARE OPERATIONS

The 2018 National Defense Strategy discusses how "challenges to the U.S. military advantage represent another shift in the global security environment. For decades the United States has enjoyed uncontested or dominant superiority in every operating domain. We could generally deploy our forces when we wanted, assemble them where we wanted, and operate how we wanted. Today, every domain is contested—air, land, sea, space, and cyberspace." In the 38th Commandant's Planning Guidance and Force Design 2030, the enemy threat is acknowledged and two items are made clear; "The individual / force element which shoots first has a decisive advantage" and forces that can continue to survive and operate within the enemy's Weapons Engagement Zone (WEZ) are more operationally relevant.

Applying this concept to AAW, we see that the intent of AAW is to take the fight to the enemy and to protect and defend the MAGTF and its battlespace from enemy air and missile attacks. AAW is an enabler for other MAGTF ground, logistics, and aviation operations. The MAGTF conducts two types of anti- air warfare operations: offensive counterair and defensive counterair. JP 3-01 identifies that countering air and missile threats consists of a combination of counterair and Integrated Air and Missile Defense (IAMD). Counterair is the foundational framework at the theater level. IAD is an approach that synchronizes aspects of counterair with global missile defense (MD); homeland defense (HD); global strike; and counter rocket, artillery, and mortar (C-RAM).

(a) Offensive Counterair. Offensive Counterair (OCA) destroy or neutralize enemy aircraft, missiles, launch platforms, and their supporting structures and systems both before and after launch, and as close to their source as possible. (JP 3-01) OCA operations in or near the objective area consist mainly of air attacks to destroy or neutralize hostile aircraft, airfields, radars, air defense systems, and supporting areas. Examples of the enemy's air and missile threat include aircraft, surface-to-air weapons, and theater missiles. To destroy or neutralize the enemy's air and missile threat, OCA operations target enemy air capabilities and infrastructure, which include not only the weapons themselves, but launch platforms, airfields, air and missile defense systems, command and control nodes, and support facilities. As OCA takes the fight to the enemy, it also takes the initiative to gain air superiority while providing robust force protection. See chapter 2.

(b) Defensive Counterair. Defensive Counterair operations include all defensive measures designed to neutralize or destroy enemy forces attempting to penetrate or attack through friendly airspace. (JP 3-01) Defensive Counterair (DCA) consists of active and passive measures to protect our forces against attack from enemy aircraft and missiles.

Active air and missile defense is direct defensive action taken to destroy, nullify, or reduce the effectiveness of hostile air and missile threats against friendly forces and assets. It includes the use of aircraft, air defense weapons, electronic warfare (EW), and other available weapons. Passive air and missile defense includes measures (other than active AMD) taken to minimize, mitigate, or recover from the consequences of aircraft and missile attacks. See chapter 3.

1002. PRINCIPLES

The conduct of AAW is based on destruction-in depth, mutual support, and centralized command and decentralized control. The MAGTF must apply these principles to achieve and preserve force protection and air superiority to accomplish its mission. While these principles are most readily apparent to defensive counterair operations, they apply equally to offensive counterair operations.

(a) Destruction-in-Depth. Destruction-in-depth consists of threat detection and destruction that begins as far from the vital area (a designated area or installation to be defended by air defense units) as possible and continues as long as the threat exists. The enemy's ability to impede the MAGTF's freedom of operations determines the degree of threat and the depth of destruction.

In DCA operations, the senior commander, e.g., MAGTF, area air defense or joint force, achieves the full impact of destruction-in-depth by integrating all available air and missile defense resources in zone, area of operations or area of responsibility. The senior commander has the option of dividing the air defense area into sectors and assigning responsibilities for each sector. They then position assets so that enemy aircraft and missiles encounter an ever increasing volume of fire (both horizontally and vertically) as they approach the vital area, and, if aircraft survive, as they egress.

In OCA operations, destruction-in-depth may involve an expanding effort to negate the enemy's ability to deny our aircraft freedom of action. OCA operations may progress concentrically from our area of operations, concentrate on a particular zone or area or focus along a particular axis into the battlespace controlled by the threat.

(b) Mutual Support. Mutual support is support that units provide each other against an enemy. The decision to provide mutual support is based on a unit's assigned tasks, its position relative to other units and to the enemy, and its inherent capabilities. By employing mutual support, the MAGTF ensures continuous engagement, improves the survivability of AAW assets, decreases the chances of hostile aircraft or missiles penetrating the vital area, and increases the chance of gaining and retaining air superiority.

Units achieve mutual support by integrating, employing, and positioning AAW asset to provide overlapping detection coverage and engagement envelopes. Proper integration, employment, and location of AAW assets ensures that several AAW units have the same assigned target within their range. This integrated and overlapping pattern of mutual support and continuity of engagement reduces degradation of the AAW system that can result from the loss of any AAW asset.

(c) Centralized Command and Decentralized Control. The MAGTF commander has overall responsibility for MAGTF aviation operations and delegates the authority for control, coordination, planning, and supervising MAGTF aviation operations to the ACE commander. Centralized command of AAW promotes coordinated operations and economy of force and aids in the integration of all AAW assets into a cohesive AAW capability. Decentralized control allows a shorter decision cycle and enables decision making at the lowest level possible. It minimizes friendly losses and permits subordinate AAW units to react immediately to an air threat unless overruled by higher authority. The MAGTF's ability to function under centralized command and decentralized control provides it with an integrated air defense system (IADS) that has minimum reaction time, maximum damage resistance, and inherent self- sufficiency.

Although a higher authority may delegate specific authority to subordinate commanders, the higher authority still monitors AAW units' actions. The higher authority only makes direct target assignments to units for proper fire distribution, maximum efficiency of target engagement, and to prevent engagement of friendly aircraft The ACE commander determines the AAW tasks that must be personally supervised and then delegates authority for tasks that do not require the ACE commanders direct attention. When exercising centralized command, the ACE commander delegates authority for control of various Marine aviation functions to MACCS agencies. For effective decentralized control during AAW operations, the ACE commander relies on their subordinate commanders' judgment and their ability to understand commander's intent. See the USMC Doctrine 3-20 aviation series for more information.

1003. INTEGRATED AIR AND MISSILE DEFENSE

At the theater level, IAMD consists of DCA supported by OCA attack operations. IAMD is primarily focused on DCA. IAMD is also directly supported by OCA attack operations providing protection for US and Allied forces/assets (e.g., attacks against BMs and their associated infrastructure). In addition, OCA attack operations also include missions contributing to air superiority (e.g., attacks against enemy fighter airfields) which are outside of IAMD. While OCA attack operations against IAMD-related targets may require the support provided by SEAD, fighter escort, and fighter sweep, these elements of OCA are considered outside of IAMD. For more information on OCA and DCA missions, refer to the subsequent OCA and DCA Chapters.

1004. THREAT LEVELS

The MAGTF orients on the enemy to determine its strengths and weaknesses. Evaluating enemy aircraft and the missile threat helps determine what is needed to achieve force protection and air superiority. This evaluation is expressed as threat levels.

Threat levels determine the extent of AAW required and may help determine how the MAGTF task- organizes. The threat levels low, medium, and high are general with no clear separation between each level. Levels may overlap or change based on mission, enemy, terrain and weather, troops and support available-time available (METT-TC). For example, enemy air defense systems that pose a low or medium threat to one type of aircraft may pose a high threat to another type of aircraft. Likewise, enemy aircraft that pose a high threat to an air command and control agency during daylight hours may be only a low threat to the same agency during hours of darkness. Based on current intelligence, determining the threat level helps aircrews, surface-to-air weapons operators, and MACCS operators prepare tactics for a particular situation and environment.

Determining threat levels serves as a point of departure for estimating enemy capabilities and should not be used as the singular measure of the degree of AAW means required. The threat is normally characterized as either sophisticated or non-sophisticated, based on the—

- Type, quantity, and quality of individual weapons and weapons systems.
- Command and control systems used to integrate weapons systems
- Quality of the command.
- Type, quantity, and quality of training.
- Ability to conduct coordinated and sophisticated tactics (multiaxis, diversion, deception, integration of electronic attack). Navigation and air-to-ground targeting capability.

(a) Low Threat. A low threat level allows MAGTF operations to proceed without prohibitive interference. Examples of a low threat environment include small arms, medium antiaircraft weapons, and limited optical acquisition antiaircraft artillery with no integrated fire control systems.

(b) Medium Threat. A medium threat level allows acceptable exposure time of friendly aircraft to enemy air defenses or acceptable interference by enemy aircraft to MAGTF operations. This threat level can restrict the MAGTF commander's flexibility. A medium threat environment may vary greatly between 4th and 5th generation aircraft. Medium threat examples for 4th generation aircraft include —

- A limited radar or electro-optic acquisition capability that is not supported by a fully integrated fire control system.
- A fully integrated fire control system that is degraded due to terrain, weather or other factors.
- Low-technology theater missile capabilities.

(c) High Threat. A high threat level exists when the enemy order of battle severely restricts the MAGTF's ability to conduct operations. A high threat environment may vary greatly between 4th and 5th generation aircraft. High threat examples for 4th generation aircraft include —

- Command and control systems.
- Mobile and strategic surface to air missiles.
- Early warning radars.
- Electronic warfare systems.
- Integrated air defense / fire control systems.
- Interceptor aircraft.
- Mid- to high-technology theater missile capabilities.

1005. CAPABILITIES

The MAGTF has a variety of organic capabilities to conduct AAW operations including aircraft, ground- based air defense weapons, artillery, reconnaissance forces, and air command and control facilities. MAGTF organic AAW capabilities include both lethal and non-lethal means.

Multi-role weapons platforms and equipment suites provide commanders with maximum flexibility. For example, MAGTF fighter aircraft can perform OCA and DCA missions. The F/A-18 can fire a variety of air-to-air missiles, employ high speed anti-radiation missiles, and drop ordnance against OCA targets. The F-35 is able to execute OCA and defensive counter-air (DCA) missions in environments that would otherwise be prohibitive. Air command and control suites can coordinate and control OCA and DCA missions.

The MAGTF's AAW resources are fully capable of integrating with, and in some cases, providing enabling functions for, joint and coalition operations against enemy aircraft and missile threats.

The MAGTF does not possess an organic capability to defend itself against tactical ballistic missiles. Planners must identify those assets that require protection and then work with the other services' air defense planners to ensure that MAGTF assets are protected.

With this understanding of the function of AAW and a review of some general capabilities, philosophies, and fundamentals, we can now transition to detailed discussions of how the MAGTF conducts AAW operations. It should be noted that MAGTF AAW operations will rarely, if ever, be the singular source for operations against the enemy's aircraft and missile threat. It can be expected that all military operations will be joint operations. MAGTF AAW activities will be conducted to support the MAGTF's single battle concept, but to also meet the needs and objectives of the joint force commander.

Chapter 2
OFFENSIVE COUNTERAIR

Offensive counterair (OCA) destroys or neutralizes enemy aircraft, missiles, launch platforms, and their supporting structures and systems both before and after launch, and as close to their source as possible. An OCA attack operation against a time critical target destroys the enemy capability to conduct further operations after the weapon is launched. OCA attacks the enemy's abilities to attack friendly resources with aircraft and missiles and to defend itself against attack by friendly aircraft and missiles. OCA has two purposes: to gain air superiority and protect friendly forces.

The Marine Corps has changed terminology from Offensive Anti-Air Warfare (OAAW) to OCA to align USMC doctrine with Joint doctrine. See JP 3-01, *Joint Doctrine for Countering Air and Missile Threats*.

OCA operations are characterized by responsiveness, bold actions, and initiative to gain a decisive advantage over the enemy. They focus on a particular function of the enemy's combat potential— its air and missile forces. Because OCA operations strive to destroy enemy air and missile resources as near to their source as possible, OCA is the preferred method of conducting anti-air warfare. OCA allows us to take the enemy on our terms, when and where we choose.

OCA operations are not specific to the MAGTF's ACE. They are a responsibility of the entire MAGTF and impact on all MAGTF operations. The MAGTF conducts OCA operations with a variety of organic resources (aircraft, electronic warfare, artillery, surveillance, and ground forces). The MAGTF can also request joint force, theater, and national assets, e.g., the joint surveillance target attack radar system, satellites, special operating forces, army tactical missile system or aircraft. OCA embodies the tenets of maneuver warfare described in Marine Corps Doctrinal Publication (MCDP) 1, Warfighting. It uses maneuver, tempo, and surprise to gain physical and psychological advantages over the enemy. It seeks to shatter the cohesion of the enemy's systems through rapid, violent actions. In OCA, the enemy's system may include any air-orient e d weapon, command and control or infrastructure system that poses a threat to MAGTF aviation resources. System components that may be attacked in are manned or unmanned aircraft, surface- to-air weapons, theater missiles, airfields, air command and control facilities or the enemy's aviation supporting infrastructure.

2001. TASKS

OCA operations include four tasks:

- Preemptive measures
- Suppression of enemy air defenses (SEAD).
- Local air superiority measures.
- Reactive measures.

(a) Preemptive Measures. Preemptive measures attempt to weaken the enemy's air and missile threat before they can use air and missile forces and air defense systems against the MAGTF. They are usually conducted in the early phase of an operation but can be a continuous process throughout an operation. Examples of preemptive measures are—

- Air and surface strikes against theater missile systems.
- Attacks against enemy command and control facilities and surveillance systems.
- Air and surface strikes against airfields to destroy or damage aircraft.
- Air to air sweeps.
- Air strikes against enemy aircraft supply, support, and infrastructure.

If successful, preemptive measures allow later aviation and ground operations to proceed without prohibitive interference from air and missile attacks. Preemptive measures are further categorized as major preemptive measures and continuous preemptive measures.

(1) Major Preemptive Measures. Major preemptive measures are conducted by the ACE and other MAGTF combat assets. They require detailed planning at the highest level, i.e., the MAGTF, and allocation of the maximum number of available aircraft and other assets. Major preemptive measures require the ACE to plan combined strikes to destroy or degrade the enemy's IADS.
Major preemptive measures are conducted for a limited time and usually during the following occasions:

- During pre-landing operations.
- If an influx of new enemy equipment prevents or severely limits the use of friendly air assets.
- If an enemy IADS border is reached by the MAGTF.
- If the MAGTF augments the indigenous forces of a country fighting against a well-established enemy IADS.
- If the MAGTF commander's intent is to degrade an enemy IADS.

When planning and conducting major preemptive measures, MAGTF commanders must weigh competing considerations to determine the level of effort used to support the operation. During the initial stages of a conflict, the need to conduct major preemptive measures may lead the MAGTF commander to designate the ACE as the MAGTF's main effort. Some considerations include—

- All available assets.
- Allocating the necessary support and air defense aircraft to support the operation.
- Allocating only those aircraft necessary for the effective defense of ground combat element (GCE) positions.
- Developing a support plan that identifies targets that must be destroyed.
- Giving suppression of enemy air defense (SEAD) support requests received from the ACE to the GCE a high priority.
- Having general support artillery forces support the plan, except fires such as counter fires or final protective fires.
- Developing a follow-up plan to exploit vulnerabilities and opportunities; e.g. ground attack, follow- on OCA operations, massed close air support, and destruction of resupply efforts.

(2) Continuous Preemptive Measures. Continuous preemptive measures constitute most MAGTF OCA operations. There are two types of continuous preemptive measures: those short of the fire support coordination line (FSCL) and those beyond the FSCL. Continuous preemptive measures short of the FSCL allow OCA assets to conduct ongoing efforts to destroy the enemy IADS on the friendly side of the FSCL.

Thus, continuous preemptive measures require detailed coordination between the ACE and the GCE. Continuous preemptive measures short of the FSCL reduce or eliminate the effects of the enemy IADS on other MAGTF operations that support the GCE; e.g., offensive air support or assault support. Although the MAGTF commander can establish no-fly zones for any threat system that could deny airspace to a specific type of aircraft, the ACE should plan and conduct continuous preemptive measures short of the FSCL against as many elements of the enemy IADS as assets will allow. Such attacks reduce future needs, saturate the enemy IADS, force the enemy to expend additional ordnance, and use deception to confuse the enemy. Continuous preemptive measures short of the FSCL can also employ ground operations. Ground the enemy IADS as assets will allow. Such attacks reduce future needs, saturate the enemy IADS, force the enemy to expend additional ordnance, and use deception to confuse the enemy.

Continuous preemptive measures short of the FSCL can also employ ground operations. Ground operations can include attacks by infantry, artillery, armor or special operations force units to destroy essential elements of the enemy IADS short of the FSCL. Ground units can capture or destroy elements of the enemy integrated air defense system, or they can provide terminal control for OCA air strikes against elements of the enemy IADS. Again, detailed coordination between the ACE and GCE is required. The significant differences between the two strikes lie in the level of intensity, number of assets assigned to the mission, and degree of coordination with ground forces. Continuous preemptive measures beyond the FSCL do not require coordination with the GCE but do require coordination with the MAGTF and within the ACE. Continuous preemptive measures beyond the FSCL can also be executed using ground operations. Ground operations can include raids or a t tack s by reconnaissance, long range artillery or other units to destroy essential elements of the enemy IADS beyond the FSCL. Large teams can capture or destroy enemy aircraft and missile capabilities. Small teams can provide terminal control for OCA air strikes. Resupply, linkup time with friendly forces, and withdrawal methods are primary considerations in employing ground units and teams conducting these operations beyond the FSCL.

Continuous and decisive OCA operations against the enemy IADS beyond the FSCL focus on destroying the enemy's aircraft, long-range surface-to- air missiles, and early warning systems. These operations enable follow-on attacks against an enemy with degraded capability. Continuous preemptive measures beyond the FSCL can damage or destroy the enemy's aircraft and surface-to-surface missile assets and supporting infrastructure in such a way that these resources cannot bring their power to bear against friendly assets or cannot sustain air and missile attacks.

(b) Suppression of Enemy Air Defenses. Suppression of enemy air defenses are activities, which neutralize, destroy or temporarily degrade surface- based enemy air defense by destructive and/or disruptive means. (JP 1-02) SEAD operations allow friendly aircraft to operate in airspace defended by an enemy IADS. As the most commonly implemented OCA task, SEAD can support all aviation operations, including OCA's preemptive measures, local air superiority, and reactionary measures. Factors that determine if SEAD should be used include the—

- MAGTF mission
- Capabilities and complexity of the enemy IADS. Effectiveness of the enemy's IADS depends on the quality and the quantity of the enemy's weapons mix and ability to integrate and support its elements.
- Capabilities and availability of friendly weapons systems
- Ability of friendly aircrews to invade enemy air defenses

The ACE plans SEAD missions but the ACE and the GCE should execute SEAD together. SEAD may be applied only at critical times that will allow the MAGTF to proceed without prohibitive interference from the enemy air defense system. SEAD is designed to suppress, disrupt, neutralize, destroy or temporarily degrade enemy air defenses in a specific area. Destruction may involve an inordinate number of assets while suppression may be more efficient. On the other hand, the MAGTF may choose to destroy enemy assets rather than neutralize or degrade them for each air mission. Initially, suppression, disruption, neutralization and degradation may be more cost- effective, but over the duration, a concentrated preemptive effort by the ACE to destroy enemy air defense assets may save the MAGTF significant time, effort, and ordnance.

SEAD is accomplished by destructive and/or disruptive means and attacks using lethal and nonlethal means. These means, alone or combined, include aircraft, direct and indirect fire weapons, ground forces, and command and control warfare (both deception and electronic warfare). SEAD supports specific aviation operations and can be conducted with preemptive measures. OCA planning should address situations where SEAD employment is anticipated. SEAD can be employed in direct confrontation of the enemy's air defense with ground forces, air forces, naval forces, and instances involving command and control warfare.

SEAD can be conducted short of and beyond the FSCL. Coordination is required with ground forces short of the FSCL. An example of SEAD short of the FSCL is artillery fires supporting a close air support mission. SEAD beyond the FSCL generally does not require coordination with ground forces, but does require coordination with the MAGTF and within the ACE. An example of SEAD beyond the FSCL is anti-radiation missile attacks in support of an air interdiction mission or suppression of a threat surface-air missile system by F-35. See MCRP 3-22.2A, Multi-Service Tactics, Techniques, and Procedures for Joint Suppression of Enemy Air Defenses (J-SEAD), for more information.

(c) Local Air Superiority Measures. Residual enemy air and surface-to-air weapons threats can exist after preemptive measures and SEAD. Local air superiority measures prevent any residual enemy air threat from prohibitively interfering with MAGTF operations in a specific zone of action. Local air superiority measures can include offensive combat air patrols (CAP) and sweeps, escort and self-escort tactics or aircraft countermeasures and maneuvers. All levels of the ACE can plan and execute local air superiority measures.

Reactive measures are the use of offensive firepower in response to an immediate threat. Typically, reactive measures are used against time critical targets, such as attacks against a theater missile transporter-erector launcher following a missile launch or a pop-up surface-to-air missile system. Targets attacked by reactive measures will likely be extremely mobile. Because time is essential when attacking these targets, planners must—

- Minimize response time and heighten their ability to attack by including anti-radiation missiles as part of the standard loadout on capable aircraft.
- Use electronic warfare support to identify meteorological or tracking radars which may indicate an impending launch or attack.
- Retask capable aircraft to attack the target.
- Establish preplanned, on-call aircraft to attack time critical targets.

In the case of the latter two instances, commander's intent translated through target priorities and apportionment decisions, will be the determining factor as to available resources. Reactive measures are the least preferred method of conducting OCA, but they are often the only available option.

2002. PRINCIPLES

The MAGTF conducts OCA operations using the principles of location, destruction, deception, intimidation, and combined arms.

(a) Location. Location uses surveillance, reconnaissance, and intelligence resources (including detection, identification, and evaluation) to locate high priority OCA targets. Information from these resources complements and supplements each other, and is used to pinpoint high priority targets quickly for scheduled or immediate OCA missions. An example of locating enemy resources is by employing an unmanned aerial system (UAS). The UAS is a surveillance, reconnaissance and intelligence gathering platform of choice due to its inherent low probability of detection, extended loiter time, and low attrition rate. It is especially useful in gathering targeting information before OCA strike missions.

The ACE and the MAGTF should develop plans that emphasize the aggressive employment of all available air and ground sources to pinpoint highly lethal and mobile enemy systems accurately and quickly. These plans should also address the timely collection and dissemination of combat information on the location of OCA targets.

Mobile air defense systems; e.g., antiaircraft artillery or surface-to-air missiles and theater missile transporter-erector launchers pose unique challenges to OCA location techniques. A thorough intelligence preparation of the battlespace (IPB) is necessary for locating these lucrative OCA targets. IPB should focus on systems' engagement envelopes, comparing the engagement envelopes and system capabilities with the assets they protect, and available terrain that can be used to maximize or mask their engagement potential. Theater missiles provide the enemy with the potential to employ weapons of mass destruction against the rear area. The high mobility of the theater missile transporter-erector launcher allows the enemy to shoot and move to hide sites extremely quickly. For these threats, IPB should identify potential launch sites, hiding sites, and supporting infrastructure to expedite targeting. The F-35 provides an organic MAGTF capability to locate mobile air defense systems. Additional considerations for OCA intelligence requirements are discussed on page 2-5.

(b) Destruction. Destruction eliminates the enemy's aircraft and missile threat at its source, preferably before it can launch or attack. Destruction is often preferred to neutralizing enemy air defenses or SEAD because it conserves and preserves MAGTF resources. If preemptive measures destroy OCA targets early in the operation, the target can no longer threaten friendly aircraft or forces. If the enemy knows the MAGTF can destroy their aircraft, theater missiles, and air defense assets at their source before they launch or attack, they may be intimidated into spreading their assets throughout the battlespace to protect them and lose the ability to rapidly mass forces and to capitalize on mutual support and massing of fires to protect their assets.

(c) Deception. Deception occurs when the enemy is misled by the manipulation, distortion or falsification of information. Effective deception diverts enemy attention away from OCA assets and their intended targets. Deception denies the enemy the ability to mass forces against OCA assets because they is uncertain when, where, and how the OCA strike will occur. Deception confuses the enemy, saturates air defense systems with conflicting or erroneous information, and makes them react in a way that is not in their best interest. For example, deception can cause the enemy to expend ordnance that will assist us in locating the enemy's weapon system; i.e., backblast, or radiate surveillance, target acquisition, and fire control radars, thus pinpointing them for attack. See chapter 5 for more information.

(d) Intimidation. Intimidation uses fear to coerce the enemy into or deter them from action. Effective intimidation tactics can cause the enemy to position systems and assets less aggressively, make them reluctant to employ their assets, or force them to adopt complex emission control plans. Intimidation tactics can include aggressive reconnaissance, surveillance, and location; quick, destructive reactions; and effective deception. The enemy's reluctance to employ their air defense systems allows friendly aircrews to use optimum tactics without undue restriction.

(e) Combined Arms. Combined arms integrates firepower and mobility to produce a desired effect on the enemy. The effects of combined arms (integration) will place the enemy in a dilemma by attacking with more than one combat capability of the MAGTF. In defending against combined arms operations, the enemy will attempt to counter one combat arm, which will leave them vulnerable to attack by another combat arm. Combined arms effects can be achieved by lethal methods, nonlethal methods or a combination of both. Examples of combined arms in OCA are artillery and aircraft, jamming and air attack, and ground attack and air attack.

Combined arms tactics, techniques, and procedures (TTP) can enhance the effectiveness of the MAGTF's combat arms attacks against the enemy and therefore reduce or nullify their ability to conduct aviation-related operations. Examples of combined arms in OCA include artillery fire to suppress antiaircraft defenses while attack aircraft deliver ordnance to destroy the OCA target or SEAD to suppress the enemy's ability to detect OCA aircraft while other aircraft employ anti-radiation missiles against the target. In the first example, if the enemy fails to move the system to avoid engagement by artillery, he remains vulnerable to both artillery and aircraft attack. If the enemy moves the antiaircraft system to avoid the artillery attack, they sacrifice established cover, concealment, and the ability to employ weapons against the attacking aircraft, making them highly vulnerable to attack from the aircraft. In the second example, if the enemy attempts to power through the jamming, they provide a stronger signal for the anti-radiation missile. If they continue to radiate in an attempt to acquire targets, they remains vulnerable to electronic attack.

2003. INTELLIGENCE REQUIREMENTS

The complexity of OCA operations requires dedicated intelligence support, including organic MAGTF intelligence assets and nonorganic (joint, theater, and national-level) intelligence assets. Commanders determine and articulate their intelligence requirements. As a starting point, a commander's OCA intelligence requirements should include a description of enemy air and missile and air defense threats, their location and status, reaction time for warning and direction; target intelligence; and follow-up battle damage assessments. Typically, as IPB is performed and the enemy order of battle becomes clearer, intelligence requirements change. Once intelligence/data is received, it must be converted into a usable format that contains relevant data and disseminated to OCA planners in a timely manner. The MAGTF staff coordinates the ACE's intelligence requirements for all air-related elements of an OCA mission. The MAGTF staff also coordinates the execution of SEAD operations for the GCE and ACE. To stay current with OCA operations, GCE and ACE commanders should stay appraised of threat changes, anticipate new intelligence requirements for future operational phases, and effectively articulate those requirements to their intelligence personnel.

2004. TYPES OF OCA MISSIONS

OCA missions will likely be preplanned, scheduled missions but can be preplanned, on-call or immediate missions depending on the tactical situation. OCA missions are attack operations, fighter sweep, fighter escort, and SEAD. See Figure 2-1 below.

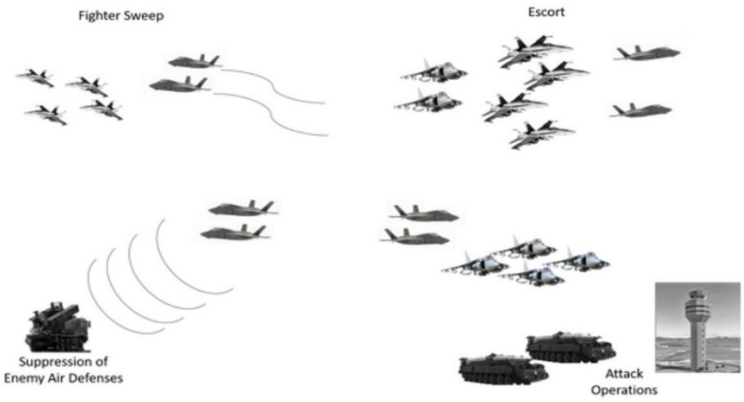

Figure 2-1: Four Type of OCA Missions

(a) Attack Operations. Attack operations destroy or disrupt the enemy's air and missile threats by engaging the enemy's forces and support structure before their combat potential can be brought to bear. Examples include missions against airfields, surface-to-air missile sites, theater missile launchers' hiding sites, and aviation supply depots/points. The goal of attack operations are to destroy the enemy's aircraft and missile capabilities while the weapons are still on the ground and to prevent them from launching. Likewise, attacks against the enemy's support infrastructure can deny them the capability to rebuild, repair or sustain further air and missile attacks. Attack operations are typically conducted in the MAGTF's deep operations area but can be conducted in the close operations area if necessary. Aircraft are normally the MAGTF resource to conduct attack operations. But, depending on the location of the target and available assets, attack operations may be conducted by other MAGTF or joint force resources such as artillery, land attack missiles or ground forces.

Attacks may be reactive against time critical targets. They occur as a result of an unanticipated threat presenting itself, and because of the nature of the threat, present a fleeting opportunity for engagement. Examples of time critical targets include mobile surface-to-air missile sites and theater missile launchers.

(b) Fighter Sweep. Sweep missions are purely offensive missions used to gain air superiority by seeking out and destroying enemy airborne aircraft or other targets of opportunity in a specific area. Sweeps are often used to clear ingress and egress paths to and from a target of enemy defensive aircraft and surface-to-air missile threats. Sweeps can be conducted independently or in support of a strike package (pre-strike sweep), the latter being conducted before strike execution. Depending on the importance of the target and the amount of risk acceptable by the commander, the success or failure of the sweep can be used as go/no go criteria for the strike package.

(c) Fighter Escort. Escort missions support a specific mission over or near enemy territory. Escorts may be assigned to high value airborne assets such as electronic warfare aircraft, airborne command and control platforms, tankers, airlift, or strike packages. In strike packages, escorts may either precede or accompany the package. Escorts can be either attached or detached where escort aircraft fly as part of the formation when attached and separate when detached. In either case, the escorts' primary function is to defend the strike aircraft against attack by enemy aircraft and missiles. The escort's mission is principally defensive, but it can assume an offensive role if sufficient early warning is received to proactively attack a target or if targets of opportunity that pose a potential threat to the supported event should arise.

(d) Suppression of Enemy Air Defenses. SEAD missions typically support OCA strike packages and close air support missions and can be executed by a variety of kinetic and non-kinetic resources. An example of a kinetic resource includes the use of anti-radiation weapons to attack equipment with the intent of degrading, neutralizing, or destroying enemy combat capability. Non-kinetic resources include electronic attack actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum, such as jamming and electromagnetic deception.

2005. SURVEILLANCE

Surveillance plays a key role in OCA operations. Information from surveillance can locate and identify OCA targets and estimate enemy intentions. Active surveillance includes the use of airborne or ground resources to actively search for OCA targets. Active surveillance resources include radars, unmanned aerial vehicles, reconnaissance aircraft or ground forces. Passive surveillance uses emissions in the electromagnetic or infrared spectrums to locate and categorize OCA threats. Passive surveillance assets include electronic warfare aircraft or ground stations and satellites.

2006. WEAPONS EMPLOYMENT

Weapons employment for OCA operations is based on the enemy threat and target and the capabilities, limitations, and requirements of each OCA system. Effective countermeasures, such as sweeps, air strikes, SEAD, self-protection, and deception used against the enemy threat increase OCA operations effective- ness. Normally, employment of any resource in support of OCA is based on the mission and the target.

(a) Airborne OCA Target. Normally, OCA operations employed against airborne targets consist of sweeps. Support for sweeps can include ground- or airborne-controlled interception/early warning systems, electronic warfare assets, and tankers. Sweeps can be employed as part of a support element for a coordinated OCA strike against a ground target.

(b) Ground OCA Target. OCA operations employed against ground targets usually consist of aircraft organized into a strike element, a support element, and a command and control element.

The strike element delivers the decisive effect on the surface OCA target. Its purpose is to destroy or neutralize the target before enemy air and air defense assets can launch or assume an attacking role against the MAGTF. The target and desired weapons effects dictate the type, number, and weapons load of the strike element.

The support element provides support to the strike element. It is tailored to each specific mission. The support element can include electronic warfare aircraft, sweeps, close escort/self-escort aircraft, UAS, SEAD aircraft, and tankers. The enemy air and ground threat determines the number of electronic warfare platforms, CAPs, UASs, and suppression aircraft. Tankers are apportioned as necessary. The support element uses military deception to confuse the enemy air and ground threat and to mask OCA objectives.

Command and control is critical to successful integration, coordination, and direction of the strike and support elements. The command and control element is tailored to each specific OCA mission. It also aids rapid assessment and evaluation of mission effectiveness. The command and control element can include airborne or ground-based platforms. An OCA coordinator and OCA manager can be used to coordinate OCA missions and integrate them with other AAW operations.

2007. REQUEST PROCEDURES

Based on input from the GCE, ACE, and Logistics Combat Element (LCE) commanders, the MAGTF commander establishes request procedures for OCA assets. These procedures are based on OCA priorities and objectives. Requests for OCA support are based on the MAGTF's main effort, enemy air force and air defense threat, and targeting information. The ACE, GCE, and LCE submit requests for OCA support, including nonorganic assets, to the MAGTF commander. The ACE commander continuously coordinates OCA requests with the MAGTF, GCE, and LCE commanders, including procedures for handling targets of opportunity, electronic warfare, and SEAD.

Requests for OCA missions can be preplanned or immediate. If MAGTF OCA requirements are sub- mitted according to a plan, i.e., in advance of an operation, they are preplanned. OCA requirements submitted by MAGTF units and agencies in response to unanticipated situations are immediate requests. A preplanned request can be scheduled to be conducted at a specific time, against a specific target, etc. or on-call, preloaded for a particular target type/target area and placed in a ground or airborne alert status. As pre- planned requests are processed, fire support coordination centers, the MAGTF fires and effects coordination center, and intelligence sections update threat data and assignment of assets to counter each threat.

Requests for preplanned, scheduled OCA warfare missions identify the target, target areas or landing zone and the known or suspected enemy air defense that may impact mission accomplishment. Requests should also contain the MAGTF and or GCE assets assigned to counter the threat and coordination information for artillery-provided SEAD missions. Coordination information for any MAGTF or GCE furnished electronic warfare and intelligence assets should also be included.

Occasionally, the ACE requests support from the MAGTF or GCE if they have assets that can contribute to the OCA effort. ACE-GCE coordination for SEAD and electronic warfare requests can occur via the tactical air command center (TACC), direct air support center (DASC) or the GCE fire support coordination center (FSCC) interface. If the GCE cannot provide support to the ACE because of higher priorities or limited assets, the request is forwarded by the ACE and or GCE to the MAGTF commander for resolution.

2008. TASKING

After priorities, objectives, and requirements are established, the ACE commander and their staff plan the employment of aviation assets to support needed OCA operations. Tasking must address the needs of supporting assets, including electronic warfare, tanker, and airborne early warning and control aircraft. Planners should coordinate tasking to ensure effective use of air and ground assets to achieve the desired OCA results. Tasking coordination must include MAGTF and GCE assets that may be required to support OCA operations, such as reconnaissance units, radio battalion, and artillery. The ACE commander tasks ground-based ACE assets through the ACE operations order and specific aircraft assets through the air tasking order (ATO). Aircraft missions in support of OCA operations are tasked as either preplanned, scheduled; preplanned, on-call; or immediate. Preplanned missions are performed according to a program planned in advance of operations and based on MAGTF requirements or requests. Preplanned missions normally permit detailed coordination.

(a) Preplanned, Scheduled Air Missions. Preplanned, scheduled air missions allow detailed coordination an economical use of aircraft and ordnance. The ACE schedules these air missions based on the MAGTF's OCA needs. Missions must meet MAGTF priorities, objectives, and requirements based on the known or suspected enemy air and air defense threat. The ACE uses preplanned, scheduled air missions to task aircraft to attack known enemy OCA targets during preemptive measures and SEAD. Support assets, including fighters, tankers or electronic warfare should be. The TACC determines if additional SEAD support is required. If the TACC cannot provide the required assets, it requests the GCE provide SEAD support.

(b) Preplanned, On-Call Air Missions. The ACE schedules preplanned, on-call air missions to augment preplanned, scheduled air missions. These missions focus on periods of anticipated increases in the enemy air threat to the MAGTF. Preplanned, on- call air missions have the appropriate air-to-air and air-to-ground ordnance loaded and assume a ground (strip) or airborne alert status. Using ground-alert aircraft for preplanned, on-call air missions has several advantages. The TACC or its designated agency, i.e., the Tactical Air Operations Center (TAOC) or DASC has a higher degree of control over assets. On station time for the aircraft is maximized for action and mission support. Aircrews can obtain exact target coordinates and brief tactics and routing before they launch. The TACC can ensure that prerequisites for mission support are available. Using airborne alert aircraft for preplanned, on-call missions also has several advantages. Airborne, on- call missions provide minimal reaction time to respond to a threat. Battlespace situational awareness can be gained from observation or from threat information passed by voice or data link to the aircraft from the TAOC. Disadvantages of airborne alert aircraft are—

- Reduced control by the TACC.
- Aircrews are unable to obtain coordinates and routing before launch.
- Aircrews may have to brief tactics airborne while coordinating with other aircraft and control agencies.
- An inability to insure that the appropriate support prerequisites are met.
- A limited on station time.

(c) Immediate Air Missions. Immediate air missions may be required if high tempo operations are conducted and if enemy capabilities are underestimated, in response to a pop-up threat or in reaction to a time critical target. Aircraft can be retasked to an immediate air mission at any time. As always, the decision to retask aircraft must be made with respect to the MAGTF commander's intent and target priorities. Requests for immediate air missions require the immediate assessment of enemy air defenses and the establishment of SEAD support requirements. To speed the tasking of aircraft, the ACE predetermines and publishes SEAD support requirements, such as on-call SEAD packages. Identifying SEAD targets and assigning firing units should occur at the lowest possible fire support coordinator's level within the GCE. It is preferred that an aircrew be briefed prior to launch, but this may increase reaction time. If limited assets preclude the assignment of preplanned missions to cover a possible threat, then possible secondary missions are assigned to an aircrew. This provides advance notice and flexibility to an aircrew and the Marine Air Command and Control System (MACCS), and permits the optimum use of assets for a particular mission.

2009. COMMAND AND CONTROL REQUIREMENTS

After the airspace control plan (ACP) and airspace control (ACO) order are promulgated and the ATO and special instructions (SPINS) issued, the MACCS coordinates the execution, employment, and assessment of OCA missions. Command and control ties individual missions into a cohesive operation by providing ground-controlled interception, target assignment, surveillance, and coordination for air and ground assets conducting OCA.

MACCS agencies use positive and procedural air control methods to command and control OCA operations. The senior agency afloat or ashore has overall command responsibility. The ACE commander has centralized command and decentralized control authority of MAGTF OCA assets. If tasked by the ACE commander, the Marine TAOC can exercise control of these assets. OCA coordinators and managers positions can also coordinate OCA operations. Nonorganic assets, such as airborne warning and control system (AWACS) or airborne early warning and control (AEW&C) aircraft, can enhance or augment command and control of MAGTF OCA. See Figure 2-2 below.

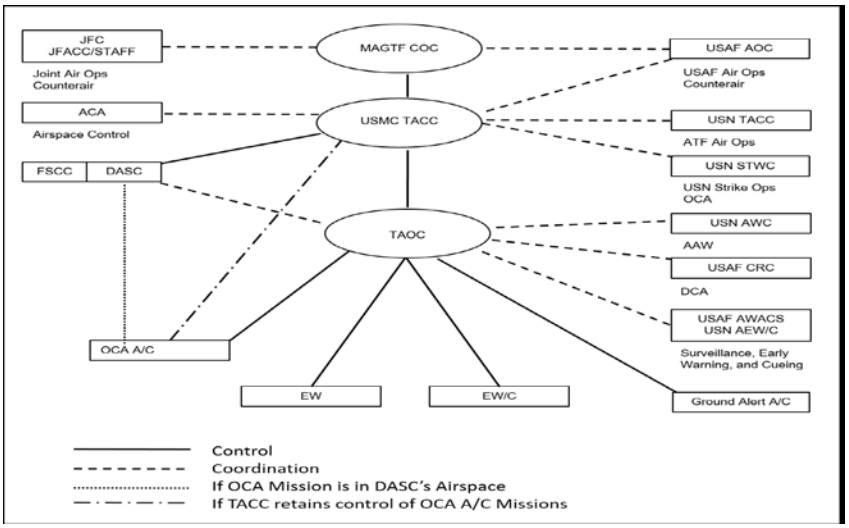

Figure 2-2

2010. ASSESSMENT

Assessing the effectiveness in OCA operations can be determined if the commander's desired objective has been reached. At the operational level of war, the commander's objective may be attaining air superiority. At the tactical level, effectiveness in reaching the commander's goal will likely be achieved in part, such as local air superiority to enable a strike package to conduct its mission, which when put together meets the commander's overall objectives. Efficient use of resources does not automatically constitute effectiveness. Efficient use of OCA assets may have conserved assets for use elsewhere. The ultimate determination of whether those assets were used effectively must be weighed as to attainment of the desired result.

Tangible evidence of effectiveness can be determined by several methods including personal reports (such as pilot reports or reports from forward observers or forward air controllers) and battle damage assessments. Personal reports can provide immediate feedback on the observed effect on a target, but are often subject to the individual's perspective and the fog of war. Battle damage assessments can measure the effectiveness of ordnance delivered on a target. These methods may include personal observation or imagery reconnaissance from platforms such as satellites and UASs. Battle damage assessments can provide ample data to determine the effectiveness of an attack, but may be subject to the interpretation of the individual analyzing the data. Intangible evidence can also assess the effectiveness of OCA operations, including reports from electronic warfare aircraft and lack of observed aviation, ground-based air defense or theater missile activity. Intangible methods of measurements, although an important part of building the overall effectiveness picture, can be misleading. Lack of electronic emissions from a surface-to-air missile site does not necessarily mean the site was destroyed or neutralized, only that the site is no longer transmitting. Lack of aircraft activity can also be translated into preparation for a forthcoming air attack.

Assessing the effectiveness of OCA operations will ultimately paint a picture for the MAGTF commander. Based on this assessment, the commander may decide that the OCA objectives achieved or that additional OCA sorties must be dedicated toward the campaign.

2011. CAPABILITIES

Many of the MAGTF's capabilities depend on its task organization. The MAGTF has a variety of organic resources to conduct OCA missions, including aircraft, ground forces, artillery, and electronic warfare platforms. These resources can be combined to place the targeted enemy capability in a dilemma.

From dispersed locations, MAGTF aircraft can quickly respond and mass (if necessary) to support OCA requirements. Aircraft response capabilities allow the MAGTF commander to bring overwhelming firepower to bear on attacking enemy aircraft or mobile air defense systems.

The variety of weapons and the type of command and control used in OCA operations enhance the MAGTF's flexibility in target assignment, weapons engagement, and weapons control.

MAGTF aircraft can operate from forward operating bases, aircraft carriers, and amphibious ships to extend their effective radius of action. Establishing forward arming and refueling points can further assist this capability.

Successful employment of OCA to protect the MAGTF has a tremendous impact on the morale of enemy and friendly troops. The presence of friendly aircraft and the absence of enemy aircraft increase the confidence of ground-based forces and facilitate rapid accomplishment of the MAGTF's mission. The presence of friendly aircraft can decrease the enemy's morale, restrict enemy actions, restrict/eliminate the ability to conduct aviation operations, and restrict their ability to apply combat power. For the enemy, losing control of the air can be a significant factor in their defeat.

Chapter 3
DEFENSIVE COUNTERAIR

Defensive counterair (DCA) encompasses air and missile defense (AMD), which is direct (active and passive) defensive actions taken to destroy, nullify, or reduce the effectiveness of hostile air and ballistic missile threats against friendly forces and assets. DCA operations provide the basis for force protection against attacks by enemy aircraft and missiles. Integrating air defenses helps maintain local air superiority, allowing friendly forces increased freedom of action unconfined by attacks by the enemy's air and missile forces.

The Marine Corps has changed terminology from Air Defense to DCA to align USMC doctrine with Joint doctrine. JP 3-01 defines DCA as all defensive measures designed to neutralize or destroy enemy forces attempting to penetrate or attack through friendly airspace. Examples of DCA missions are area defense, point defense, and high value airborne asset (HVAA) combat air patrol (CAP).

DCA is principally reactive. Employment of air defense fires depends on actions by enemy aircraft and missiles. MAGTF DCA operations use the three principles of antiair warfare—destruction-in-depth, mutual support, and centralized command and decentralized control—to provide a responsive, integrated air defense capability to protect vital MAGTF assets.

Within the MAGTF, the ACE is responsible for the coordination, control, and execution of DCA operations and provides the preponderance of air and missile defense resources. However, each MAGTF element contributes to the overall AMD effort through organic weapons employment and passive air and missile defense measures.

The MAGTF uses a variety of assets to conduct DCA operations, ranging from fighter aircraft and surface-to-air weapons to air command and control agency radars. However, due to the limited number of MAGTF assets available for DCA operations and the wide range of threats, DCA operations are more effectively conducted during joint operations when significantly more assets are available. The MAGTF integrates its capabilities into the theater air defense network, and when necessary, requests AMD assets from the joint force commander to augment organic capabilities.

Effective DCA operations synchronizes all available AMD assets to form an integrated air defense system (IADS). Although the MAGTF does not currently have a medium-range, medium- altitude radar SAM, it can field an organic IADS of air command and control facilities, aircraft, and short range air defense (SHORAD) surface-to-air weapons, and project that capability ashore. The true integration of air defense is through the MACCS. The MACCS—

- Synchronizes, coordinates, and controls MAGTF, other Service, and coalition air defense assets and operations within a designated sector or area.
- Interfaces and shares AMD information with joint and coalition partners.
- Coordinates joint DCA operations within a sector or region, as directed.
- Acts as an enabler to coordinate DCA operations for a joint force within a theater or joint operations area (under the supervision of the joint force commander or designated agent).

The MACCS facilitates joint/coalition DCA operations and participates as a contributor to the joint force's overall area air defense plan. MAGTF DCA assets are employed based on the intelligence estimate of the threat, air defense priorities, AAW, and DCA employment principles. Aircraft, surface-to-air weapons, and command and control agencies that make up the MAGTF's IADS, and their supporting intelligence, electronic warfare, and communications support are employed based on the enemy air threat to the MAGTF's vital areas. Vital areas can be areas where there are sources of strength—centers of gravity—that need to be protected from air and missile attack or they can be a vulnerability that needs additional defense to prevent them from becoming a critical vulnerability.

3001. ACTIVE AIR AND MISSILE DEFENSE

Active air and missile defense is direct defensive action taken to destroy, nullify, or reduce the effectiveness of hostile air and missile threats against friendly forces and assets. Active AMD uses available aircraft, AMD weapons, and electronic warfare to achieve its goal. It can also employ weapons that are not typically used in an air and missile defense role. Active AMD must consider AMD asset emplacement to facilitate surveillance, weapons control and coordination, and destruction.

(a) Surveillance. Surveillance activities detect, identify, and evaluate all air tracks to provide an accurate, recognizable air picture. A recognizable air picture created through integration and dissemination of surveillance data allows commanders to prioritize target engagements to assign DCA assets. Effective surveillance enables efficient weapons control, coordination, and employment.

The TAOC uses its organic radars and digital information link capabilities to support the MAGTF's surveillance operations. The TAOC's surveillance section detects, identifies, and evaluates air targets within its assigned sector. The TACC (or tactical air direction center, if applicable) may also reports surveillance data from the TAOC to agencies outside the MAGTF.

Terrain masking and the inherent limitations of ground-based radars to detect low-altitude aircraft require the TAOC's surveillance capability be supplemented. Capabilities organic to the MACS include employing and Early Warning and Control (EW/C) site or an Early Warning (EW) site to augment radar and/or communications coverage. If available, airborne early warning and control platforms and non-organic systems can supplement the TAOC and reduce or eliminate surveillance issues. Other surveillance means, including surface-to-air weapon system radars and aircraft radars, must be integrated to provide the best air picture possible.

Employment of the TAOC and AEW platforms does not guarantee that all aircraft and missiles will be detected. Visual detection capabilities provided by LAAD units, CAPs, other aircraft, and ground forces should integrate with minimal transmission time to round out the surveillance capability. Regardless of the detection means, the detection and identification process must be timely to enable target engagement. A common reference system speeds up the surveillance process.

When a common reference system is not practical, a single reference point (e.g. bullseye [B/E]) for reporting is paramount. Datalink implementation is vital to ensure the accurate and timely reporting of targets relevant to multiple users. All AMD assets must have access to surveillance information. The ability to inform the MAGTF of threats and potential encroachment is essential for force protection and engagement. Surveillance information must be streamlined and rapidly passed to initiate the appropriate response to the threat. The ability to cross-tell information from visual or manual systems to automated agencies and vice versa must be established.

A redundant communications system allows dissemination of surveillance information within the MAGTF. The communications system allows weapons in the same vicinity to exchange detection data at the lowest level possible. This affords the best reaction time without disrupting the continuous information flow to the TAOC, MAGTF combat operations center, and other key information nodes. The communications system must allow rapid reporting of visual sightings to the TAOC under any conditions at any time. The TAOC broadcasts threat information to required MAGTF units who further monitor and disseminate the information.

(b) Detection. Detection locates all tracks in and around the air defense sector. Radars, intelligence sources, visual means, and weapons system sensors all contribute to detection. Detection must occur quickly at maximum range to optimize reaction time for identification, weapon selection, and employment.

(c) Identification. Rapid and positive identification of all air tracks in and around the air defense sector is essential for an effective IADS. Positive identification protects friendly aircraft from fratricide and allows early destruction of enemy aircraft and missiles as far from the vital area as possible. Identification incorporates a combination of electronic, visual, and intelligence means. Decentralized control can streamline identification by delegating responsibility to a weapons system operator (e.g. LAAD identification of sUAS). Identification is streamlined using preplanned procedures and implementing the least restrictive measures possible referencing Rules of Engagement (ROE).

Once an object is detected, MAGTF assets use an iterative process facilitated with an identification matrix, to assign an identification category to the detected object (e.g. friendly, bandit, neutral, hostile). Ideally, friendly aircraft operating in the MAGTF's sector of responsibility are under the control of a MACCS agency and are updated as friendly. This should aid in differentiating them from hostile aircraft. However, the mission, flight profile or number of friendly aircraft may make it difficult to maintain positive, continuous contact with all friendly aircraft in the controlled airspace. This difficulty is complicated by the limited low-altitude tracking capability of ground based radar systems. Generally, friendly outbound aircraft do not pose an identification problem because—

- They recently departed from friendly airfields or ships and have positive contact with a controlling agency that alerts AMD assets within the IADS.
- Or their flight direction poses a lesser threat to the MAGTF's vital areas than aircraft approaching from the extremes of the MAGTF's area of operations.

Post mission aircraft returning through the IADS may present a higher threat profile that complicates identification because—

- The aircraft's flight direction is inbound (toward a vital area) and the tactics used to evade the enemy's air defense system may be similar to the tactics used to penetrate the MAGTF's IADS.
- The aircraft may not be tracked or under positive control of a MACCS agency.
- The aircraft may be damaged/degraded, hindering their ability to operate on planned flight routes or communicate with MACCS agencies.

Aviation planners must use procedural control measures to protect returning friendly aircraft from hostile fires and simultaneously place them in time and space where they can be positively identified to protect them from friendly fires. These control measures—return to force procedures, minimum risk routes, air corridors, etc.—must be simple to understand and execute, and they must consider the limitations of the MAGTF IADS. During the execution phase, planners reevaluate ROE and identification criteria determined during planning and establish updated identification procedures based on the tactical situation.

(d) Evaluation. After a target is detected and identified, it is evaluated. The process of evaluation further defines the air picture. It identifies the threats by prioritizing air tracks, and the target's engagement priority is determined based on its immediate threat to the vital area. By continuously evaluating air tracks and updating the air picture, AAW units can effectively apply the air defense required.

(e) Weapons Control and Coordination. Weapons control and coordination involves selecting and assigning the appropriate weapon to a particular air track and directing, controlling, and coordinating weapons employment. Weapons assignment depends on the identified target position and the position of available air defense weapons. Through effective integration and coordination, engagement and weapons use can occur across sector boundaries. DCA actions should focus on engaging targets that pose the greatest, immediate threat as soon as possible with the first weapons system either available or capable of destroying them. These engagements should occur as far from the vital area as practical without compromising mutual support within the IADS. Controllers should assign mutually supporting weapons systems in case one or more of the initial engagements fail.
IADS effectiveness results from shifting from one degree of control to another. The selected degree of control depends on the ROE, the air picture, and the ability to communicate with the weapons systems. The degree of control can vary from centralized to decentralized. Under certain conditions, air defense units may conduct autonomous operations. Effective coordination of DCA assets must occur. Destruction. Destruction is a process that either destroys enemy aircraft or missiles, or prevents them from completing their mission. Aggressive ROE and situational awareness gained from the air picture aid weapons employment and destroying the enemy air threat.

3002. PASSIVE AIR AND MISSILE DEFENSE

Passive AMD includes measures (other than active AMD) taken to minimize, mitigate, or recover from the consequences of aircraft and missile attacks. Passive AMD provides individual and collective protection for friendly forces and critical assets and is a responsibility of commanders at all levels. Passive AMD complicates the enemy's targeting ability and ordnance delivery and increases the survivability of friendly forces under attack.

(a) Tactical Warnings. Tactical warning measures provide timely dissemination of information on the likely or imminent threat of attack by aircraft or theater missiles. Tactical warnings can be general warnings that aircraft or missile launches have occurred, or specific warnings to designated units or areas that are in danger of attack. Tactical warnings should include the warning itself and likely targets. If the threat is a theater ballistic missile, the likely area of missile impact as indicated by the projected circular error of probability ellipse should be included, and, if known, the time to missile impact or aircraft attack. Tactical warnings can be communicated through wide or local area networks, radio messages, sound or visual alarms, and voice.
(b) Reducing Enemy Targeting Effectiveness. Methods for reducing the enemy's targeting effectiveness focus on ways to deny the enemy information about the location of friendly units or, if the enemy has that information, making target acquisition more difficult.
(1) Operations Security. The communications security, signature reduction, and security aspects of operations security deny enemy sensor and reconnaissance assets timely acquisition and identification of friendly targets. Examples of operations security measures used for passive AMD are: emission control measures, cover, and concealment.

(2) Camouflage. Camouflage is the use of natural or artificial material on personnel, objects or tactical positions with the aim of confusing, misleading or evading the enemy. (JP 1 -02) Camouflage disguises friendly positions from the enemy.

(3) Deception. Deception misleads the enemy by manipulating, distorting or falsifying friendly actions. Deception misleads the enemy on location, type or intention of friendly units. Well-executed deceptive measures can cause the enemy to deplete their aircraft and missile resources by attacking false targets, missing intended targets, and denying the enemy accurate battle damage assessment. Decoys and chaff are among the most commonly used deception measures.

(4) Mobility. Mobility reduces vulnerability to attack by aircraft and missiles and increases the survivability of certain systems by limiting them to exposure of reconnaissance and targeting. Mobility contributes to deception by moving assets frequently to mislead enemy reconnaissance efforts in locating friendly assets.

(c) Reducing Vulnerability

(1) Protective Construction. Protective construction of assets reduces vulnerability to attacks. It limits or negates damage to friendly resources by providing protective coverage around the resource. Protective construction may be as basic as building sandbag walls around facilities or as elaborate as constructing revetments for aircraft.

(2) Redundancy and Robustness. A way to retain combat power is to duplicate critical vulnerabilities particularly vulnerable to attack by aircraft and missiles. Critical capabilities include soft targets, such as key command and control nodes, sensors, and fixed sites such as airfields. Planning for alternate agency responsibilities, ensuring alternate paths of communication, and preparing alternate operating locations are ways to achieve redundancy and robustness.

(3) Dispersal. Dispersing assets reduces their vulnerability to attack by decreasing their concentration and making the target less lucrative. Dispersing assets forces the enemy to use more aircraft or missiles or conduct reattacks to neutralize or potentially destroy the target. Dispersal can also mislead the enemy as to the occupation or use of a particular location.

(4) Chemical, Biological, Radiological, Nuclear, and Explosives Defense. Aircraft and missiles are among the most common delivery methods for weapons of mass destruction. Although the best method for nullifying this threat is destroying the weapons at their source or the enemy's ability to manufacture the weapons, preparing for a biological or chemical attack and operations within contaminated areas are necessary requirements. Passive AMD against these weapons include contamination avoidance, force protection, and decontamination. Contamination avoidance includes detecting, identifying, and reporting the presence of agents or materials. Force protection includes individual and collective protection measures to negate or minimize the effects of various agents or materials. Decontamination removes the hazards from personnel and equipment, minimizes the spread of the contaminant, and restores normal operations.

(d) Recovery and Reconstitution. Recovery and reconstitution refers to the ability of a unit to be restored to a desired level of combat effectiveness commensurate with mission requirements and available resources after an attack. (JP 3-01.5) Recovery and reconstitution efforts may include reestablishing or reinforcing command and control; replacing personnel, equipment, and supplies; and repairing damage.

3003. PRINCIPLES

Location, destruction, reduction, and confusion maximize destruction and minimize the effects of air and missile attacks.

(a) Location. Locating the target is the first step in DCA operations. The target must be detected, identified, and evaluated prior to engagement. Surveillance, reconnaissance, and intelligence help locate targets. Information from air and ground sources complements and supplements each other. The ACE and the MAGTF should develop plans that emphasize the vigorous employment of all available air and ground sources to locate enemy air and missile assets quickly after they launch or during their attack. Timely collection and dissemination of combat information to a friendly IADS aids in locating the enemy's air threat.

(b) Destruction. Destruction eliminates the enemy air assets post launch or while they are attacking. The complete destruction of enemy air assets is preferred to reducing or nullifying the impact of the enemy's attacks on MAGTF operations. Detailed planning and coordination is essential to AMD asset integration. The ACE coordinates and plans DCA missions for MACCS support to fighter engagement zones (FEZ), missile engagement zones (MEZ), SHORAD engagement zone (SHORADEZ) and/or within a joint engagement zone (JEZ). MAGTF aircraft and surface-to-air weapons support each other to achieve destruction of the enemy's air threat. This mutual support demoralizes the enemy by diverting their attention from their primary target and reduces their ability to destroy MAGTF assets. Electronic warfare, chaff, deception, and concurrent ground operations can be used in concert with these principles to confuse the enemy.

(c) Reduction. Reduction is the process of lessening, diminishing or decreasing the size, number or effect of the enemy's air and missile threat after it is launched or while it is attacking. By reducing the number of enemy air assets after they launch or before they penetrate the MAGTF's IADS and approach the vital area, the MAGTF lessens the enemy threat. Reducing or eliminating the enemy's air assets that deliver ordnance increases the MAGTF's ability to survive the attack, facilitate maneuver, and complete its mission. The MAGTF can also use dispersion, deception, and mobility to lessen the effect of enemy air action on MAGTF operations. Comprehensive planning and the subsequent execution of that plan stress the reduction or elimination of the enemy's assets and their effect on MAGTF targets. Reduction and elimination must be stressed during all levels of MAGTF planning, including down to the individual Marine. Planning and execution should out- line methods of survivability (cover, concealment, camouflage and protective construction).

(d) Confusion. Confusion is the act of throwing enemy air assets into a state of disorder and disarray. The MAGTF attempts to disrupt the cohesiveness of the enemy's attack by locating, destroying, and reducing the enemy's air threat after launch or while attacking. Early location of enemy air assets allows the MAGTF's IADS to direct, steadily increase, and overlap its fires. This destroys or reduces the enemy threat, eliminates the enemy's element of surprise, and increases the enemy's losses.

3004. INTELLIGENCE REQUIREMENTS

DCA operations require diverse resources and extensive integration and coordination to function cohesively. DCA operations require intelligence information from organic assets, MAGTF assets, and nonorganic assets to determine the scope of the enemy air threat. Nonorganic assets, including joint, theater, or national-level, may require approval at the joint force, theater, or higher level.

Once air defense orders are issued, the MAGTF staff coordinates and determines intelligence requirements based on the mission. The ACE commander identifies their intelligence requirements by submitting information requirements. At a minimum, DCA operations require information on the threat capabilities, description, location, status, warning, and direction of the enemy air threat from intelligence sources.

3005. ACTIVE AIR AND MISSLE DEFENSE APPLICATIONS

(a) Area Defense. Area defense uses a combination of weapon systems; e.g., aircraft, surface-to-air weapons, and various combinations of air, land, or sea sensors and shooters to defend broad areas. There can be specialized applications of area defense when friendly assets requiring protection are spread over a large geographical area with defined threat boundaries.

(b) Point Defense. Point defense protects limited areas and is normally used in defense of vital areas of forces or installations.

(c) Self-Defense. Self-defense allows friendly units to defend themselves against direct attacks or threats of attack using organic weapons and systems. The right of self-defense is inherent to all ROE and weapon control procedures.

(d) HVAA Protection. A DCA mission using fighter escorts that defend airborne national assets, which are so important that the loss could seriously impact US or MNF warfighting capabilities or provide the enemy with significant propaganda value. Fighter aircraft perform HVAA protection using various CAP or escort tactics. In a maritime environment, cruisers and destroyers can accomplish this mission.

3006. WEAPONS EMPLOYMENT

Weapons employment is based on the air defense sectors assigned to the MAGTF and the sector's corresponding surveillance area, destruction area, and vital area. Air defense sectors are typically designated by the joint force commander through the area air defense commander (AADC) if one is designated. Based on input from the aviation, ground, and combat service support element commanders, the MAGTF commander recommends to the joint force commander the air defense sectors and responsibilities to be assigned to the MAGTF.

Regardless of the MAGTF's role in the operation, its assigned air defense region or sector should correspond with its area of operations and, depending on the air control abilities of other members of the joint force, can potentially be larger than the MAGTF area of operations. The MAGTF commander (with input from the ACE, GCE, and LCE) defines vital areas, destruction areas, and surveillance areas within the air defense sectors. Weapons systems are placed within the air defense sector to provide an effective defense of the MAGTF's vital area. See chapter 6 for more information.

3007. WEAPONS MANAGEMENT

Weapons management is integrating and coordinating assets allocated for the DCA mission and operation of the MAGTF IADS. Weapons management responsibilities exist at various levels within the ACE, starting with the ACE commander down to the control agency, missile unit, or individual aircrew; e.g., TAOC, Marine SADC or weapon platforms. See chapters 4 and 6 for information on command and control relationships and air defense weapons management responsibilities within the MAGTF.

3008. REQUEST PROCEDURES

Requests for the MAGTF's airborne DCA resources are completed the same way as OCA sorties. Joint force sorties for DCA are requested through the joint force commander or their designated agent; i.e., the AADC who consolidates the requests and allocates resources for theater air defense.

For surface-to-air missiles, coordination between the requesting unit and the ACE commander (through the chain of command) is appropriate. Requests for assets external to the MAGTF are forwarded to the joint force commander or their designated agent; i.e., the AADC for distribution of joint force assets.

3009. TASKING

After priorities, objectives, and requirements are established, the ACE commander and their staff plan the tasking of aviation assets to support DCA operations. Tasking must also address the needs of supporting assets, such as electronic warfare, tanker, and airborne early warning and control aircraft. Planners should coordinate tasking to ensure effective use of air and ground assets and aid in the establishment of air defense through air intercept (fighter engagement) zones, SHORADEZ, and depending on availability, MEZs for radar SAMs. To fulfill air and missile defense requirements, the ACE commander tasks ground-based ACE assets via the operation order. Specific aircraft assets are tasked through the MAGTF ATO. Preplanned aircraft missions are planned in advance of an operation, and based on previous MAGTF requirements/requests. Preplanned missions permit detailed coordination and can be scheduled or on-call. Aircraft tasked to support DCA operations are assigned preplanned scheduled, preplanned on-call, or immediate missions.

(a) Preplanned, Scheduled Air Missions. The ACE schedules preplanned air missions based on the MAGTF's DCA needs. These missions provide air defense of vital areas based on the known or suspected enemy air threat. Preplanned, scheduled air missions also support DCA operations, such as tanker, airborne early warning and control aircraft, and electronic warfare. Preplanned, scheduled air missions are executed at a specific time; e.g., a CAP mission is assigned a specific launch time and time to be on station. Preplanned, scheduled air missions allow detailed coordination and economical use
of aircraft and ordnance.

(b) Preplanned, On-Call Air Missions. The ACE schedules preplanned, on-call air missions to assist scheduled missions. These missions focus on periods of anticipated increases in the enemy air threat to the MAGTF. Preplanned, on-call air missions load the appropriate air-to-air ordnance and assume ground (strip) or airborne alert status. Ground alert CAP aircraft provide several advantages. The TACC or its designated agency, such as the TAOC, has a higher degree of control over assets. The aircrew can obtain target/airborne threat location. Tactics and routing can be briefed before launch. The TACC can also ensure that mission support prerequisites are provided. On station time increases with on-call aircraft.

Airborne alert CAP aircraft provide several advantages: minimal reaction time, battlespace situational awareness gained from observation, and the TAOC providing real-time threat information to data link-equipped aircraft. Disadvantages are a reduced ability to ensure that support prerequisites are met and a limited time on station.

(c) Immediate Air Missions. Immediate air missions may be required if high tempo operations are conducted or if the MAGTF's IADS becomes saturated by enemy air assets. Immediate air missions to augment the defense effort may involve tasking aircraft not optimal for air and missile defense, such as AV-8B Harriers.

Aircraft can be retasked to an immediate mission at any time. It is preferred that aircrew retasking to an immediate mission are briefed on the deck but this increases response time. If there are not enough assets to assign to preplanned missions to cover possible threats, then secondary missions may be assigned to aircrew. Aircraft eligible for airborne retasking should include air-to-air ordnance in addition to their air-to-ground ordnance. Retask guidance and conditions in the MAGTF operations order can provide the MACCS and aircrews with some notice and flexibility to determine which assets may provide the best mission results. Before aircraft are retasked, the retasking authority should ensure that the mission change is aligned with the MAGTF commander's intent.

3010. COMMAND AND CONTROL REQUIREMENTS

Command and control coordinates and integrates the execution and employment of DCA assets after the area air defense plan and airspace control plan /airspace control order are promulgated and the MAGTF ATO and special instructions are issued. It ties individual missions and engagements into a cohesive air defense plan by providing ground controlled intercept, target assignment, surveillance, and coordination for CAPs and surface-to-air weapons. MACCS agencies, positive and procedural control measures, and communications provide the elements for command and control of DCA assets and operations. Non-organic assets, including airborne warning and control system and airborne early warning and control aircraft, can enhance or augment command and control of MAGTF DCA assets.

The ACE commander exercises centralized command and decentralized control of MAGTF DCA assets. He delegates the authority for supervision, management, and coordination of DCA operations within MAGTF air defense sectors to the Marine SADC during MAGTF operations. The Marine SADC is the MAGTF commander's air defense battle manager but is not an air command and control agency. The ACE commander delegates the authority for real-time control of DCA assets to the TAOC. The TACC supervises and the TAOC executes control of the MAGTF's IADS. Control of DCA operations can be decentralized or centralized. The maximum degree of decentralized control is achieved through establishing effective procedural control measures, including WEZs and ROE/RTF procedures. When operating under decentralized control, weapons platforms conduct engagements based on the established weapons control status and ROE. Under centralized control, weapons platforms evaluate targets based on the established weapons control status and ROE and then request permission to engage the target from the engagement authority, which may be the SADC or could be delegated lower to the TAOC. Engagements are conducted post engagement authority approval, unless the target meets the criteria for self-defense. Communications provide the means to execute command and control of DCA operations. Communications paths between the TACC, Marine aircraft units, forward operating bases, the TAOC, and air and missile defense platforms are critical for DCA operations to succeed.

3011. ASSESSMENT

Because of the MAGTF's limited DCA resources and the need to protect its assets, the MAGTF commander strives to be efficient with the employment of their DCA assets. However, efficiency should not be sacrificed for the cost of lost resources. The MAGTF commander determines the degree of risk he is willing to accept. The degree of risk translates into allocating DCA resources to protect designated MAGTF air defense priorities. Although destroying the attacking aircraft or missile is usually desired, it is not the only gauge to assess the effectiveness of an IADS. Other examples of assessing effectiveness include—

- Turning away an aircraft before its attack through lethal or nonlethal means.
- Deflecting a missile warhead so that it cannot reach its target or create collateral damage affecting its target.
- Using passive measures to cause the enemy to attack positions where there are no friendly forces.
- Demonstrating such strength and integration of air and missile defense assets that the enemy does not attack.

There may be times when an aircraft or missile can penetrate the integrated air defense system and succeed in its attack. Using the principle of destruction-in-depth, it is key that the aircraft or missile launch platform be destroyed after the attack to prevent future attacks. Attacking an aircraft during its egress from the target area is a DCA function. Actions against aircraft on the ground or transporter-erector launchers is a task of OCA.

3012. CAPABILITIES

Many of the MAGTF DCA capabilities depend on its task organization. The MAGTF possesses active AMD weapons systems, including aircraft and surface-to-air-missiles. Decentralized control of AMD assets allows the MAGTF to rapidly respond to aircraft and missile threats within the assigned area of responsibility.

The MAGTF's organic air surveillance radars, augmented by data link information, provide battlespace awareness for commanders, C2 agencies, and air and missile defense assets. The MAGTF's AMD resources can integrate with joint and coalition forces to contribute to the joint force commander's concept for theater AMD. The MAGTF's organic AMD assets provide flexibility with engagement of air threats. This flexibility also provides the IADS with a capability for sustainment (Surface-to-air missile units are not limited by aircraft time on station restraints). Darkness and limited periods of visibility brought on by weather, smoke, etc., can impede effective employment of optically AMD systems. Radar ducting can have adverse effects on target acquisition.

Without a medium range, medium altitude radar SAM, the MAGTF lacks the ability to destroy enemy aircraft and missiles at medium altitudes until they are within weapons release parameters. Augmenting joint AMD assets is critical to deny the enemy altitude sanctuaries against the MAGTF's low altitude surface- to-air missile.

As with OCA operations, a DCA aircraft's time on station is limited by distance to and from their station, station altitude, and other related factors. Tanker aircraft or employment of ground alert aircraft help eliminate this problem.

Line of sight is affected by the curvature of the Earth and other obstructions, such as intervening terrain. Terrain can mask areas from radar and communications coverage. Line of sight and terrain masking affect all radars and certain communications media. Proper sight selection; placement of radars and communications equipment; and airborne radars (command and control and on-board weapons radars) can augment the MAGTF's organic ground-based surveillance and minimize line of sight and terrain masking effects.

Phasing of AAW (DCA) functions ashore can be a time-intensive process and create a greater reliance on sea-based DCA assets. Incremental phasing of control ashore and the early introduction of air and missile defense assets ashore can speed the process. The enemy's use of jamming, destruction, and electronic deception can adversely affect DCA operations. The enemy can employ electronic attack against MAGTF radars; command and control voice and data communications; and air controllers. Susceptibility to electronic attack can be minimized by understanding the enemy's electronic warfare capabilities and training, and by employing proper electronic protection; e.g., using decoys, brevity codes, chattermark procedures or frequency hopping radios.

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 MACCS. From their command post at the TACC, the ACE commander or their 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.

4001. 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 they directs an aviator to maneuver the 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—

- TAOC and its Early Warning and Control (EW/C) sites.
- Direct air support center (DASC).
- Marine air traffic control company (MATCC).
- 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

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

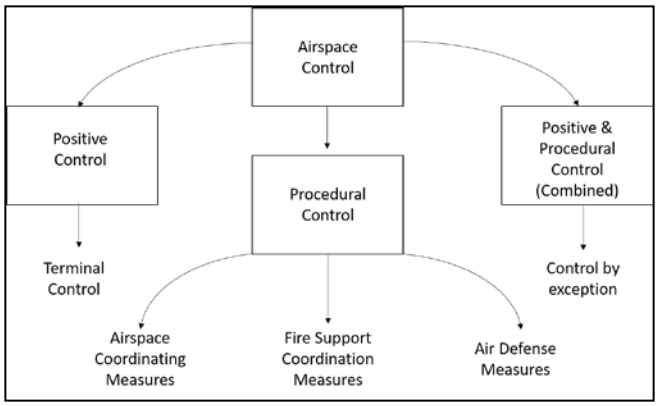

Figure 4-1 Airspace Control Methods

4002 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 coordinating measures (ACMs) are published in the airspace control order, airspace control plan, and special instructions to the ATO. Airspace coordinating 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.

(a) 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 are TAOCs, EW/C sites, and MATC.

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, MATC, forward air controllers, forward air controllers (airborne), and other designated personnel perform terminal control of AAW operations.

(b) Procedural Control. Procedural control relies on previously agreed upon and promulgated orders and procedures. Included in these orders and procedures are airspace coordinating measures, fire support coordination measures, and air defense 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), TAOC, EW/C site, DASC, MATC, 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 and missile defense unit and publishing ROE that specify target engagement conditions. Air and missile defense units, particularly those operating in the main battle area, are managed by procedural control techniques to facilitate this freedom of movement.

(c) 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 techniques; 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 MCTP 3-20F, Control of Aircraft Missiles, for more information on airspace control methods.

4003. AIRSPACE COORDINATING, MANEUVER CONTROL, AND AIR REFERENCE MEASURES

Airspace coordinating measures are employed to facilitate the efficient use of airspace to accomplish missions and simultaneously provide safeguards for friendly forces. Used with air defense measures, maneuver control measures, air reference measures, and fire support coordination measures, airspace coordinating measures maximize the effectiveness of combat operations by promoting safe, efficient, and flexible use of airspace. Airspace coordinating measures can outline or modify hostile criteria or serve as a tool for identifying targets and coordinating fires.

Maneuver control measures (MCMs) are established by the supported / supporting commander on the surface to define lines of responsibility in support of movement and maneuver of friendly forces.

Air Reference Measures are used for command and control purposes and defines a point over the ground or a volume of airspace. Air reference measures do not require coordination to pass over or through.

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

Requests for establishing various coordinating measures are forwarded to the joint force commander or their designated agent (the airspace control authority) for implementing through the airspace control order. Typical airspace coordinating measures, maneuver control measures and air reference measures used by the MAGTF follow.

(a) 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. An AOA is a maneuver control measure.

(b) 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 the assigned airspace control area or sector.

(c) Air Control Points. Air control points are air reference measures that enable the routing of 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.
- Enroute.
- Orbit/holding.
- Contact.
- Initial.
- Rendezvous.
- Egress control.
- Penetration.
- Ingress, Egress, and Return to Force Control Procedures

The most difficult aspect of air and missile defense is planning for friendly aviation operations that support the MAGTF but protect it from air attack. Friendly aircraft enroute to and returning from combat missions need to avoid enemy AMD systems yet be visible to friendly AMD assets. 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 AMD units.

Control procedures must be disseminated to all appropriate units and agencies (MACCS agencies, air controllers and coordinators, aircraft, and surface to air weapons). 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 AMD 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 (ACA).
- Joint Airspace Coordinating 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 Airspace Control*; MCTP 3-20F; MCRP 3-20F.4, *Multi-Service Tactics, Techniques, and Procedures for Airspace Control*; and MCRP 3-25 F, *Multi-Service Tactics, Techniques, and Procedures for the Theater Air-Ground System (TAGS)* for more information on joint airspace control and joint airspace coordinating measures.

4004. FIRE SUPPORT COORDINATION MEASURES

Fire support coordination measures are employed by commanders to facilitate the rapid engagement of targets and simultaneously provide safeguards for friendly forces. If used properly, these measures expedite target engagements by allowing a commander to open areas of the battlespace for fires while maintaining the commander's ability to restrict and control fires in certain areas. Fire support coordination measures do impact AAW operations, especially OCA and SEAD. Fire support coordination measures are either permissive or restrictive.

(a) Permissive Fire Support Coordination Measures. Permissive fire support coordination 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 coordination measure is the FSCL. In OCA, the rapid conduct of an attack operation 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 attack operation.

(b) Restrictive Fire Support Coordination Measures. Restrictive fire support coordination 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 coordination measure is a no-fire area. The no-fire area protects friendly resources (or other assets) from attack by friendly forces or their affects, including OCA missions. Permission for OCA operations within a no-fire area must be obtained from the establishing authority except in cases of self- defense. See MCTP 3-20F, appendix D.

4005. AIR DEFENSE MEASURES

Air defense measures refer to coordination measures that involve areas and zones used specifically for DCA. They are established to maximize the effectiveness of DCA operations while minimizing interference with other operations. Air defense measures complement airspace coordinating and fire support coordination measures. Air defense measures within the MAGTF's airspace are normally recommended by the Marine SADC to the TACC concurrently with recommendations to the regional, or area air defense commander. The area air defense commander is the establishing authority for air defense measures in joint operations. They submit proposed air defense measures to the airspace control authority for deconfliction with other airspace coordinating measures and subsequent inclusion in the airspace control order. Air defense measures are listed below:

(a) Air Defense Area. An air defense area is a specifically defined airspace for which air defense must be planned and provided (JP 3-01). It defines, in an area of operations, the area to be defended. An air defense area is a planning aid delineated by the area air defense commander. The air defense area is not an airspace control measure.

(b) 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 (MCRP 3-20F.4). Typically, an ADIZ is used for sovereign national boundaries or in the case of areas of operations, for identification into the rear areas.

(c) 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.

(1) Fighter Engagement Zone. In DCA, a 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 a DCA 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.

(2) Missile Engagement Zone. A MEZ is an airspace of defined dimensions within which the responsibility for engagement normally rests with surface-to-air missile systems. In joint doctrine, MEZs are divided into high-altitude and low-altitude MEZs, as well as short-range air defense engagement zones. The principal differences between the aforementioned are the type and capabilities of missile systems being employed and the altitude limits of the MEZ. The area air defense commander designates the MEZ. High-Altitude Missile Engagement Zone (HIMEZ).

- HIMEZ is airspace of defined dimensions within which the responsibility for engaging air and missile threats, including endo- and exo-atmospheric ballistic missiles, rests with high-altitude SAMs (e.g., SM-3, SM-6, THAAD). The Marine Corps does not have an organic capability that operates within the HIMEZ. However, MAGTF air defense agencies must understand joint asset coordination methods, mediums, and employment considerations that support AMD asset integration within the IADS Low-Altitude Missile Engagement Zone (LOMEZ).
- LOMEZ is airspace of defined dimensions within which the responsibility for engagement of air and missile threats rests with low-to-medium-altitude SAMs (e.g., SM-2, PATRIOT).
- Short-Range Air Defense Engagement Zone (SHORADEZ).SHORADEZ is airspace of defined dimensions within which the responsibility for engagement of air and missile threats rests with the SHORAD weapon/entity (e.g., LAAD). By definition, a SHORADEZ may be established within a LOMEZ or HIMEZ because the SHORADEZ has SHORAD weapons.

Table 4-2 below defines surface to air weapons capability by altitude and by range

Surface to Air Weapons Capability by Altitude	
Low Altitude	< 20,000 ft
Medium Altitude	20,000 – 40,000 ft
High Altitude	> 40,000 ft

Surface to Air Weapons Capability by Range	
Short Range	< 20 km
Medium Range	20 – 100 km
Long Range	> 100 km

Table 4-2 Surface to Air Weapons Capability

(3) Joint Engagement Zone. A JEZ is airspace of defined dimensions within which multiple air and missile 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.

(4) Base Defense Zone. The 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 MATC operating at the forward operating base. 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., MATC or a joint/coalition air traffic control system.
- Radar.
- Weapons system.

(d) Vital Area. A vital area is a designated area or installation to be defended by DCA 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 their MAGTF air defense priorities.

(e) 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, 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, 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.
- Retasking 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.

(f) 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.

(g) 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.

(h) 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.

(i) 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.

(j) 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.

4006. RELATIONSHIP BETWEEN AIRSPACE CONTROL AND AIR AND MISSILE 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 and missile defense units to *reduce the risk of fratricide and balance those risks with the requirements for an effective air and missile defense.*

The balance required between restrictions on airspace control and flexibility provided to DCA 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 DCA 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 coordinating 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 and missile 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, MCTP 3-20F, MCTP 10-10B and chapters 6 and 7 of this MCTP.

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4007. MARINE AIR COMMAND AND CONTROL SYSTEM

The MAGTF commander normally delegates the authority for aviation operations to the ACE commander. The ACE commander exercises their authority through the Marine Air Command and Control System (MACCS). The MACCS provides the ACE commander with the means for effective command, coordination, and control of all MAGTF aviation operations and the effective function of the MAGTF's IADS. Appendix A provides an example data link architecture that supports information exchange requirements.

The MACCS task-organizes its resources based on the mission, enemy, terrain and weather, troops and support available, time available, and civil considerations (METT-TC). Although all MAGTF elements provide personnel and control agencies that comprise the MACCS, the ACE provides the majority of functionality.

(a) Tactical Air Command Center. The Tactical Air Command Center (TACC) is the senior MACCS agency and the focal point for command 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.

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
- Current operations
- Air combat intelligence (ACI).

Future plans conducts aviation and aviation support planning for the next Marine Expeditionary Force (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 MCRP 3-20F.2, Marine Tactical Air Command Center Handbook, and chapter 5 of this MCTP.

(1) Tactical Air Direction Center. A Tactical Air Direction Center (TADC) can be established by the Commander, Landing Force (CLF) during amphibious operations. It coordinates between MACCS agencies ashore and the Commander, Amphibious Task Force'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 DCA operations, OCA operations or both. See NWP 3-09.11, Supporting Arms in Amphibious Operations, and chapter 6 of this MCTP for more information on passage of control ashore.

(b) Sector Air Defense Commander. A Marine Sector Air Defense Commander (SADC) is the MAGTF's DCA battle manager and is responsible to the ACE commander, who is second only to the AADC or Regional Air Defense Commander (RADC) for the effective management of air and missile defense assets within the assigned sector. During MAGTF only operations, the ACE Commander appoints and determines the extent of the SADC's authority. During joint operations where a Marine is designated as the SADC by the AADC, the AADC will be responsible for determining the extent of the SADC's authorities. The SADC must be experienced in AMD operations and thoroughly knowledgeable on the capabilities and limitations of air and missile defense assets (aircraft and surface-to-air) within the sector. The SADC coordinates with the ACE commander, Senior Watch Officer, as well as higher and adjacent air defense commanders during joint operations (e.g other SADCs, RADC, AADC).

The SADC does not exercise real time control of aviation operations. Their responsibilities focus on coordinating and planning DCA and limited OCA operations. Within these guidelines, the SADC and their staff typically provide the interface between TAOC controllers, the ACE commander's battlestaff, and the Air Defense Commanders within adjacent sectors and/or regions.

When the Area Air Defense Commander assigns a Marine SADC, the SADC and their battlestaff normally collocate a Sector Air Defense Facility (SADF) with the TAOC to integrate and provide the AADC with a greater capability to coordinate with the TAOC and ACE battlestaff. Representatives from various units of the Marine Air Control Group, joint force personnel (e.g. ADAFCO), and representatives from the ACE battlestaff may also man the SADF.

SADC functions in AAW operations typically include—

- Managing DCA resources, including aircraft and surface-to-air weapons within the assigned sector.
- Managing airborne tankers.
- Recommending air defense 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 DCA priorities to the MAGTF commander via the ACE commander.
- Launching alert aircraft or retasking airborne aircraft to attack time critical targets, when authorized.

The SADC may incorporate the following crew positions to support AAW operations

(1) SADC Operations Officer. The SADC Operations Officer (SADC Ops) facilitates the interface between the TAOC and the TACC as well as making recommendations to the SADC for the employment of AMD assets. The SADC operations officer coordinates DCA operations with the TACC's air defense coordinator and the TAOC's weapons director.

(2) SADC Operations Chief. The SADC Operations Chief is responsible for the setup, organization, and administrative functions of the SADF in accordance with the SADC operations officer's direction.

(3) Intelligence Representative. The SADC Intelligence Representative provides the interface between the intelligence officers/representatives at various air defense units and the intelligence watch officer at the TACC. The intelligence representative is responsible for collecting, processing, and analyzing all available intelligence and disseminating that information throughout the TAOC. Based on available information, the intelligence representative may provide insight concerning probable enemy courses of action to the SADC.

SADF Augments

(1) Anti-Air Warfare Aviation Representative. When feasible, the SADC staff should be augmented by an aviation representative (75XX) to provide specialized knowledge on matters concerning MAGTF aviation. When available, the aviation representative could assist the SADC and TAOC crew members on matters including fighter tactics; weapons parameters and loadouts; aircraft capabilities and limitations; tanker operations; and interpretation of threat tactics.

(2) Air Defense Artillery Fire Control Officer. Brigade Air Defense Artillery Fire Control Officers (ADAFCOs) deploy to any region or sector where Army lower-tier engagement capabilities are employed. Primarily located with the RADC or SADC the ADAFCO coordinates and integrates Army lower-tier fires into the IADS by controlling the fires of subordinate units. The ADAFCO gives all fire control orders to subordinate units. The ADAFCO can be located with either the SADC crew or with the actual TAOC Weapons crew dependent upon how the SADC determines they want to fight the current Air Defense situation based on mission planning factors such as Rules of Engagement, Threat Analysis, etc.

(3) Low Altitude Air Defense Liaison. The Low Altitude Air Defense (LAAD) Liaison collects and manages information from LAAD sections and advises the SADC or Weapons Director (WD) on LAAD capabilities and employment options. In addition, the LAAD Liaison recommends states of alert for LAAD teams to the SADC or WD and passes threat and intelligence information to LAAD units.

(c) Tactical Air Operations Center. The Tactical Air Operations Center (TAOC) is subordinate to the TACC. It is the primary AAW agency of the MACCS within its MAGTF's assigned sector. The TAOC may perform alternate TACC functions (current operations section only) for limited periods. Additional air defense capabilities subordinate to the TAOC such as the Early Warning and Control (EW/C) site or Early Warning (EW) site may be employed to provide limited control functions (EW/C) and fill gaps in surveillance and/or communications coverage.

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 itinerant air traffic control and navigational assistance for friendly aircraft. The TAOC's organic surveillance radar is the AN/TPS-80.

(1) AN/TPS-80. The AN/TPS-80 can operate in Air Defense and SHORAD modes. These modes are determined at the command and control agency based on the mission and threat. Acquisition range, tracking, and update rate are two key differences between the aforementioned modes.

The TAOC shares an air picture built by its organic radars with data link and or cooperative engagement capability (CEC) equipped aircraft, missile units, MACCS, and joint air and missile defense agencies. See *Appendix A* for further information on digital connectivity. For units not capable of receiving information via digital means, the TAOC provides voice reports (manual crosstell) for early warning and situational awareness.

The TAOC detects, identifies, and controls intercepts for DCA operations within its assigned sector and assigns targets to surface-to-air weapon units. For OCA missions, the TAOC can provide control for sweep and escort missions and routing or coordination for SEAD or surface strikes. With information from the external platforms, the TAOC can provide location data for the guidance of aircraft conducting attack operations. See MCRP 3-20F.6, Tactical Air Operations Center Handbook.

d. Marine Air Traffic Control Company. The Marine Air Traffic Control Company (MATCC) 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 sector. The MATCC contributes to the MAGTF's IADS by exchanging air traffic control information with command and control units via voice reports (manual cross-tell) and chat. The MATCC is normally responsible integrating with LAAD within a BDZ to provide early warning and cueing to surface-to-air weapons. See MCRP 3-20F.7, Marine Air Traffic Control Detachment Handbook.

e. Low Altitude Air Defense Battalion. The LAAD battalion consists of a headquarters and service battery and three 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 SADF.

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 MCRP 3-20F.8, *Low Altitude Air Defense Battalion Handbook*

Over the past decade, small Unmanned Aircraft Systems (sUAS) proliferation and platform capability has increased. As technology progresses, both reconnaissance and attack capabilities have matured to the point where sUAS represent a significant threat to MAGTF operations from state and non-state actors. As a result, a significant modernization of the LAAD battalions is underway. The Marine Air Defense Integrated System (MADIS) family of systems incorporates the full kill chain in a maneuverable weapon system mounted on a turreted Joint Light Tactical Vehicle (JLTV). MADIS has active and passive sensors, including a small radar for target acquisition and guidance of weapons, as well as passive radio frequency (RF) detector and electro-optic/infrared (EO/IR) cameras for visual tracking and identification of aircraft. The MADIS includes kinetic and non-kinetic defeat options against sUAS, and fixed-and rotary-wing (FW/RW) manned aircraft. The primary version of the MADIS fielded to LAAD units will include multiple weapon options: the Stinger missile to retain a proven short range capability against FW/RW aircraft; a crew served weapon for engagements against manned aircraft within the

minimum engagement range of Stinger and low-cost engagements against sUAS; and, kinetic and electronic warfare (EW) weapons optimized for sUAS engagements. Finally, the MADIS will include a command, control and communications suite capable of coordinating LAAD unit surface to air fires within the unit, and integrating into the MAGTF IADS.

The MADIS family of systems also uses the proven and integrated sensors, weapons, and C3 suite to enable other employment options. The "Light-MADIS (L-MADIS)", which mounts sensors, C3, and EW capabilities on a utility vehicle capable of internal transportation on Marine Corps RW and tiltrotor aircraft is optimized for employment on MEUs. The MADIS family of systems can also be employed as a suite, without vehicles, to provide a tailored C-sUAS capability to meet Marine Corps installation requirements. Additional Counter sUAS planning and employment considerations can be found in *ALSA MTTP AMD, Chapter 6*

Lastly, as enemy cruise missile proliferation continues to increase, the Marine Corps will continue to leverage a network of radars and C2 systems to detect and identify threats. The aforementioned sensors and systems coupled with a kinetic counter cruise missile (CCM) capability will enable organic prosecution of threats inbound to MAGTF assets.

f. Direct Air Support Center. The Direct Air Support Center (DASC) is subordinate to the Marine TACC. It directs aviation operations that directly support ground forces. 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 OCA 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 and combined control using data link provided by adjacent agencies. 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 OCA missions, including OCA attack operations against a time critical target, conducted in or near the proximity of friendly troops. See MCRP 3-20F.5, *Direct Air Support Center Handbook*.

g. 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.

h. Air Coordinators and Air Controllers. Ground-based and airborne coordinators and controllers serve as extensions of the MACCS (e.g., forward air controllers; forward air controllers (airborne); tactical air coordinators). These coordinators and controllers can contribute significantly to the overall AAW effort during Strike Coordination and Reconnaissance missions, assisting in the control of OCA strikes, conduct of visual surveillance, and providing input to the intelligence cycle.

4008. 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 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 they need to add to their 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 mediums.

The TACC, TAOC, and LAAD can interface and share air and missile defense information with joint and coalition 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 resources. 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 challenges caused by terrain features and curvature of the Earth. Optimizing radar placement relative to designated surveillance areas and augmenting radar coverage with gap filler/early warning radars and airborne radars can minimize this limitation.

Passing AAW-related information and receivingradar data depends highly on the electromagnetic spectrum. Aviation 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 upon 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.

Integrating AAW operations with supporting arms fires. Weapons employment and ROE. Aerial refuelers. The means and procedures to warn all ATF and LF (or MAGTF) units of the impending air attack. The land-based air and missile defense system's ability to support forces afloat.

Chapter 5
PLANNING

Planning is the art and science of envisioning a desired future and laying out effective ways of bringing it about. (MCDP 5, Planning). It is a process that requires a number of ongoing, iterative, interdependent activities. The ongoing planning process requires plans to build on itself. The MAGTF conducts planning to orient itself on future objectives. Planning forces MAGTF personnel to project their thoughts forward in time, focus on the enemy, anticipate actions and reactions, and assess risk. Proper planning can help seize the initiative, assist in time-sensitive decision making, simplify complex situations, and generate tempo.

The commander's intent and planning guidance are essential to the creation of plans. Their active involvement in each step of the planning process ensures clear understanding of their vision and desired end state while ensuring the plan built supports the MAGTF's single battle concept. AAW planning supports—

- Deep operations to shape the battlespace and achieve battlespace dominance.
- Close operations to engage in decisive combat.
- Rear operations to provide force sustainment.

Effective conduct of anti-air warfare operations requires integrated planning at all levels and with each MAGTF element. The MAGTF commander relies on the expertise and advice of element commanders and their staffs to help determine the MAGTF's AAW concept of operation. ACE, GCE, and LCE commanders; their staffs; and their subordinate elements must understand the MAGTF commander's guidance and intent. To achieve unity of effort, the MAGTF commander must clearly outline AAW planning responsibilities. However, all commanders are responsible for the planning and execution of passive AMD measures.

5001. DELIBERATE PLANNING

AAW operations must be carefully and deliberately planned to achieve the desired degree of air superiority and force protection required by the MAGTF. There are three planning frameworks used to conduct timely and thorough deliberate planning.

a. Concurrent Planning. Concurrent planning is planning accomplished simultaneously by two or more echelons of the same command or by corresponding echelons of different commands. Subordinate commanders can start concurrent planning based on information announced before written planning documents are issued. Planning memorandums, warning orders, and outline plans are other ways to disseminate fragmentary planning information. This dissemination allows subordinate commanders to start concurrent planning. Concurrent planning can avoid the long, detailed planning process that can occur if essential information is stalled in lower command echelons. To control con- current planning, subordinate commanders must have a clear understanding of the commander's intent (at least two echelons above the subordinate commander).

b. Parallel Planning. Parallel planning results from close and continuous coordination between corresponding units. AAW's coordination requirements, interrelationship of assigned tasks, and complex support requirements make parallel planning essential. Basic AAW decisions are determined based on a common understanding of objectives and procedures obtained from the free exchange of information among units. Mission-type orders, clear commander's intent, and continuous liaison provide an atmosphere conducive to parallel planning.

c. Detailed Planning. Detailed planning is required at all levels, although its extent is situation dependent. It should promote flexibility. Planners should foresee likely possibilities and develop plans that respond to changing conditions such as—

- The requirements for air, naval, and artillery fire control for SEAD.
- All-weather operations.
- Airspace control.

5002. PLANNING FACTORS

The MAGTF commander should consider many factors when developing planning guidance. These factors reflect METT-TC and the commander's intent based on the MAGTF's concept of AAW operations, and provide a framework. Factors that should be addressed are—

- The quantity and capability of enemy offensive and defensive air weapons, including theater missiles (both ballistic missiles and cruise missiles) and electronic warfare assets, the latter with particular regard to electronic attack and electronic protection capabilities.
- The terrain within the AOA.
- The anticipated duration of operations.
- The ATF's AAW plan for ship-based radar surveillance and weapons projections ashore.
- The air defense regions, sectors, and procedures established by the ATF commander, naval expeditionary force (NEF) commander or the joint force commander based on DCA responsibilities.
- Integrating MAGTF AAW assets with naval, joint or coalition forces.
- The characteristics of, definition of, and procedures for the destruction, vital, and surveillance areas.
- Availability, capability, and integration of MAGTF AAW assets.
- The plans to land MAGTF anti-air warfare units in relation to their proposed locations.
- The time and conditions for phasing control ashore.
- Centralized command and decentralized control.
- Integrating AAW operations with supporting arms fires.
- Weapons employment and ROE.
- Aerial refuelers
- The means and procedures to warn all ATF and LF (or MAGTF) units of the impending air attack.
- The land-based air and missile defense system's ability to support forces afloat.

5003. PLANNING RESPONSIBILITIES

The Marine Corps planning process is driven by top-down guidance, the single battle concept, and integrated planning. Applying these tenets to each warfighting function, the commander and their staff strive to achieve unity of effort and effective integration of combat power.

(a) Higher Headquarters. Initially, AAW planning, including coordinating all AMD weapon systems and electronic attack, is the responsibility of higher headquarters. Depending on the type of operation and command relationships, higher headquarters can be the joint force or appropriate naval commander. Higher headquarters concentrates on the general conditions required for AAW planning. General conditions are based on the level of command and vary accordingly; e.g., if the joint force commander's main focus is on the campaign, subordinate commander's focus principally on the conduct of operations that support the campaign. In battles and engagements, commanders plan AAW operations against enemy capabilities that will shape the battlespace, achieve battlespace dominance, and influence future operations. Responsibilities may include—

- Establishing and disseminating appropriate ROE.
- Coordinating plans for early warning and air surveillance.
- Determining AAW priorities.
- Establishing appropriate AAW sectors.
- Establishing AAW restricted areas.

(b) MAGTF Commander. The MAGTF commander directs MAGTF operations in support of the joint force commander's campaign. The MAGTF commander directs the planning of AAW operations to shape the battlespace and achieve battlespace dominance. He tasks their staff to plan AAW operations to support MAGTF operations. He tasks subordinate commanders to conduct AAW planning in support of deep, close, and rear operations. Both the MAGTF staff and subordinate commanders and their staffs conduct AAW planning based on the MAGTF commander's mission, commander's intent, main effort DCA priorities, and other guidance. MAGTF AAW operational planning isolates, shapes, and prepares the battlespace for future operations and provides for the force protection and air superiority required to conduct deep, close, and rear operations. Responsibilities include—

- Coordinating MAGTF intelligence planning and cyber operations
- Translating information requirements into collection tasks for agencies both within and external to the MAGTF.
- Providing initial and periodic assessments of enemy air defense capabilities.
- Identifying MAGTF or LF requirements and capabilities needed to conduct AAW.
- Informing higher headquarters; i.e., the joint force commander, NEF commander, and CATF of MAGTF AAW requirements and capabilities.
- Establishing AAW priorities among the ACE, GCE, and LCE including identifying vital, destruction, and surveillance areas.
- Issuing OCA and DCA objectives in the initial MAGTF planning guidance.
- Ensuring AAW is available and allocated sufficiently in quantity and type to establish an effective, land-based, AAW system ashore.
- Acting on requests for organic and nonorganic support that include—
- Organic electronic warfare support.
- Signals, human, and imagery intelligence support from national and theater-level intelligence collection assets.

(c) Supporting arms support. Organic communications support that connects national and theater-level intelligence collection assets and the MAGTF.

(d) Intelligence. Employment and integration of other Service, theater, and/or national assets to support or augment early warning, surveillance, and control of AAW operations.

(e) Aviation Combat Element (ACE) Commander. The ACE commander conducts AAW operations in support of the MAGTF. The ACE commander directs the staff and subordinate commanders and their staffs to plan AAW to support the MAGTF's deep, close, and rear operations. Appendices B and C are detailed checklists to ensure every significant planning consideration is covered. AAW planning is based on the MAGTF's mission, commander's intent, designation of the main effort, DCA priorities, and other guidance. The MAGTF commander may designate the ACE as the main effort to conduct AAW operations (especially during the initial stages of a conflict) or to conduct other shaping efforts where AAW efforts could play a large role.

(f) Ground Combat Element (GCE) Commander. The GCE commander uses combined arms to conduct ground operations that support the MAGTF commander's plan. GCE operations include deep, close, and rear operations. AAW provides force protection and air superiority for the GCE to conduct ground operations. The GCE commander and the staff must provide input during the planning of AAW operations.

The MAGTF's size and the level of threat imposed by enemy air and air defense assets determine the GCE commander's involvement. The GCE commander's needs can encompass DCA and OCA areas of concern Responsibilities include—

- Developing intelligence requirements for AAW operations and submitting them to the MAGTF G-2.
- Recommending to the MAGTF commander and coordinating with the ACE commander on—
    - Developing OCA and DCA objectives.
    - Developing OCA target priorities and procedures.
    - Developing DCA priorities with respect to the GCE.
    - Identifying vital, destruction, and surveillance areas.
    - Developing the preliminary AAW plan.
    - Determining the GCE's AAW requirements during planning and execution.
    - Developing procedures to monitor AAW operations.
    - Developing procedures to process and disseminate air and missile defense targets of opportunity and air asset information.

- Helping the ACE commander develop procedures to rapidly attack/engage enemy air and missile defense targets of opportunity discovered by the GCE.
- Providing periodic evaluation of the impact of enemy air and missile defense capabilities on GCE objectives.

(g) The Logistics Combat Element (LCE) Commander. The LCE commander conducts operations that provide essential logistics functions, activities, and tasks that support and permit force sustainment of the MAGTF. Force sustainment supports deep, close, and rear operations. AAW operations provide force protection and air superiority for the LCE to conduct logistics operations. The LCE commander and staff must provide input to AAW planning. The MAGTF's size and the level of threat imposed by enemy air and missile defense and OCA assets determine the LCE commander's involvement.
Responsibilities include—

- Developing intelligence requirements for antiair warfare operations and submitting them to the MAGTF G-2.
- Recommending to the MAGTF commander and coordinating with the ACE commander on—
    - Developing OCA and DCA objectives.
    - Developing OCA target priorities and procedures.
    - Developing of DCA priorities with respect to the LCE.
    - Identifying vital, destruction, and surveillance areas.
    - Developing the preliminary antiair warfare plan (includes DCA and OCA).
    - Determining the LCE's antiair warfare requirements during planning and execution.
    - Developing procedures to monitor AAW operations.
    - Developing procedures to process and disseminate air and missile defense targets of opportunity and air asset information.
- Helping the ACE commander develop procedures to rapidly attack/engage enemy air and air defense targets of opportunity discovered by the LCE.

- Providing periodic evaluation of the impact of enemy air and missile defense capabilities on LCE objectives.

5004. THE ACE BATTLESTAFF

The TACC is where the ACE commander and staff plan and execute AAW operations. The ACE battlestaff consists of three mutually supporting cross-function operational work sections supported by a centralized intelligence center called ACI. The ACE G-3 is the direct representative of the ACE commander in the TACC. The G-3 is responsible for the overall functioning of future plans, future operations, and current operations. The ACE G-2 has staff cognizance over all ACE intelligence activities, including ACI and the intelligence watch sections in future and current operations.

(a) Future Plans. Future plans is responsible to the ACE G-3 for aviation planning in support of the next MAGTF mission change. Future plans—

- Maintains liaison with MAGTF future plans.
- Conducts deliberate planning for MAGTF operation plans and follow-on missions associated with the current operation.
- Develops aviation courses of action for each follow-on MAGTF mission under development.
- Develops aviation estimates of supportability for each follow - on MAGTF mission under development.
- Develops and refines operation plans and orders associated with each follow-on MAGTF mission.
- Provides detailed deployment, employment, mobilization, and sustainment plans for follow-on MAGTF missions.
- Prepares course of action brief and/or supportability decision briefs.
- Helps future operations after the ACE support plan transitions to the operational planning team for operation order/frag order detailed preparation.

(b) Future Operations. Future operations plans for those activities directed against an enemy when detailed planning must be accomplished and aviation resources allocated. Future operations builds the next ATO using preplanned requests and planning and coordination information from the ACE headquarters staff, MAGTF headquarters, and the joint force commander's staff. Future operations coordinates with current operations to determine any requirements to continue or extend the efforts of the current battle. Future operations—

- Maintains liaison with MAGTF future operations, fires and effects coordination center, and the joint air operations center combat plans division.
- Plans and produces the next ATO using approved planning guidance.
- Develops ACE operation orders/frag orders based on support plans prepared by future plans.
- Administers the ACE targeting board.
- Formulates current plans outside the ATO cycle but within the current operation order/frag order.
- Plans and coordinates changes to the airspace control order and air defense plan.
- Develops ACE's air apportionment recommendation.
- Directs, coordinates, and supervises the development and forwarding of the ACE commander's critical information requirements.
- Provides the ACE operational planning team's nucleus.
- Coordinates with current operations and development of ATO.

(c) Current Operations. Current operations coordinates and executes those activities directed against an enemy when planning has been completed and resources committed. This period is normally 24 hours. It includes all on-

going operations conducted by the ACE in support of the MAGTF, such as current aviation operations in support of deep, close, and rear operations. Current operations personnel execute the current ATO. Its crewmembers interface directly with subordinate MACCS agencies such as the TAOC, DASC, and MATC to ensure ACE capabilities are managed and employed in accordance with the ACE commander's intent. Current operations crew members coordinate with and receive information from TACC future operations to assist in directing and controlling current operations. Current operations—

- Maintains liaison with MAGTF current operations and the joint air operations center combat operations division.
- Manages the execution of the ACE operations order/frag order.
- Manages the execution of the current ATO.
- Assesses and adjusts current ACE operations based on changes in MAGTF guidance or the status of friendly and enemy force situation.
- Analyzes and interprets battlespace events as they relate to MAGTF aviation operations.

(d) Air Combat Intelligence. ACI provides timely, tailored, and fused intelligence to future plans, future operations, and current operations. It is the focus of all aviation intelligence activities supporting the ACE. It produces and disseminates aviation-specific all-source intelligence, including assessments of enemy capabilities and vulnerabilities, target analysis, battle damage assessment, and the current status and priority of assigned targets.

ACI is responsible to the ACE G-2 for producing and disseminating aviation-tailored all-source intelligence required for decision making during the planning and execution of MAGTF aviation operations. ACI extends and complements, but does not duplicate, the efforts of the MAGTF G-2 all-source fusion center. See MCRP 3-20F.2. Some specific ACI tasks are:

- Maintain liaison with the MAGTF G-2 operations section, the joint air operations center intelligence division, and other designated intelligence activities.
- Prepare ACE intelligence estimates and intelligence summaries.
- Direct, coordinate, and supervise the development and forwarding of ACE priority intelligence requirements and other intelligence requirements.
- Prepare and implement the ACE organic intelligence collection plan, including planning and coordinating unmanned aerial system (UAS) operations.
- Direct, coordinate, and supervise the production and dissemination of all-source intelligence to the ACE commander, staff, and subordinate units.
- Direct, coordinate, and determine ACE requirements for maps, charts, graphic aids, and imagery products, and supervises distribution.
- Coordinate intelligence support for ACE survival, evasion, resistance, and escape requirements, and arrange for and coordinate dissemination of weather data for the ACE.

5005. THE AIR TASKING ORDER

The ATO is generated by the ACE commander in MAGTF operations and the JFACC in joint operations. The ATO tasks and disseminates targets and specific missions of projected sorties, capabilities, and forces to components, subordinate units, and command and control agencies. It normally provides general and specific instructions; e.g., call signs, targets, and controlling agencies.

The ATO may include the airspace control order or issued separately. It also includes special instructions (SPINS).

SPINS provide amplifying notes, important details, and changes. The ATO, airspace control order, and SPINS provide operational and tactical direction at appropriate levels of detail. The level of detail should be explicit when forces operate from different bases and multi-component and/or composite missions are tasked. Less detail is required when missions are tasked to a single component or base. See JP 3-52.

Each ATO covers a 24-hour period. There are usually four ATOs at any given time. They include the ATO—

- Undergoing assessment (yesterday's plan).
- In execution (today's plan).
- In production (tomorrow's plan).
- In planning (the following day's plan).

Because input to the joint ATO must be provided 3 to 4 days in advance, the ATO can represent only a starting point for daily flight operations. It is impractical to predict every need in advance. The MAGTF commander must have the flexibility to launch or retask any aircraft to complete the mission, even if this requires short-notice deviations from the ATO.

The air tasking cycle is the key aviation planning tool regardless of the size or type of operation. It provides planners with a process that most efficiently and effectively supports MAGTF operations with available aviation assets. This cycle produces the MAGTF ATO and/ or air plan. The six-phase joint ATO cycle is described in JP 3-56.1, *Command and Control for Joint Air Operations*. The MAGTF six-phase air tasking cycle is discussed in MCWP 3-20, *Aviation Operations*. The re- vised MAGTF six-phase air tasking cycle retains the necessary steps of the previous four-phase cycle but is more compatible with the joint ATO cycle. This progression is essential for Marine aviation to function in the joint arena, particularly if the ACE commander is dual-hatted as the JFACC. Figure 5-1, The six phases of the MAGTF ATO cycle are command aviation guidance, target development, allocation and allotment, tasking, force execution, and combat assessment.

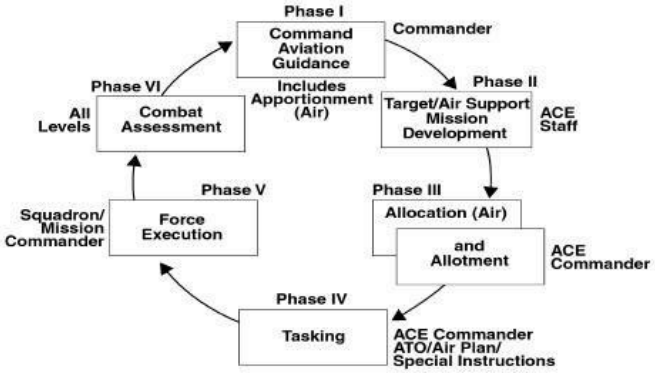

Figure 5-1 MAGTF Six-Phase Air Tasking Cycle

Chapter 6
OPERATIONS

An operation is a military action or the carrying out of a strategic, tactical, service, training or administrative military mission; the process of carrying on combat, including movement, supply, attack, defense and maneuvers needed to gain the objectives of any battle or campaign. (JP 1-02). In support of U.S. military operations, Marine forces are organized and equipped specifically to meet the requirements of expeditionary operations. (MCDP 3, Expeditionary Operations). Expeditionary operations are military operations conducted by an armed force to accomplish a specific objective in a foreign country. Expeditionary operations involve projecting a force into a crisis or conflict by establishing forward bases (land- or sea-based) from where military operational power can be brought to bear on the tactical situation. Expeditionary operations are temporary in nature. They are conducted with the intent of withdrawing from the foreign country after the specific task or mission has been accomplished.

6001. MAGTF ANTIAIR EMPLOYMENT

The MAGTF is the Marine Corps' primary tactical organization for conducting missions across the spectrum of military operations. Each MAGTF has a command, ground combat, aviation combat, and logistics combat element. Each element contributes directly or indirectly to the MAGTF's AAW operations. Regardless of the MAGTF's task organization, each MAGTF element commander is responsible for conducting passive AMD operations.

(a) Marine Expeditionary Force. The Marine Expeditionary Force (MEF) is the principal Marine Corps warfighting organization. It is usually employed in support of larger crises or contingencies. It is capable of missions across the range of military operations, particularly amphibious assault and sustained operations ashore. The MEF's AAW resources enable it to perform all missions as described in chapters 2 and 3, and fully integrate into the aviation operations and air and missile defense architecture of a joint or coalition force using the command and control structure described in chapter 4. The MEF's AAW resources normally include-

- A Marine aircraft wing with squadrons of fixed- and rotary-wing aircraft that conduct all AAW missions.
- Short-range surface-to-air missile systems for air and missile defense.
- A MACCS that can execute centralized command and decentralized control of AAW operations (including air command, direction, surveillance, and control) and integrating MAGTF AAW operations with those of the joint or coalition force.

The MEF is an enabler for certain joint force functional requirements. In AAW operations, capabilities include performing as the joint force air component commander and hosting the associated command post, i.e., the joint air operations center; and coordinating joint force DCA operations as the AADC or as a regional or sector air defense commander (RADC/SADC) under the AADC.

(b) Marine Expeditionary Brigade. The Marine expeditionary brigade (MEB) is the mid-sized MAGTF normally employed to conduct operations that bridge the gap between our principal warfighter (the MEF), and the MEU. The MEB is normally a self-contained operating force capable of missions that require sustained operations for up to 30 days. The MEB is capable of conducting independent amphibious assault operations, maritime prepositioning force (MPF) operations or operate/ serve as the advanced echelon of a MEF.
MEB AAW resources can be task-organized to perform many of the missions as described in chapters 2 and 3, and integrated (to a lesser degree than a MEF) into the aviation operations and air and missile defense architecture of a joint or coalition force. This is accomplished by using task-organized portions of the command and control structure described in chapter 4. MEB AAW resources may include-

- A composite Marine aircraft group (MAG) task- organized with fixed- and rotary-wing aircraft to conduct OCA and DCA missions.
- A short-range surface-to-air missile assets for AMD against aircraft or sUAS.
- A MACCS capable of executing centralized command and decentralized control of AAW operations critical to the MAGTF.

This MEB C2 system may be task-organized to perform functions as the JFACC and AADC if required to integrate with a joint or coalition force.

(c) Marine Expeditionary Unit. The Marine Expeditionary Unit (MEU) is the standard forward- deployed Marine expeditionary organization. It is normally used as a self-contained operating force capable of missions of limited scope and duration, and may act as a forward-deployed extension of the MEF. AAW capabilities typically include—

- A composite squadron of fixed and rotary-wing aircraft that conduct limited OCA and DCA operations.
- A reinforced short-range surface-to-air missile section.

Because of its limited size and scope of its operations, the MEU relies on the NEF to fill most of its AAW requirements. The NEF typically provides for AMD of the MEU and its accompanying amphibious ready group and OCA resources from naval surface fire support and carrier-based aircraft. The NEF provides the majority of command and control to the MEU. The MEU contributes to NEF AAW efforts with its infantry, artillery, aircraft, and surface-to-air missiles. Its aircraft and man-portable surface-to-air missiles can augment the amphibious ready group's DCA efforts during emergency defense.

(d) Special Purpose MAGTF. The Special Purpose MAGTF (SPMAGTF) conducts a specific mission that is limited in scope, focus, and of- ten in duration. The SPMAGTF may be a force of any size, but is normally small. SPMAGTF AAW capabilities are specifically tied to its task organization.

6002. DEFENSIVE COUNTERAIR PRIORITIES

Once DCA priorities are assigned to MAGTF assets, the assets are defended in priority order by the supporting air and missile defense units. In determining DCA priorities, the MAGTF commander evaluates assets and determines the relative importance of each asset to the MAGTF's ability to accomplish its mission. The supporting AMD unit commander balances force availability against the MAGTF commander's list of critical assets. Beginning with the most important asset, the AMD unit commander determines, based on their experience, the assets the forces can defend. Then he recommends to the MAGTF commander, via the ACE commander, that these assets receive DCA priority. The following factors determine the relative importance of an asset and its need for air and missile defense.

(a) Criticality. Criticality is the degree to which the asset or area is essential to mission accomplishment. If prioritizing, assets are categorized as those that—

- Prevent mission accomplishment if damaged.
- Interfere with the immediate accomplishment of the mission if damaged.
- Interfere with the eventual accomplishment of the mission if damaged.
- Slightly restrict the mission accomplishment if damaged.

(b) Vulnerability. Vulnerability consists of two parts: susceptibility (the degree an asset is susceptible to surveillance, attack, or damage) and recoverability, if attacked and damaged. Recoverability, once a factor itself, is now a subset of vulnerability and is the degree and ability to recover/reconstitute from inflicted damage in terms of time, equipment, and manpower and to continue the mission. Commanders should consider the time to replace personnel, equipment, or entire units, as well as whether other forces can perform the same mission. Useful factors to determine an asset's vulnerability include—

- Hardening/ Survivability and Cover (resistance to destruction or degradation).
- The mission.
- Mobility and dispersion (ability to relocate while protected by other AMD weapons).
- Organic Active and Passive AMD capability against enemy AMD threats

(c) Threat. Assess the probability an asset will be targeted for surveillance or attack by the adversary. Determination of adversary intent and capability are key determinants of assessing the probability of attack. An intelligence assessment, oriented specifically on adversary air and missile capabilities is key to an accurate threat assessment. Intelligence personnel can support with past adversary surveillance and attack methods, threat type, location, strength, and threat doctrine. Threats such as sUAS and cruise missiles with advanced capabilities provide unique challenges that are being addressed by emerging Marine Corps capabilities. Once the MAGTF commander has established the air defense priorities, employment principles and asset guidelines provide the basis for employment of AMD weapons in the MAGTF's IADS.

6003. AIR AND MISSILE DEFENSE EMPLOYMENT PRINCIPLES

AMD employment principles creates an IADS that prevents enemy air attacks from interfering with the MAGTF's mission.

(a) Mobility. Mobility is crucial to air and missile defense. The MAGTF's AMD systems must be highly mobile and rapidly deployable to provide continuous protection for maneuver elements and provide self-defense.

(b) Weapons Mass. Weapons mass allocates sufficient AMD resources to defend MAGTF air defense priorities or areas adequately. Weapons mass is achieved by concentrating ground -based and airborne DCA assets on and around a vital area to defend it from enemy air attack. The ability to mass weapons depends on effective command and control.

(c)Weapons Mix. Weapons mix blends aircraft, SAMs, and small arms to achieve a balanced, complementary AMD system that complicates the enemy's ability to attack the MAGTF. Weapons mix offsets the limitations of one AMD system with the capabilities of another, strengthens the MAGTF's IADS, and degrades the enemy's ability to respond.

(d) Integration. Integration is the close coordination of effort and unity of action that results from the efficient blending of individual AMD systems. It conserves fires and eliminates unnecessary multiple engagements of the same target by different assets. If the MAGTF IADS is to support the battle for air superiority, it must be integrated into MAGTF operations. Command and control provides the means to coordinate and control the MAGTF IADS.

6004. AIR AND MISSLE DEFENSE EMPLOYMENT GUIDELINES

Commanders should reference MAGTF size, organization, and inherent AMD assets when tailoring employment guidelines.

(a) Balanced Fires. Balanced fires result from positioning AMD assets so they can provide equally defensive fires from all directions. Balanced fires take on added importance when faced with a 360 degree threat from enemy air attack.

(b) Weighted Coverage. Weighted coverage results from concentrating AMD weapons toward known enemy locations, unprotected unit boundaries or likely enemy attack corridors or routes.

(c) Mutual Support. Mutual support results from positioning individual assets so they deliver fires into dead zones that surround adjacent assets. Mutual support enhances defensive survivability. The required maximum distance between AMD units and assets to achieve mutual support varies depending on the type of AMD weapon and the speed and altitude of the threat.

(d) Early Engagement. Early engagement is the engagement of aircraft before their release of ordnance at the maximum range of surveillance and weapons systems. DCA assets should be positioned far enough from the defended asset or area to allow engagement of enemy aircraft before they deliver their ordnance. The distance between the defended area and the defending assets will vary. The enemy threat, ordnance, delivery methods, and the type of MAGTF DCA assets determine the distance between the defended area and the defending assets.

(e) Overlapping Fires. Overlapping fires occur when individual AMD units' engagement zones overlap. Overlapping fires reduce the possibility of enemy aircraft slipping through the MAGTF's air defense without being engaged by at least one AMD unit.

(f) Defense-in-Depth. Defense-in-depth results from positioning AMD assets so enemy aircraft meet an increasing volume of fire as they approach a defended asset or area. The MAGTF IADS maximizes the effects of defense-in-depth by integrating and coordinating all AMD weapons.

6005. SELECTING AND POSITIONING AIR AND MISSILE DEFENSE WEAPONS

Force protection considerations are critical during MAGTF operations. The MAGTF's mission, task organization, concept of operations, and the anticipated threat are the principal factors that determine the weapons to protect the MAGTF from aircraft and missile attacks. Other factors to consider to determine the number and disposition of ground- based and airborne weapons systems include—

- Availability of fighters and fire units.
- Terrain (topography and accessibility).
- Type of defense.
- Coverage by other AMD resources.
- Nature of the enemy threat (ground-based and airborne).
- Coverage and limitations of ground-based radars, adjacent fighters, and fire units.
- Minimum safe intercept point for each type of threat.
- Enemy weapons delivery technique.
- Attack altitude and speed.
- Available ordnance.
- Likely avenues of approach.
- Anticipated rates of attack.
- Time lapse between target detection and intercept
- Communications requirements.
- Airspace coordinating, air defense, and fire support coordination measures.

6006. EMPLOYMENT OF GROUND-BASED AIR DEFENSE WEAPONS

Surface-to-air weapons provide the ground-based air defense of the MAGTF's IADS. Positioning ground- based air defense weapons are affected by the type of defense desired and specific system site considerations.

Point defenses are usually located in the MAGTF's rear area to achieve balanced fires, early engagement, destruction-in-depth, and mutual support. Normally, point defenses do not have enough assets to provide weighted coverage in more than one direction and still protect the defended asset from attack from an unexpected direction.

Air and missile defenses are usually located in a forward zone to achieve destruction in-depth, mutual support, early engagement, and weighted coverage. Normally, area defenses do not attempt to achieve balanced fires. Area defenses are designed to prevent penetration from the rear, and they usually provide defense in- depth along expected avenues of approach. If a limited number of air defense systems are available, area defenses may be forced to forego early engagement along more than one threat axis to achieve continuous coverage over a broad territory.

LAAD elements must consider friendly positions and ensure that requirements in their sites do not exceed the bounds of the supported unit's security area. To avoid revealing friendly force locations to the enemy, supported units may restrict areas where weapons can employ. Each LAAD unit commander, down to and including team leaders, must coordinate with supported or adjacent friendly forces' firing site requirements and support the friendly scheme of maneuver. See MCRP 3-20F.8 for details on LAAD employment. Considerations for the location of LAAD capabilities include—

- Enemy air threat, including air delivery methods and tactics.
- Mission and disposition of the defended unit(s)/installation(s).
- Commander's guidance concerning elements or installations to be defended and their order of priority.
- Capabilities of other MACCS agencies to provide integrated air defense and early warning.
- Weapon system capabilities and limitations.
- Availability of firing and alternative firing positions.
- Location and coverage by other AMD means.
- Clarity of fields of fire.
- Disposition/control procedures while embarked.
- Self defense criteria and actions during autonomous operations

6007. EMPLOYMENT OF FIGHTER AIRCRAFT

Aircraft manning CAPs are the airborne AMD assets of the MAGTF's IADS. In the MAGTF's IADS, the CAP is the maneuver element. CAP employment, positioning, and tactics must be considered to optimize CAP effectiveness in the MAGTF's IADS. Fighter/sensor CAP capabilities are flexible and blend with the principles of destruction-in-depth and mutual support. Destruction in-depth normally places the fighters forward of ground-based air defense weapons in the MAGTF integrated air defense system as the first line of defense. Weapon engagement zones are placed in line with the threat axis to allow CAPs to continuously engage threat aircraft during their ingress and egress.

Placement of CAPs should facilitate engagement of enemy aircraft as far from the vital area or defended asset as practical. This may or may not correspond to the maximum surveillance range of the TAOC's radars because of terrain masking and airspace limitations. CAP engagements should occur before the enemy reaches its weapons release point. This requires some form of extended range combat air patrols and expanded DCA lanes, which extend well forward of the forward line of own troops.

(a) Altitude. An altitude should be high enough to provide low-altitude surveillance coverage denied to TAOC radars.

(b) Search Patterns. Search patterns should be tailored to anticipate threat tactics and TAOC surveillance gaps.

(c) Speed. CAP aircraft speed should be based on threat and time on station requirements.

(d) Formation. Synchronized, single, night, and all-weather CAPs require special consideration. Refer to appropriate Naval Air Training and Operating Procedures Standardization (NATOPS) manuals for more details.

(e) Commit Criteria. Commit criteria should be established within the confines of mission requirements and ROE.

(f) Rules of Engagement. ROE should be established during the planning process and continuously evaluated to provide fighters with the opportunity to use offensive tactics.

(g) Intercept Tactics. Aggressive tactics should be used to destroy enemy aircraft, break up strike packages, and negate the effects of enemy fighters.

(h) Manning and Relieving. Defense conditions and available assets determine the CAP manning plan. Procedures should be established for sufficient IADS coverage.

(i) Situational Awareness. Communications flow between IADS control agencies and weapon platforms should be determined and transmitted to all potential users to facilitate situational awareness.

6008. WEAPON ENGAGEMENT ZONE

Establishing weapon engagement zones is imperative to protect MAGTF vital areas. The MAGTF commander uses the weapon engagement zone concept to define zones of responsibility to a weapons system; e.g., aircraft or surface-to-air weapons. Weapon engagement zones enhance weapons systems capabilities and offensive tactics (fire and maneuver) by fighters. If possible, the MAGTF commander should select recognizable terrain features to define a weapons engagement zone. A weapon engagement zone should offer—

- Well-defined responsibilities for all weapons.
- Concentration of firepower.
- The ability to use offensive tactics for radar fighters.
- Ease of command and control
- Less restrictive weapons engagement conditions.

Each weapon system; e.g., LAAD, F-35, F/A-18 has specific requirements for optimum location and employment. The ACE commander must determine the number and location of AMD assets for effective air and missile defense of MAGTF air defense sectors based on input from the TACC ADC, SADC, TAOC, and GCE and LCE commanders. Number, location, and composition of aircraft for CAP stations to defend against the enemy threat in fighter engagement zones must be determined. The ACE commander, with input from the TACC ADC, and/or SADC, determines the number of aircraft on station, ground or airborne alert and the aircraft's secondary DCA mission. They also determine the number, location, and composition of surface-to-air weapons needed in the missile engagement zone to defend against the enemy threat.

Weapon engagement zone activation and deactivation procedures must be clearly outlined for adequate AMD coverage of the MAGTF's air defense sectors. Normally, the TACC ADC, SADC or TAOC is tasked with activation/deactivation responsibility. Activation occurs as surface-to-air weapons or aircraft become operational and assume responsibility for air and missile defense of a particular weapon engagement zone; i.e., fighter or missile engagement zone. A weapon engagement zone is deactivated if a surface-to-air weapons unit is degraded, destroyed or inoperable because of maintenance or if aircraft cannot provide coverage in a fighter engagement zone. When part of or an entire weapon engagement zone is deactivated, another weapon engagement zone is normally activated to provide air and missile defense coverage in that area.

Minimal, dedicated, full-time aircraft may be required on station in the weapon engagement zone if timely intelligence and early warning threat surveillance within the weapons engagement zone is present. Ground or strip-alert aircraft may be used to meet the DCA requirement within the weapon engagement zones. Dedicated on station aircraft may be required to ensure the integrity of the MAGTF IADS if timely intelligence and surveillance are unavailable.

6009. WEAPONS MANAGEMENT

Weapons management is integrating and coordinating assets allocated for AAW missions and specifically operation of the MAGTF's IADS. Weapons management responsibilities start with the ACE commander and extend to the individual aircrew/missile unit; i.e., TAOC, or weapon platforms.

(a) Air Defense Warning Conditions. Air defense warning conditions indicate a degree of air raid probability. They are passed by the senior air control agency to all MAGTF elements. Warning conditions may differ between areas of the battlespace due to the tactical situation and localized enemy air threat. The three air defense warning conditions are—

Red	Attack by hostile aircraft is imminent or in progress.
Yellow	Attack by hostile aircraft is probable.
White	Attack by hostile aircraft is improbable.

Table 6-1. Air Defense Warning Conditions.

(b) Rules of Engagement. ROE are 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. (JP 1-02) As this relates to the ACE, ROE identify the exact conditions under which aircraft and missile batteries may engage a target (airborne or on the ground). Equipment, discipline, and principles for the employment of MAGTF aviation under the different ROE do not change. What is mitigated is the degree of force applied. ROE always allow the right of self-defense.

(c) Identification Criteria. Identification criteria are closely related to ROE. While identification criteria describe the conditions to declare unknown personnel or equipment as either friendly or hostile, ROE cannot be applied until identification occurs. There is an inverse relationship between the ease of identification and the restrictiveness of ROE.

(d) Weapons Control Status. Weapons control statuses define the restrictions on firing AMD weapons for a particular area and time period. Weapons control statuses may vary to apply only to specific aircraft, weapons systems or targets, e.g., assigning a status of weapons free against all targets with ballistic trajectories and weapons tight against all air breathing targets for all ground-based air defense units. The three weapons control statuses are:

- Weapons free - fire at any target that is not positively identified as friendly.

- Weapons tight - fire only at targets positively identified as hostile in accordance with prevailing target identification criteria.
- Weapons hold - do not fire except in self-defense or in response to a formal fire control order.

(e) Tactical Air Command Center. The ACE commander and battlestaff provide overall coordination and management of the weapons platforms allocated for the DCA mission. The ACE commander coordinates weapons management within the TACC via watch-standers from future operations and current operations. The TACC initiates coordination with a Marine aircraft group, Marine air control group, forward operating bases, and the joint force.

Ordnance availability; fuel availability or consumption; time on station of committed aircraft; and aircraft launch, recovery, and turnaround priority are time-sensitive issues requiring coordination and management among the members of current operations. Through its management of the current ATO, current operations also has the authority to cancel, retask or change missions to meet the needs of the current situation.

Current operations maintains situational awareness on each OCA and DCA sortie. Members of the current operations section achieve situational awareness in part by establishing close and continuous communications with each Marine aircraft group and forward operating base's air boss. The air boss is the individual at the MAGTF controlled forward operating base responsible to the TACC for decentralized coordination and execution of the fragmentary order. He coordinates with and briefs each DCA aircrew before they launch and debriefs them upon recovery. He prioritizes ordnance loading and fueling of DCA aircraft. Based on the forward operating base's base defense zone procedures, the air boss establishes launch/recovery priorities with the MATCC or Marine air traffic control mobile team. The air boss concept may or may not occur at a joint task force/host country-controlled air facility.
In addition to coordination with the Marine aircraft groups and the air boss, current operations also builds situational awareness through coordination with the SADC, TAOC, MATC, and joint force AMD agencies. Situational awareness is enhanced through activation and maintenance of digital data links with naval, joint, and coalition air command and control agencies. Members of current operations normally perform the data link interface coordination duties for the MACCS.

Based on recommendations from subordinate MACCS units and the situational awareness gained from the previously described sources, the TACC may direct that aircraft be retasked from their scheduled missions to meet immediate needs for higher priority threats; i.e., time-sensitive targets. The TACC directs establishing air defense warning conditions for the MAGTF and weapons release conditions for aircraft operating within the MAGTF's assigned air defense sector, unless managed by a SADC.

Future operations conducts detailed planning and coordination to build the next ATO. Future operations conducts direct coordination with the ACE commander and ACE operations officer to determine the allocation of ACE resources needed for future AAW operations. Future operations also coordinates with naval and joint force aviation to determine needed up-front sorties for DCA, air reconnaissance, and air interdiction missions.

Current and future operations maintain close and continuous liaison with the joint force's J -3, JFACC, and AADC as needed. This ensures that the TACC and the SADC receive the status of joint force sorties available to support the MAGTF's current and future operations.

(**f) Weapons Platforms.** Personnel manning weapons platforms (aircraft and LAAD assets) are responsible for conserving and managing fuel and ordnance to increase a platform's performance. Weapons platform operators provide their equipment/system state, fuel state, and weapons state to the TAOC's weapons section. If the TAOC becomes a casualty and no alternative ground agency can perform integrated weapons management, senior platform personnel may manage similar assets within a WEZ.

Basic considerations to determine threat levels, positioning weapons, and exercising command and control are essential to understanding AAW operations. The rest of this chapter covers the types of operations normally conducted by MAGTF's and how AAW contributes to the MAGTF commander's single battle concept.

(g) Sector Air Defense Commander. The SADC and their staff interface with the TAOC directors and the ACE commander's battlestaff. The SADC is the AADCs air defense battle manager within a sector. He coordinates and manages all active AMD weapons (aircraft and surface-to-air weapons) within the assigned sector, and functions to the extent of the authority delegated by the AADC. The TACC plans, allocates, and provides assets to the AADC to manage and commit to current AAW operations. In turn, the SADC assists in detailed planning of for future operations. When delegated the authority by the AADC, the SADC can retask aircraft to attack OCA time critical targets and to respond to immediate air and missile defense requirements. When authorized, the SADC will establish air defense warning conditions within the designated sector.

(h) Tactical Air Operations Center. The TAOC performs real-time control of fighter aircraft and surface-to-air weapons. By using system state, fuel state, and weapons state, the TAOC controls missile units and aircraft committed to a weapon engagement zone. The TAOC provides the TACC ADC and SADC with the current status of committed/on-station assets. The TAOC also establishes follow-on/ replacement weapons platform requirements.

6010. AMPHIBIOUS OPERATIONS

Amphibious operations are attacks launched from the sea by naval and landing forces, embarked in ships or craft involving a landing on a hostile or potentially hostile shore. (JP 1-02) Amphibious operations are designed and conducted to prosecute further combat operations; obtain a site for an advanced naval, land or air base; deny use of an area or facilities to the enemy; or to fix enemy forces and attention, providing opportunities for other combat operations. JP 3-02, Joint Doctrine for Amphibious Operations, provides the overarching doctrine for conducting amphibious operations. Assaults, raids, demonstrations, and withdrawals are types of amphibious operations. Other operations may be conducted by amphibious forces, e.g., NEOs and humanitarian assistance.

Forces assigned to conduct an amphibious operation task-organize as an amphibious force. The amphibious force is normally part of a larger NEF. The amphibious force is composed of Navy and Marine Corps forces.
Force protection for the amphibious force during movement to the operational area is a high priority. AAW operations conducted by naval forces provide the required force protection and achieve air superiority for the landing force to project combat power ashore. The Navy is responsible for AAW during movement of the landing force to the operational area. Landing force aviation and Navy aircraft operating from supporting aircraft carriers and AMD-capable ships provide AMD weapons platforms and capabilities. Landing force assets aboard amphibious ships support the Navy's point defense for the ships; e.g. LAAD.

Since Navy and Marine Corps units have organic aviation, they work in concert to support the amphibious force. Landing force assets can enhance or augment Navy anti-air warfare assets, but potential loss or expenditure of finite landing force resources may affect the MAGTF's ability to accomplish objectives ashore.

Although the amphibious assault is the principal type of amphibious operation, anti-air warfare actions will normally follow a similar pattern despite the type of operation. AAW operations that support amphibious operations are grouped into pre-D-day, D-day, and post-D-day (if the MAGTF is established ashore) operations. AAW assets require careful planning. Training and rehearsals can ensure that personnel and equipment meet combat readiness requirements.

(a) Pre-D-Day Operations. Depending on the threat, pre-D-day AAW operations may include neutralizing or destroying enemy SAMs, aircraft, airfields, supporting infrastructure (including command and control), and various missile capabilities. Pre-D-day OCA operations achieve the air superiority for the MAGTF to conduct operations. They shape the battlespace for the main assault and create opportunities for the MAGTF commander to exploit during the main assault. The Navy normally controls the airspace and may be tasked as an area air defense commander for a specific region or sector during pre-D-Day amphibious operations. The MAGTF commander provides anti-air warfare support to the Navy commander during this period. Landing force assets may be tasked to provide emergency defense of the amphibious ships.

(b) D-Day Operations. AAW operations on D-day and beyond are geared toward maintenance of air and missile defense and air superiority for the MAGTF's operations ashore, whether an assault, raid or NEO. The critical part of this phase is the actual landing of the MAGTF ashore. Anti-air warfare operations initiated during pre-D-day should continue as preparation of the landing area continues. Aviation, naval surface fire support, sea-based surface-to-air weapons systems, and infantry weapons provide most of the anti-air warfare fires until artillery and ground-based air defense assets have landed and are operational ashore.

The Navy normally retains controls of the airspace, DCA operations, and the Navy tactical air control center. Navy, Marine Corps and joint antiair warfare assets are integrated to maintain air superiority. AMD capabilities are normally established and built up ashore. Capabilities include ground-based surface-to-air weapons, aircraft, surveillance assets, and command and control agencies. After landing force (MAGTF) assets and units are established ashore, transfer of specified operations may pass from the Navy to the MAGTF. If the MACCS is established ashore, the MAGTF may assume control of the airspace and DCA operations within the area of operations.

(c) Initial Air and Missile Defense Capability Ashore. Initially, aircraft operating from supporting naval assets or forward operating bases support operations ashore. LAAD assets operating in direct support of the ground combat element are the first ground based air defense capability established ashore. LAAD assets supporting the assault unit may initially collocate and coordinate their activities with forward air controllers to deconflict supporting friendly aircraft from enemy aircraft.

Deconfliction and coordination of DCA aircraft (operating feet-dry) and direct support LAAD assets occur between air warfare commander and the LAAD unit commander. Established return-to-force procedures and ROE must be briefed in detail and understood by all air defenders, fixed-wing, and rotary-wing aircrews. See figure 6-2.

The LAAD section leader, located in the assault unit's fire support coordination center, supervises and controls the LAAD teams. The senior LAAD commander ashore establishes communications with the LAAD sections ashore and with the Navy tactical air control center. The unit commander afloat provides hostile early warning alerts to LAAD sections and team commanders ashore. The senior LAAD commander ashore provides threat, engagement, and status information to the unit commander afloat.

(d) Air and Missile Defense Buildup Ashore. As the landing force's follow-on GCE and LCE resources phase ashore, additional DCA assets also phase ashore as soon as possible. The GCE's follow-on infantry and artillery units may be accompanied by additional LAAD assets assigned in either general or direct support. The LCE may also have LAAD assets assigned in direct support. General support LAAD assets establish a comprehensive low-altitude air defense of the force beachhead and integrate with the assault force's direct support LAAD assets. The platoon commanders of LAAD assets in general support coordinate their activities with the LAAD commander located with the TACC afloat.

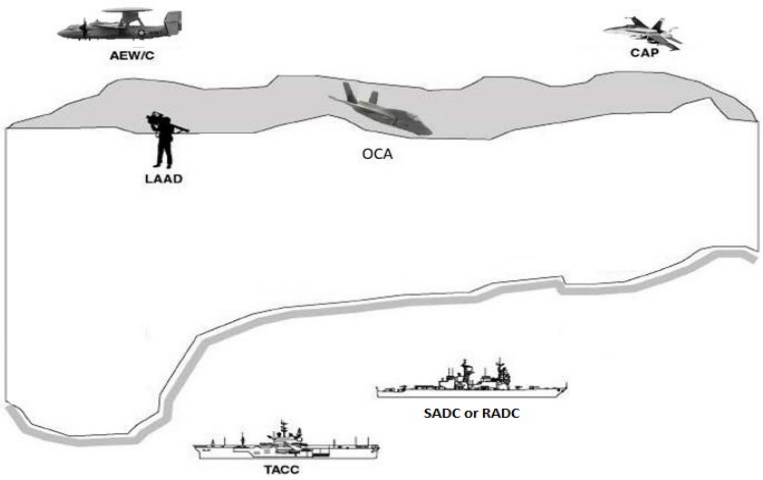

Figure 6-2: Notional Initial Air and Missile Defense Capability Ashore.

During the buildup of MAGTF air and missile defense ashore, Marine wing communication squadron detachments, Marine wing support squadrons, and Marine air traffic control establish forward operating bases ashore. Forward operating bases allow MAGTF aircraft (including antiair warfare capable platforms) to establish forward bases ashore. As forward operating bases are established ashore and LF aircraft begin using the forward operating bases, ground-based air defense assets must provide air and missile defense. Once the forward operating base is operational and MAGTF DCA assets are available, a forward operating base defense zone must be established and coordinated with the air warfare commander. The senior direct support LAAD commander may also integrate their forces with the DASC after it phases ashore and becomes operational. This integration provides comprehensive and timely deconfliction and coordination of friendly aircraft and enemy aircraft. The early introduction of LAAD sections and an early warning and control site extends shipboard weapons employment, radar surveillance, identification, and coordination/control capabilities.

The LAAD section and the early warning and control elements provide initial engagement, early warning, cueing, and surveillance capabilities against the enemy aircraft and missile threat. The early warning and control site also initiates data link connectivity with ATF and other AMD units. General support LAAD platoon commanders/section leaders may collocate at command and control nodes to facilitate rapid exchange of surveillance/identification information to support defense of key equipment.

In addition, data between the early warning and control site's radar and Navy capable surface and airborne platforms is also exchanged through Cooperative Engagement Capability (CEC). This shared data provides a composited track on detected objects derived from participating sensors. CEC significantly increases surveillance information exchange capability and the potential for weapons employment further from the vital area and defended assets.

Furthermore, ground-based air defense assets and the early warning and control site ashore allow limited control operations within fighter engagement zones and weapons employment within missile engagement zones activated for use. Airspace users, GBAD units, and control agencies should expect a change of RTF and ROE procedures that must be understood and adhered to by all. See Figure 6-2.

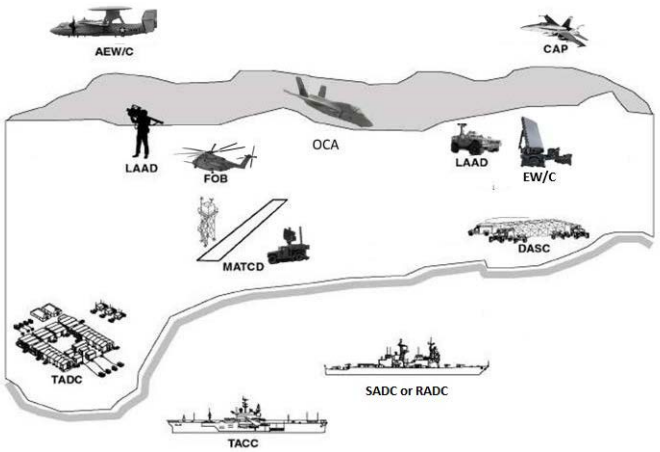

Figure 6-3: Notional Air and Missile Defense Buildup Ashore.

(e) Forces ashore and transfer of control. Depending on the type of operation, the MAGTF commander establishes air control agencies ashore as required to transfer control ashore. These agencies provide, air control, increased surveillance, quicker response to air and missile threats, facilitate OCA targeting, and extend the ATF's weapons control capabilities. Initially, air control agencies ashore operate as an adjunct to agencies afloat. Air control agencies ashore assist as needed and monitor air control aspects (including communications circuits) directly related to their tasking. As the MACCS becomes functional and able to assume greater air control responsibilities, the Navy may incrementally pass control of some parts of the operation to the MAGTF. The decision to phase ashore all or parts of airspace, air control, and control of air and missile defense assets is based on the mission, the type of operation being conducted, the ability to establish agencies ashore, the tactical situation, and the MAGTF commander's recommendation to phase functions ashore. During the phasing of airspace and air and missile defense functions ashore, Navy control units afloat monitor the progress of assumption of air control responsibilities ashore, and can act in a backup or alternate role if required.

The TAOC is the MAGTF commander's air defense battle management agency. The TAOC controls AAW resources during missions tasked by the MAGTF or ACE commander. The Navy's air and missile defense commander should coordinate with the MAGTF or ACE commander to request support. Only the MAGTF or ACE commander have the authority to commit MAGTF aviation resources.

Once the TAOC is ashore and operational, control of air and missile defense of the landward sector phases ashore. Before transferring control of air operations to the MACCS units ashore, the MACCS must establish an integrated and comprehensive surveillance plan for the MAGTF, especially to facilitate effective air and missile defense. Surveillance resources are employed ashore based on their capability and coverage. The Marine air control group commander, staff, and subordinate unit commanders must thoroughly analyze the surveillance requirements of the MAGTF's sector of responsibility. They must address terrain and its masking effects, threat axis of attack, and available surveillance resources. They must also identify the —

- Location of the TAOC, EW/C, and/or EW site with associated radars.
- Ability of Marine air traffic control radars at forward operating bases to augment the surveillance system and base defense zone concept.
- Location of LAAD units in general and direct support.

- Orientation of aircraft weapon engagement zones. Resources used in weapon engagement zones should provide specific airborne surveillance or weapon capabilities in a sector that other surveillance sources cannot see.

Marine air control group planners must also identify to the ACE commander any other specific surveillance capabilities to leverage (e.g., airborne early warning and control and surface-to-air weapons). During operations, the TAOC's surveillance section disseminates surveillance information from organic sensors and other surveillance sources in accordance with the surveillance plan. The surveillance section leverages multiple sources to build a comprehensive air picture for dissemination and use by the ACE commander, SADC, and IADS participants during aviation operations.

A Marine SADC, when designated and collocated with the TAOC, will establish communication links via voice and data to higher air defense commanders (e.g. RADC), subordinate AMD assets, and adjacent air defense commanders to support air and missile defense in zone (e.g. adjacent SADC). The SADC may activate fighter engagement, missile engagement, and joint engagement zones as operationally required. Control agencies must coordinate flight paths to ensure landing force aircraft required to penetrate the MEZ are safe from friendly air and missile defense fires. Joint ground based air defense assets may also be in zone and under the control of the SADC or RADC, when assigned.

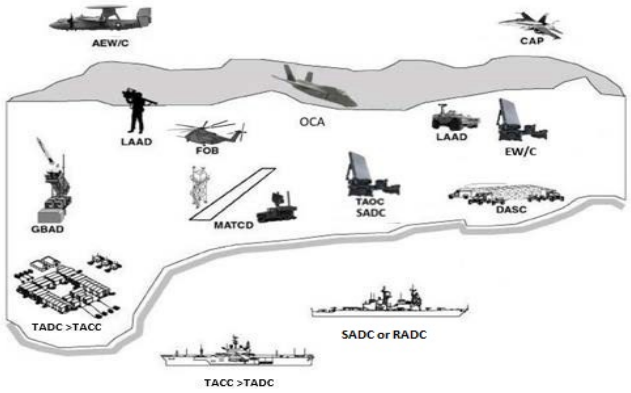

Figure 6-4: Transfer of Control Ashore

Chapter 7
JOINT AIR AND MISSILE DEFENSE OPERATIONS

Joint AMD operations protect the joint force as a whole or as components from attack by hostile aircraft and missiles. The range of weapons systems, the ability to cross boundaries between component areas of operation, and the speed associated with air and missile attacks make joint air and missile defense a responsibility of all components of the joint force. The intent of joint air and missile defense operations is to successfully negate attacks by enemy aircraft and missiles by providing a seamless, fully integrated air defense system. METT-TC is used to determine the extent to which air and missile defense integration is accomplished, the employment of air and missile defense systems, and the area of air and missile defense coverage afforded by joint force resources.

7001. JOINT FORCE COMMANDER

The joint force commander (JFC) is ultimately responsible for air and missile defense of the joint forces. Normally, they have two options for delegating authority for the coordination of joint AMD operations: to the staff or to a functional component commander.

The JFC's staff is normally used to coordinate joint AMD operations when a conflict or situation is of limited duration, scope or complexity. When the JFC's staff is used to coordinate joint AMD operations, they may elect to centralize planning and coordination functions within the staff and retain the ability to directly task joint force AMD capabilities and forces. The JFC's staff functions to the extent of the authority given by the JFC.

The JFC's choice to use their staff for coordinating joint AMD operations is influenced by their span of control, the duration and scope of operations, and the degree of centralized planning and control needed to conduct effective air and missile defense operations. The complexity of the operations is the primary consideration for the JFC in determining if their staff has the ability to coordinate joint force AMD operations. When the complexity of coordinating joint AMD operations exceeds the scope and capabilities of the JFC's staff, the JFC will designate a functional component commander to coordinate joint air and missile defense operations. A functional component commander promotes unity of effort and increases the JFC's span of control through delegation of authority. The functional component commander normally designated is the AADC.

7002. AREA AIR DEFENSE COMMANDER

The area air defense commander is normally the component commander with the preponderance of air defense capability and the command, control, and communications capability to plan and execute integrated air defense operations. (JP 1-02) The AADC is an individual; i.e., position, not an air command and control agency. The JFC defines the support relationship between the AADC and supporting commanders. All components will provide representatives to the AADC's headquarters to provide specific weapon systems expertise as well as broader mission expertise. The AADC normally exercises operational control over forces assigned or attached to them and tactical control over other military forces and capabilities made available for tasking. Responsibilities between joint AMD and joint airspace control are inherently interrelated. The JFC normally designates the same individual as AADC and airspace control authority. AADC responsibilities include—

- Assessing the enemy order of battle and situation.
- Developing and executing the joint air defense plan (a detailed plan to disseminate timely air and missile warning and cueing information to components, forces, allies and coalition partners, and civil authorities), as appropriate.

- Developing and implementing identification and engagement procedures and ROE that are appropriate to the aircraft and missile threat.
- Coordinating air and missile defense operations with other component commanders.
- Ensuring timely and accurate track reporting among participating units to provide a consistent common operating picture.
- Establishing air defense regions or sectors to enhance decentralized control of joint AMD operations.
- Establishing air defense warning conditions and weapons release conditions for the joint operations area.
- Publishing technical and tactical operational data messages or operational task link messages for coordination of air and missile defense and data link operations.
- Performing the duties of the airspace control authority when directed by the JFC.

Relationships with other component commanders and the AADC are established by the JFC. The JFC normally establishes AADC command relationships as shown below.

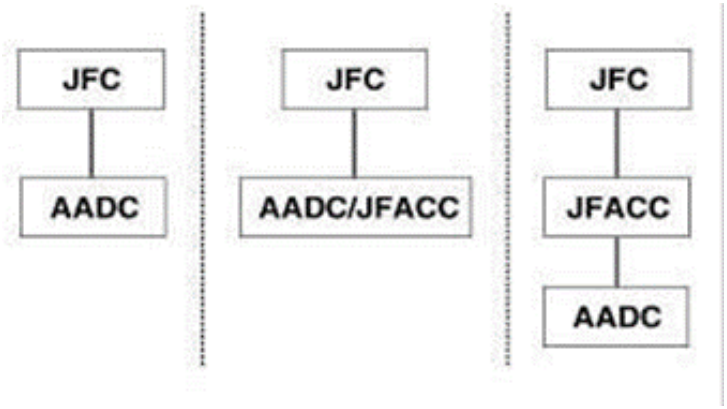

Figure 7-1: Command Relationships

(a) AADC as a Separate Functional Commander. The JFC may designate the AADC as an individual who has no other functional commander responsibilities. The AADC reports directly to the JFC on topics relative to joint AMD. The AADC would also coordinate with other Service and functional commanders, including the JFACC, on area air defense. This arrangement is most beneficial when it is anticipated that functional responsibilities will pass from one component to another, such as the passing of AADC functions from afloat to ashore.

(b) AADC as a Combined Functional Component Commander. The JFC may designate one individual as the AADC and another functional component commander; e.g., the AADC as the JFACC. This individual performs the duties as the AADC and the JFACC, although the responsibilities of each functional area are separate but interrelated. The individual commander may use one or two staffs to fulfill dual responsibilities. This arrangement is most beneficial when high tempo, high intensity OCA and DCA operations facilitate unity of effort and enhance coordination between joint air offensive and defensive operations.

7003. AREA AIR DEFENSE PLAN

The AADC, with the support and coordination of the Service and functional commanders, develops, integrates, and distributes a JFC approved area air defense plan. It integrates the air and missile defense capabilities of the joint force's components to provide a responsive AMD system that will achieve both operational and tactical objectives. The area air defense plan reflects the priorities established by the JFC. Because air and missile defense, airspace control, and management functions are inherently interrelated areas, the area air defense plan and the airspace control plan should be developed in tandem to avoid conflicts. Some items addressed are—

- Sensor employment.
- Identification procedures.
- Engagement procedures.
- Airspace coordinating measures pertaining to air and missile defense.
- Weapons control procedures.
- Weapons system employment.
- Datalink architecture
- Dissemination of early warning.

7004. REGIONAL AND SECTOR AIR DEFENSE COMMANDERS

To enhance lethality, the AADC, in coordination with other component commanders, may recommend establishing air defense regions to the JFC. Air defense regions may be further subdivided into air defense sectors. The number of air defense regions and sectors will vary depending on geographical, political, and operational factors; e.g., friendly forces, geography, threat, and concept of operations. A RADC is designated to coordinate AMD activities within each region. A sector air defense commander (SADC) is designated for each air defense sector. Responsibilities of both commanders may include, but are not limited to—

- Coordinating AMD actions between regions and sectors.
- Evaluating the results of engagements within their region or sector.
- Forwarding observations and results of engagements within their region or sector to the AADC.
- Requesting from the AADC or directing, when authorized, changes to the air defense alert and weapons release conditions commensurate to the threat.
- Requesting additional AMD assets from the AADC when necessary.

The AADC provides RADCs with—

- Guidance and direction for air defense warning conditions and weapons release conditions.
- Changes to ROE.
- Allocation of additional AMD resources as necessary or as available.
- Additional airborne DCA assets from the JFACC.

7005. NOTIONAL JOINT AIR AND MISSILE DEFENSE OPERATIONS

The area, regional, and sector air defense commanders can coordinate air and missile defense operations at the lowest level. This concept of centralized command—exercised through the AADC— and decentralized execution—exercised through RADCs and SADCs—promotes coordinated operations and economy of force while allowing decision making at the lowest level. Reaction time to the threat is enhanced and the likelihood of fratricide is reduced.

Based on the JFC's air defense priorities, the AADC builds an area air defense plan designed to optimize the joint force's air and missile defense capabilities against enemy attack. When employing available AMD resources, the AADC considers factors such as mutual support and destruction-in-depth to maximize engagement opportunities and protection of forces.

The AADC's air and missile defense resources include air command and control agencies, surface-to-air weapon systems, and aircraft. The AADC reviews air command and control agencies' locations to ensure overlapping air surveillance coverage of the joint operations area, thus enhancing mutual support and increasing opportunities for detecting threat aircraft and missiles. The AADC determines the positioning of those surface-to-air missile systems specifically designated for joint theater air and missile defense. The employment plan for components' surface-to-air missile systems is factored into the area air defense plan to determine gaps in air and missile defense coverage and to identify shortages in resources.

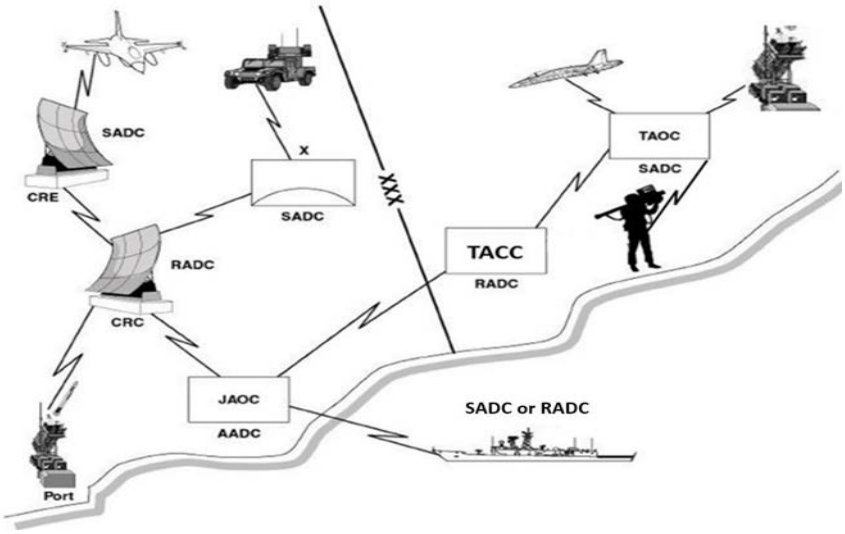

Figure 7-2: Notional Joint Air and Missile Defense Organization

The JFACC allocates a percentage of aircraft to perform DCA missions based on the JFC's apportionment decision. The AADC typically allocates DCA missions to each RADC to perform air defense activities within each region. RADCs, in turn, distribute DCA aircraft to subordinate SADCs, depending on the anticipated need for DCA aircraft within their sectors. SADCs further distribute DCA aircraft to control agencies within their sector. It is the responsibility of controlling agencies to execute the DCA mission through the coordination, control, and integration of aircraft and surface-to-air weapon systems under their direction per guidance passed by the air defense commander.

Counter Rocket, Artillery Mortar (CRAM) may serve as a mission set managed by a local base defense operations center, resident artillery units, or Tactical Operations Center during joint operations where detecting and engaging rockets, artillery, and mortar is executed to protect friendly forces and vital areas. MAGTF planners must be aware of capable joint platforms and how advanced warnings may be disseminated to affected areas.

7006. MAGTF AND JOINT AIR AND MISSILE DEFENSE OPERATIONS

The MACCS integrates the MAGTF with the joint air and missile defense network. The senior agency of the MACCS, the TACC, plans and coordinates MAGTF DCA operations with the AADC. When designated, The Marine SADC assists in the near-term coordination and management of MAGTF-organic and joint force DCA resources allotted to the MAGTF by coordinating with the area, regional air defense commander, as appropriate. The TAOC is the MAGTF's principal air and missile defense agency responsible for the real-time execution of DCA operations. The TAOC, through the SADC, coordinates its activities with adjacent sector and regional air defense control agencies.

Currently, three Services have the command and control capabilities to perform area, regional or sector air defense commander functions: the United States Air Force, United States Navy, and United States Marine Corps. Capabilities are based on each Service's organic ability to communicate, surveil, coordinate, and command and control all facets of joint air and missile defense. The Navy provides a sea-based command and control capability that is best suited for maritime operations, but can also provide joint air and missile defense coordination functions in the littorals. The Air Force's capabilities are land-based, focused on high-tempo, extended-duration DCA operations in support of a major theater campaign. The MAGTF can perform joint air and missile defense coordination functions in both littoral operations and sustained operations ashore. The MAGTF's expeditionary nature and orientation on the littorals are defining factors that planners must comprehend when assigning these functions to the MAGTF.

The MAGTF's ability to perform AADC functions is best described as an enabling or pass-through capability. The MAGTF is well-suited to function as AADC in littoral operations for limited time. Examples of the MAGTF performing AADC functions include—

- The planned passage or transition of AADC functions from a sea-based facility to a shore-based facility (or vice versa)—similar to phasing control ashore—with the intent of the MAGTF passing those functions to another Service at a later time.

- Or, if an unplanned transition, where the AADC is unexpectedly unable to perform its functions because of a catastrophic action that significantly curtails the ability of the primary AADC to perform its functions.

If designated as the AADC, the commander, Marine Corps forces may delegate the authority for air and missile defense coordination to the MAGTF commander, who may delegate that authority to the ACE commander.

The ACE commander, acting as the agent for the AADC, uses a joint staff whose composition is representative of the joint force to plan, manage, and coordinate joint air and missile defense operations. The TACC may host the AADC's staff, providing the necessary voice and data communications resources and planning tools to coordinate joint air and missile defense operations.

The TACC's battlestaff is responsible for the coordination and execution of MAGTF aviation operations and should not be considered a part of the AADC's joint staff. However, it is likely that TACC crew members will be used to augment and provide subject matter expertise to the AADC's staff. The MAGTF's ACE does not have the resources to perform area air defense functions for extended durations or in support of large scale theater operations without significant communications and personnel support. The requirement for the TACC to remain expeditionary should be considered when determining the scope and duration for MAGTF designation as the AADC.

Like the AADC, regional and sector air defense commanders are managers of DCA assets. The MAGTF possesses a robust capability to function as regional and sector air defense commanders in both amphibious operations and sustained operations ashore, with regional and sector air defense coordination activities falling well within the scope and capabilities of the MAGTF's existing air and missile defense architecture.

The TAOC, as the MAGTF's AMD battle management agency, is the most likely candidate to host the SADC and support SADC functions. The RADC may be hosted at the TACC. Like the AADC, regional and sector air defense commander positions are joint force billets. Joint staffs separate from the MAGTF
AMD staff should coordinate region and sector AMD operations. If designated as the MAGTF's agent to perform regional or sector air defense commander functions, the appointed Marine air defense commander should ensure that liaisons from affected joint and coalition forces be included in the staff to facilitate planning and coordination of air and missile defense operations.

As a RADC, the MAGTF's agent coordinates AMD operations directly with the AADC. As a SADC, the MAGTF's agent coordinates sector air and missile defense with the RADC. Assuming these joint force responsibilities creates a requirement for dual reporting of AMD activities, one through joint reporting channels, and the other through the MAGTF's.

Chapter 8
Marine Littoral Regiment

As the Marine Corps continues to build the capacity of the Marine Littoral Regiment (MLR), it is important to define mission and structure of the MLR and identify how the MLR, and subordinate Littoral Combat Team (LCT) and Littoral Anti Air Battalion (LAAB), support AAW operations and sea denial. Command relationships and key points of integration with our naval counterparts during AAW must be refined to maximize lethality within the contested maritime environment.

8001. MLR MISSION

The mission of the MLR is to maneuver and persist inside of a contested maritime environment and conduct sea denial operations as part of the Naval Expeditionary Force in order to enable Fleet operations. The MLR is tasked with the following:

- Conduct surveillance and reconnaissance
- Conduct Operations in the Information Environment (OIE)
- Conduct screen/guard/cover
- Deny or control key maritime terrain
- Conduct surface warfare operations
- Conduct air and missile defense
- Conduct strike operations
- Conduct sustainment operations
- Conduct FARP operations

8002. MLR COMPOSITION

The MLR consists of a Headquarters with fires (lethal and non-lethal), a Littoral Combat Team (LCT), Littoral Logistics Battalion (LLB), and Littoral Anti Air Battalion (LAAB).

(a) Headquarters: The headquarters consists of the command team and staff sections. The headquarters element with subordinate headquarters company may receive additional attachments to support Operations in the Information Environment (OIE) and MLR Communications. The OIE capability within the MLR will provide augmentation to the HQ S-2, S-3, and S-6, while also providing intelligence support teams to each MLR battalion. The Communications capability with resident jump teams supports the MLR headquarters and provides general support to each MLR battalion.

(b) Littoral Combat Team: The LCT is employed as a task organized maritime littoral unit, capable of commanding and controlling distributed expeditionary advanced bases (EABs) conducting sustained operations to enable fleet operations via sea denial. The LCT is composed of (1) Headquarters and Service Company, (3) Line Companies, and (1) Missile Battery.

(c) Littoral Logistics Battalion (LLB): The LLB is employed as a task organized maritime littoral unit, capable of providing tactical logistics support to MLR equities beyond their organic capabilities by supporting EABs, managing cache sites, and connecting operational-level logistics. The LLB is composed of (1) Headquarters and Service Platoon, (2) Combat Logistics Companies, and (1) General Support (GS) Company.

(d) Littoral Anti Air Battalion (LAAB): The LAAB is a composite battalion sourced from the Marine Aircraft Wing (MAW) and includes elements of the Marine Wing Support Squadron (MWSS), Marine Wing Communications Squadron (MWCS), Marine Air Support Squadron (MASS), Low Altitude Air Defense Battalion (LAAD), and Marine Air Control Squadron (MACS). The LAAB is composed of (1) Headquarters and Service Battery, (1) MADIS Battery, (1) FARP Company, and (1) Air Control Company. Additional capabilities may be attached and/or sourced from the MAW to support AAW operations. See Figure 8-1 for MLR organization.

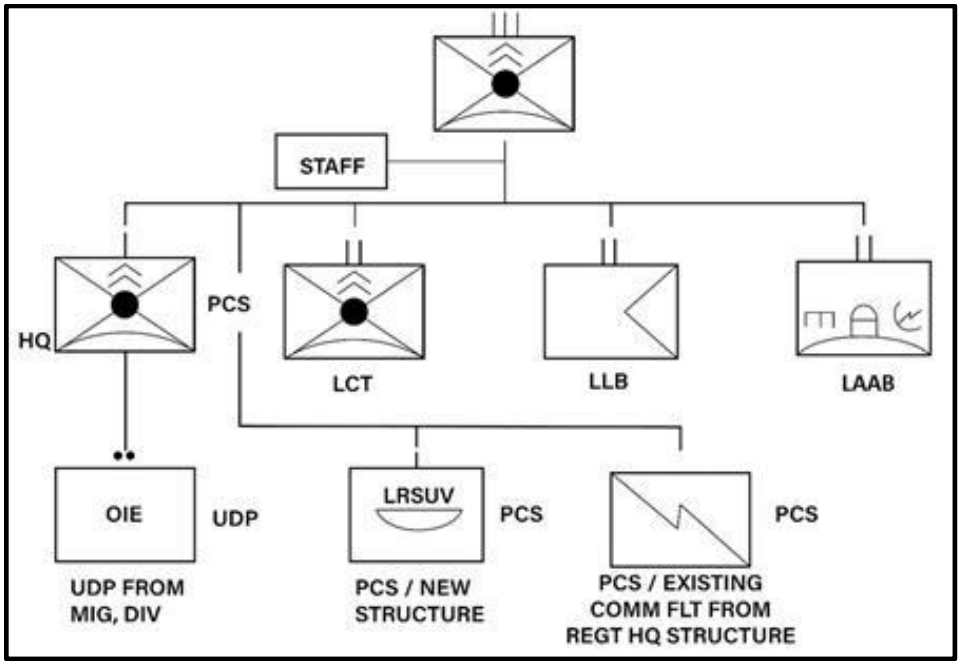

Figure 8-1: MLR Organization

8003. LITTORAL ANTI AIR BATTALION

The mission of the LAAB is to conduct maneuverable ground based air defense, forward aircraft arming and refueling, and air control in support of anti-air warfare and sea denial within a contested maritime environment in order to enable Fleet operations.

The LAAB conducts air surveillance, air control, and ground based air defense during AAW operations. The Air Control Company coordinates with the MAW for aviation support and synchronizes MLR and MAW efforts in the conduct of AAW. The Air Control Company integrates land and surface based fires with aviation to support sea denial operations within the assigned maritime operating area. During operations, the Air Control Company may employ an Aviation Command and Control (AC2) Node; a cross functional agency with representation from the Air Support Platoon, Early Warning Platoon, and Communication Platoon. AC2 Nodes support the integration of all domain capabilities resident within the MLR as well as coordination with naval and joint counterparts. During DCA operations, the Air Control Company will leverage available AMD resources to provide defense to Expeditionary Advanced Bases (EABs) and/or defense to naval assets afloat. During OCA operations, the air control company will coordinate with and/or manage resources tasked with destroying or neutralizing enemy aircraft, missiles, launch platforms, and their supporting structures and systems before and after launch. OCA actions are aimed at gaining a decisive advantage and will occur as close to the enemy source as possible. See Figure 8-2 for LAAB organization.

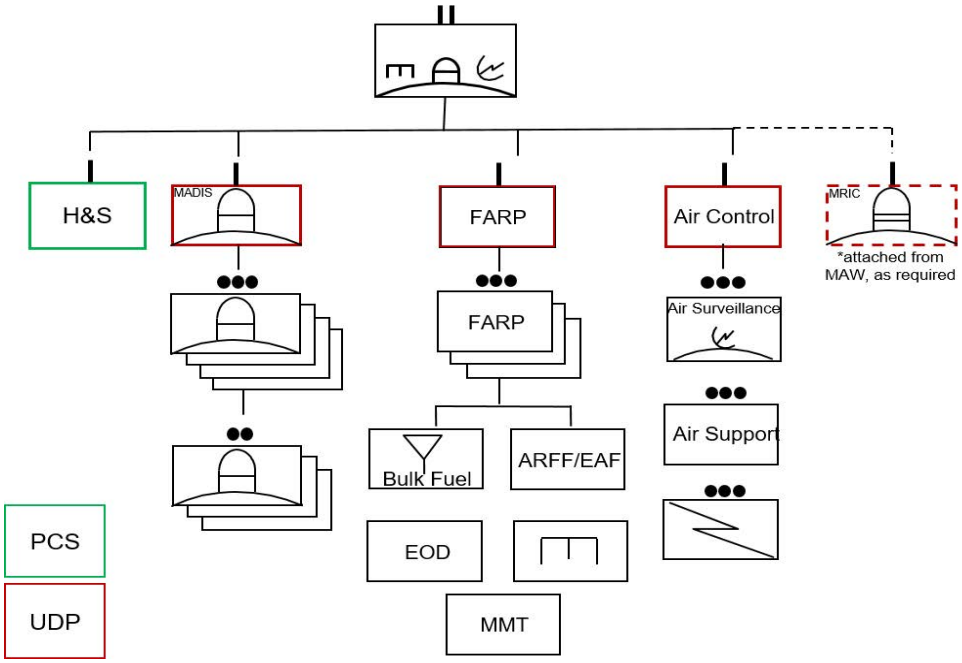

Figure 8-2: LAAB Organization

8004. COMPOSITE WARFARE COMMANDER ORGANIZATION

In order for the MLR to maneuver and persist inside a contested maritime environment to conduct sea denial operations as part of the Naval Expeditionary Force, Marines must be well versed in composite warfare doctrine. The 38th Commandant's Planning Guidance articulates how, through education, we must "enable our commanders and staffs across the Fleet Marine Force to quickly integrate into naval forces and provide critical capabilities both afloat and ashore." Composite warfare doctrine is a framework for command characterized by *command by negation*, *decentralized control and execution*, and *collaborative planning*. Due to the widely distributed nature of maritime forces, composite warfare employs command through preplanned actions to address threats by delegating warfare functions to subordinate commanders. Subordinates take action without delay, guided by the commander's intent, keeping the commander informed of the actions they take. Just as Marine commanders will communicate mission and tasks via operations orders updated by fragmentary order, composite warfare commanders issue orders via OPTASK updated by daily intentions message (DIM). The Navy's composite warfare commander (CWC) is the cornerstone of task force operational and tactical C2 systems and is designed to support open ocean wars as well as expeditionary operations, including missions overland and within the littorals. Per JP 3-32 Joint Maritime Operations, "the composite warfare construct allows the officer in tactical command to assign some or all of the command functions associated with mission areas to warfare commanders, functional group commanders, and coordinators" to support decentralized execution. Members of the MLR, as well as the larger Fleet Marine Force, must have a basic understanding of how the Composite Warfare Commander assigns command functions to subordinates. In turn, Marine planners, in conjunction with our Navy counterparts can integrate appropriately and refine tactics, techniques, and procedures for integration. Figure 8-3 represents current CWC Organization. See *Tentative Manual for EABO,1st edition* for notional CWC organizations that includes the Expeditionary Warfare Commander (EXWC).

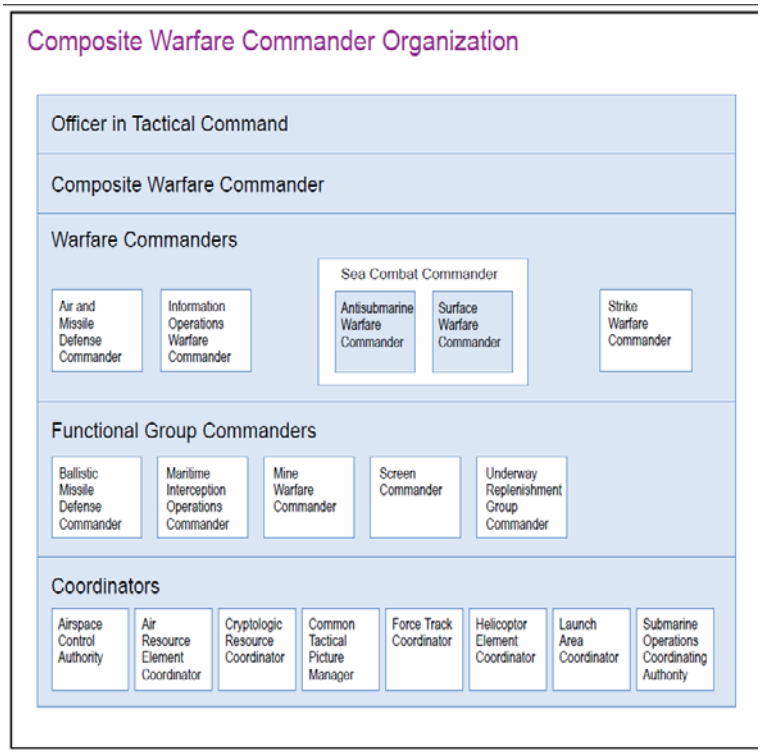

Figure 8-3: CWC Organization

8005. INTEGRATION

The information below is designed to be informative and will highlight integration considerations between warfare commanders in support of sea denial and AAW. Information below is not intended to be an all-inclusive list of integration points. Subsequent doctrine, future planning, and lessons learned will inform and generate refinements to naval expeditionary force integration.

Officer in Tactical Command. The OTC, also identified as "Alpha", is the senior officer present eligible to assume command or the officer to which the senior officer present has delegated tactical command. The OTC's planning will normally focus on power projection and sea-control operations.

Composite Warfare Commander. Appointed by the OTC, the CWC's planning efforts will normally focus on operations to counter threats to the force. The CWC appoints warfare commanders who in turn align resources to surveillance areas; classification, identification, and engagement areas; and vital areas. The CWC is also identified as "Bravo".

Surface Warfare: Surface warfare encompasses operations conducted to destroy or neutralize enemy naval surface forces and merchant vessels. These operations typically include the planning and directing of surveillance of the maritime domain, interdiction, and strikes by aircraft and missiles.

The CWC's Surface Warfare Commander (SUWC), also identified as "Sierra," directs force action against surface threats for the CWC. This includes actions to direct surface surveillance coordination, armed reconnaissance/strike coordination and reconnaissance, war-at-sea strike, counter-fast attack craft (FAC) /fast inshore attack craft (FIAC), and airborne maritime mining missions within the classification, identification, and engagement area (CIEA). The SUWC collects, evaluates, and disseminates SUW surveillance information and plans, directs, monitors, and assesses the employment of SUW resources.

Antisubmarine Warfare. The CWC's antisubmarine warfare commander (ASWC), also identified as "Xray", is the officer assigned some or all of the OTC's detailed responsibilities for antisubmarine warfare and granted the tactical-control authority to accomplish the assigned missions and tasks.

SUWC and ASWC may be combined as the Sea Combat Commander, also identified as "Zulu".

Strike Warfare: Strike Warfare (STW) are naval operations to destroy or neutralize targets ashore, including attacks against strategic or tactical targets, such as manufacturing facilities and operating bases, from which the enemy is capable of conducting or supporting air, surface, or subsurface operations against friendly forces. Strike operations may employ ballistic or cruise missiles, aircraft, naval surface fires, Marines, and SOF to attack targets ashore. The term "strike warfare" commonly includes joint fire support, interdiction, strategic attack, and CAS. Amphibious operations may involve extensive application of STW capabilities and require coordination with the JFLCC and JFACC, while amphibious raids are also a form of strike operations.

The CWC's Strike Warfare Commander (STWC), also identified as "Papa", coordinates offensive power projection operations for air and naval cruise missile engagements against land-based targets. The STWC plans, directs, monitors, and assesses maritime power projection ashore and may strike surface targets at sea at extended ranges from the strike group for the CWC. The STWC normally exercises TACON of assigned STW assets. Typically, the STWC does not plan or direct TLAM missions. The STWC integrates or coordinates carrier air wing (CVW) resources with TLAM missions via the TLAM launch area coordinator (LAC) and TLAM strike coordinator (TSC). The STWC coordinates naval surface fire support (NSFS) missions via the NSFS coordinator. The STWC identifies requirements for nonorganic STW air support. When Navy TF/TG/ships are operating in or adjacent to a JOA, they are to coordinate STW operations with the appropriate AOC.

Fires generated from the MLR in concert with surface and aviation fires external to the MLR are essential to supporting sea denial. The Air Control Company within the LAAB is responsible for the airspace integration and deconfliction of land, surface, and aviation fires. Specific authorities for these actions may be assigned and delegated amongst Marine Corps, Naval, or Joint counterparts. The integration of land, surface, and aviation fires is paramount in ensuring proper asset management and employment while minimizing cross-coordination requirements. The LAAB will be able to employ an aviation command and control capability, and support naval air control functions as an Air Control Unit (ACU). This ACU may be tasked to conduct duties as a Maritime Air Controller (MAC). MAC duties are specifically associated with controlling Air Operations in Maritime Surface Warfare (AOMSW) missions.

Air and Missile Defense: Countering air and missile threats consists of a combination of theater counterair and integrated air and missile defense (IAMD). Counterair is the foundational framework at the theater level. IAMD synchronizes aspects of counterair with global missile defense, homeland defense, and global strike.

The CWCs Air and Missile Defense Commander (AMDC), also identified as "Whiskey", is the officer assigned some or all of the OTC's detailed responsibilities for DCA operations and is granted tactical control to accomplish the assigned mission tasks. The air and missile defense commander protects the naval force against air-breathing and ballistic missile threats. The AMDC coordinates with the MOC IAMD cell / CTF IAMD to seamlessly integrate maritime forces in the execution of the AADP. Depending on the threat and available forces, the AMDC's BMD tasks may be delegated to a separate BMD commander, also known as "Uniform", under the CWC.

Maritime Operations Center IAMD: The MOC's IAMD cell serves as the JFMCC's primary planning and execution coordination conduit with higher HQ, other Service components (e.g., the AOC and US Army Air and Missile Defense Command), subordinate forces, and outside support agencies for IAMD requirements. The MOC IAMD cell / CTF IAMD also plans AMD for ships operating independently and not covered by a CWC structure. In the Joint construct, when a subordinate TF commander is designated as a RADC, the MOC's IAMD cell assists with coordination. The IAMD cell supports the development of the AADP and provides subordinate AMD planners a conduit for providing recommendations and adjustments to the plan.

The MOC IAMD cell serves as a good integration point for the Marine TACC's Air Defense Cell. In addition, members of the LAABs Air Control Company may integrate organic sensors, communications, and weapons within the larger AMD system, coordinating with Whiskey to maximize lethality and improve friendly force survivability via organic and naval AMD resources. In this capacity, a Marine aviation C2 agency is assigned airspace and performs AIC duties as an air control unit (ACU), conducting early detection, asset management, and combat identification to support threat platform engagement forward of friendly forces in defense of an EAB and/or naval assets afloat.

For more information on CWC, EABO, and MLR please see *JP 3-32 Joint Maritime Operations, MCTP 10-10B AMD*, NWP 3-56, *Composite Warfare: Maritime Operations at the Tactical Level of War*, and Chapter IV, "Command and Control and Other Operational-Level Considerations for Specific Maritime Operations", and the *Tentative Manual for Expeditionary Advance Base Operations, First Edition.*

Appendix A
TACTICAL DATA LINKS

A tactical data link (TDL) is a Joint Staff approved, standardized communications link suitable for transmissions of digital information. Current practice is to characterize a TDL by the message formats and transmissions characteristics. According to JP 1-02, a data link is the means of connecting one location to another for the purpose of transmitting and receiving data. TDLs interface two or more C2 or weapons systems via a single or multiple network architecture and multiple communications media such as radio, landline, microwave and other specialized media.

The distinct characteristics and unique message formats, such as timing architecture, means of transmission, and message standards of each type of link cause considerable difficulty in exchanging data link information during joint operations. In AAW operations, TDLs share air track information to build a comprehensive picture of the current air situation in real time or near real time. The following TDLs are the most commonly during air and missile defense operations.

A.1 Link 16

Link 16 is a secure, jam-resistant, node-less data link. It uses the Joint Tactical Information Distribution System Transmission (JTIDS), Multifunctional Information Distribution System (MIDS) Low Volume Terminal (LVT), Small Tactical Terminals (STT), TachNet Tactical Radio (TTR), and other third party terminals. Link 16 is capable of exchanging digital voice (J-Voice), digital air control, free text messages, commands, orders, alerts, EW information, tracks, and points in real time. Link 16 devices will be located in ground, airborne C2, surface based AMD platforms, and selected fighter aircraft. Link 16 uses the J-series message structure. The data link unit designator that communicates directly on Link 16 is a JTIDS Unit (JU).

A.2 Joint Range Extension Application Protocol

Joint Range Extension Application Protocol (JREAP) provides a foundation for Joint Range Extension (JRE) of Link 16 and other TDLs to overcome the line-of-sight (LOS) limitations. JREAP enables tactical data to be transmitted over digital media and networks not originally designed for tactical data exchange. JREAPs A, B, and C are the three BLOS protocols. JREAPs use the J-Series message structure.

A.2.1 JREAP A

JREAP A is an encrypted satellite link using a serial data interface to exchange information in a half-duplex or broadcast mode. JREAP A uses an announced token passing protocol for half-duplex communications. This protocol may be used when several terminals share the same JRE media and take turns transmitting or in a broadcast situation when one transmits and the rest receive. JREAP A is designed for use with UHF TDMA/DAMA SATCOM, EHF Low Data Rate (LDR), and UHF non-DAMA SATCOM.

A.2.2 JREAP B

JREAP B can operate in a synchronous and asynchronous point-to-point mode similar o JREAP A. Also, JREAP B can use SHF and EHF LDR modes to operate in a full-duplex connection to exchange tactical data through STU-III operations via phone lines or other point-to-point media connections Normally, JREAP B will be used with a STE.

A.2.3 JREAP C

JREAP C is the most commonly used JREAP in AMD operations. JREAP C uses internet protocol (IP) in conjunction with either the user datagram protocol (UDP) or transmission control protocol (TCP) to exchange tactical data. JREAP C operates in a server/client connection-oriented mode where one node must be configured to be a client and the other node must be configured to be a server. Both nodes must know the server JREAP port number (JPORT).

A.3 Variable Message Format (VMF)

VMF is a bit oriented digital information standard consisting of variable length messages suitable for near real time data exchange in a bandwidth constrained combat environment. VMF uses the K-series message structure and is capable of forwarding/receiving certain message sets to/from Link 16.

A.4 Multi-Functional Advanced Data Link (MADL)

MADL is a digital data waveform that provides secure data-linking technology between stealth aircraft. MADL is a high-data-rate, directional communications link that allows for the secure transmission of coordinated tactics and engagement for 5th Generation aircraft operating in high-threat environments. MADL is a LOS data link with limited/restricted range not allowing connections beyond a four aircraft flight. See Figure A-1 for MAGTF TDL Capabilities.

	TACC	TAOC	EW/C	MATC	LAAD	F/A-18	F35	DASC
Link 16	X	X	X		X	X	X	X
JREAP	X	X	X	X	X			X
VMF	X	X	X	X		X	X	X
MADL							X	

Figure A-1: MAGTF TDL Capabilities

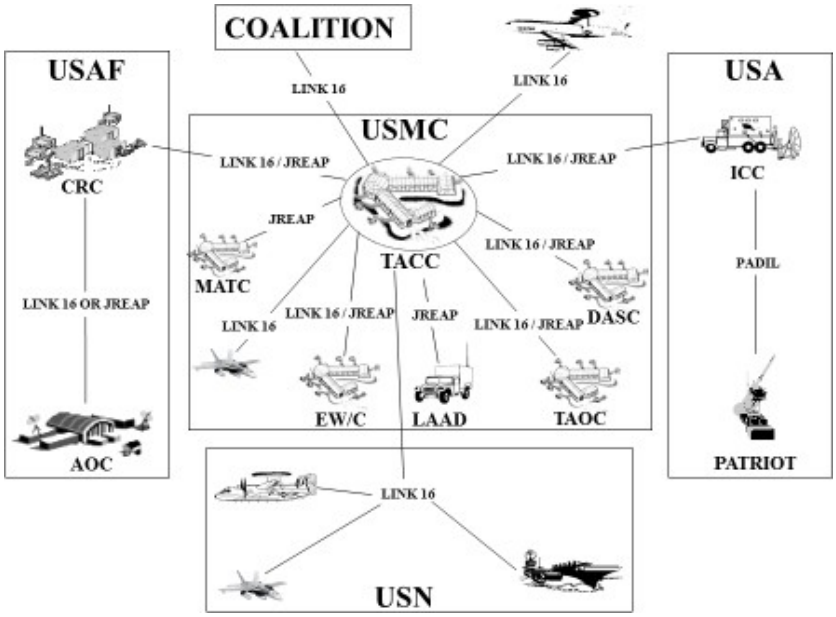

Figure A-2: Notional Data Link Interface.

Appendix B
DEFENSIVE COUNTERAIR PLANNING CHECKLIST

This checklist helps form information requirements, plan an overall AMD strategy, and apply tactics and techniques for air and missile defense operations above the MEU level.

B.1 GENERAL MISSION OVERVIEW

- Air and missile defense strategy.
- Mission statement.
- Tasking and general requirements.

B.2 THREAT ANALYSIS

B.2.1 Air Order of Battle

- Aircraft numbers, types, and locations.
- Aircraft range and time on station.
- Air-to-ground weapons (standoff capability).
- Air-to-air weapons (defensive electronic attack capabilities).
- Night and all-weather capabilities.
- Navigation systems.
- Targeting information required.
- Tactics (ROE, identification criteria, RTF ingress/ egress routes, formations, escort tactics, and
- attack profiles).
- Self-protection capabilities.
- Maximum sortie rates.
- Electronic attack/IR countermeasures capability.
- Training and readiness.
- Sustainability/logistics support.

B.2.2 Ground Order of Battle

- SAM systems, locations, and numbers.
- Antiaircraft artillery systems, locations, and numbers.
- SAM/antiaircraft artillery engagement envelopes and tactics.
- Theater missile systems, locations, and numbers.
- Theater missile engagement envelopes and tactics.
- Training and readiness.
- Sustainability/logistic support.
- Enemy troop concentrations
- Organic air and missile defense capability.
- Surface-to-surface threats.

B.2.3 Electronic Order of Battle

- Electronic attack/electronic protection capabilities.
- Radio electronic combat assets/locations.
- Defensive electronic attack capabilities.
- Electronic attack/electronic protection tactics.
- C2 nets (filter centers, links, and control points).
- Early warning and acquisition systems numbers, types, locations, coverage, and detection range.

B.2.4 Enemy Command and Control

- SAM/antiaircraft artillery control (location).

- Ground-controlled intercept facilities (location).
- SAM/CAP/strike coordination.
- Theater missile control (location).
- RTF procedures.
- ROE.
- Training and readiness.
- Identification criteria.

B.2.5 Enemy Logistics Support

- Airfields (location).
- Support facilities (maintenance depots; ammunition dumps; petroleum, oils, and lubricants).
- Means of supply.
- Lines of communications.

B.3 INTELLIGENCE

- Intelligence collection assets tasked.
- Intelligence disseminated to air and missile defense planners/ controllers.

B.4 AMPHIBIOUS OBJECTIVE AREA/AREA OF OPERATION DESCRIPTION

- Sector of responsibility.
- Vital/destruction/surveillance areas.
- Zone defense grid.

B.5 DCA OPERATIONS

Methods Available

- Electronic warfare.
- Communications jamming.
- Radar jamming.
- Deceptive jamming.
- Deception.
- Aircraft/ordnance.
- Decoys.
- Chaff.
- MANPADS
- MADIS
- Radar SAM.
- MACCS.

B.6 Considerations

- Missile engagement zones (SHORADEZ, HI, LO, BDZ)
- Fighter engagement zones.
- Joint engagement zones
- Visual CAP locations and Radar CAP locations
- LAAD positions
- Tankers.
- Airborne early warning and control aircraft.
- Aircraft/ordnance availability.
- Surveillance capability.

- Defense conditions.
- Weapons control statuses.
- Radar control procedures.
- Threat axis.
- AAW fragmentary orders and call signs.

B.7 Surveillance Coordination

- Digital information link configuration.
- Non real-time track reporting (visual).
- Evaluation criteria.
- Surveillance sectors/ Track Production Scheme

B.8 ROE

- Standing and Supplemental.

B.9 Specific Control Procedures

- RTF ingress/egress routes and procedures.
- Lame duck procedures.
- IFF/selective identification feature.
- Radar fighters.
- Visual CAP.
- LAAD.
- Lost communications procedures.

B.10 Identification Authority Identification Criteria

- Not identified as friendly/visually identified as hostile.
- Flight characteristics/flight profiles.
- Pop-up.
- Electronic attack detected.
- Attacking friendly assets.
- Mode I, II, III, and V.

B.11 Weapons Control and Management

- Radar-equipped CAP.
- Visual CAP.
- LAAD
- Radar SAM.
- Casualty procedures.

B.12 Aerial Refueling Plan

- Track location.
- Assets.
- Mission priorities.

B.13 What-ifs for Major Weapons System Deficiencies

- Mission and Tasking Reviewed

Appendix C
OFFENSIVE COUNTERAIR PLANNING CHECKLIST

This checklist helps form information requirements, plan an overall OCA strategy, and apply tactics and techniques for OCA operations above the MEU level.

C.1 GENERAL MISSION OVERVIEW

- OCA strategy.
- Mission statement.
- Tasking and general requirements.

C.2 THREAT ANALYSIS

C.2.1 Air Order of Battle

- Aircraft numbers, types, and locations.
- Air-to-air weapons (defensive electronic attack capabilities).
- Night and all-weather capability.
- RTF ingress/egress routes and formations.
- Training and readiness.
- Sustainability/logistics support.

C.2.2 Ground and Missile Order of Battle

- Enemy troop concentrations (e.g., FEBA).
- Organic air and missile defense capability.
- SAM/antiaircraft artillery engagement envelopes and tactics.
- Theater missile systems, locations, and numbers.
- Theater missile engagement envelopes and tactics.
- Training and readiness.
- Surface-to-surface threats.

C.2.3 Electronic Order of Battle

- Electronic attack/electronic protection capabilities.
- Radio electronic combat assets/locations.
- Defensive electronic attack capabilities.
- Electronic attack/electronic protection tactics.
- C2 nets (filter centers, command and control links, and control points).
- Early warning and acquisition systems numbers, types, locations, coverage, and detection range.

C.2.4 Enemy Command and Control

- SAM/antiaircraft artillery control (location).
- Location of ground-controlled intercept facilities.
- SAM/CAP coordination.
- Theater missile control (location).
- RTF procedures.
- ROE.
- Training and readiness.
- Identification criteria.
- IADS capabilities, procedures, and effectiveness.

C.2.5 Enemy Logistics Support

- Airfields (location).

- Support facilities (maintenance depots; ammunition dumps; and petroleum, oils, and lubricants).
- Means of supply.
- Lines of communications.
- Sustainability/logistics support.

C.2.6 INTELLIGENCE/TARGETING

- Collection assets tasked.
- Targets prioritized.
- Weapon assets allocated (weaponeering).
- Assessment plan developed (planning, execution, post-strike phase).
- Intelligence disseminated to mission commanders/ planners.
- Intelligence preparation of the battlespace prepared for potential theater missile transporter- erector launcher hide sites.
- Mission planning feedback.
- Execution.
- Assessment of effectiveness.

C.3 OCA STRIKE PLANNING

C.3.1 Preemptive Measures

- Tasking based on intelligence.
- Integration of/coordination with the targeting sequence.
- Integration with SEAD and local air superiority measures.
- Assignment of mission commanders.
- Allocation of weapon assets (weaponeering).
- Initiation of planning.
- Scheduling and coordinating with other Marine aviation functions; e.g., offensive air support, assault support, and electronic warfare.
- Mission planning feedback.
- Execution.
- Assessment of effectiveness.

C.3.2 SEAD Measures

- Coordination with GCE.
- Tasking based on intelligence.
- Integration with preemptive and local air superiority.
- Assignment of mission commanders.
- Allocation of weapon assets (weaponeering).
- Scheduling and coordinating with other Marine aviation functions; e.g., offensive air support, assault support, and electronic warfare.
- Mission planning feedback.
- Execution.
- Assessment of effectiveness.

C.3.3 Local Air Superiority Measures

- Tasking based on intelligence.
- Integration with preemptive and SEAD measures.
- Assignment of mission commanders.
- Allocation of weapon assets (weaponeering).
- Initiation of planning.

- Scheduling and coordinating with other Marine aviation functions; e.g., offensive air support, assault support, and electronic warfare.

C.3.4 OCA OPERATIONS

Methods Available

- Ground/naval fires.
- Electronic warfare.
    - Communications jamming.
    - Radar jamming.
    - Deceptive jamming.
- Deception.
    - Aircraft/ordnance.
    - Decoys.
    - MACCS.
    - Chaff corridors.
- Anti-radiation missile support:
    - Self-launched.
    - Standoff planned.
    - Standoff targets of opportunity.
- Close-in planned.
    - Close-in targets of opportunity.
    - Direct attack:
    - Bombs/rockets.
    - Cluster bombs.
    - Precision-guided weapons.
- Avoidance.
- Night attack.

C.3.5 Self-Defense Measures

- For friendly aircraft, adherence to:
- Safe passage corridors.
- Altitude and speed criteria.

C.3.6 Preconditions for Air Attack

- Target geographically located via electronic, visual or photographic reconnaissance or by probing defenses:
- Emitters turn on to electronically locate.
- Sites shoot to visually locate reconnaissance.
- Targeted for antiradiation missile (enemy emitter up) accomplished by—
    - Simulated attacks.
    - Real attacks.
- Jamming assets:
    - Support OCA strikes for the preemptive plan.
    - Operate randomly for no specific air mission, but operate concurrently with ground fires to effect deception.
    - Support deceptive air strikes.
    - Support CAS strikes.
    - Electronically locate threats.

C.3.7 Deception Assets

- Tactical air launched decoys (TALD).
- UASs.

- Other aircraft. These aircraft can be directed by the DASC to contact the OCA manager. Their missions should be anticipated and supported by electronic warfare. Deception aircraft fly at medium altitude to the edges of enemy envelopes. Aircrews are given the pre-briefs required to fly these profiles (intelligence and procedures). Deception aircraft can be fragged for a deception mission as a follow- on to CAS or any other mission if assets permit.

C.3.8 Purposes of Deception Assets

- Cause the enemy to expend missiles and emit.
- Locate enemy sites.
- Deception for other strikes.

C.4 AIRCREW TACTICS—LOCATION

C.4.1 Visual Methods (Organic)

- The aircrew observes the system or launches made by the system.
- Ground troops observe the system and provide location information.
- C.4.2 Electronic means
- F-35s indicate the presence of a system within a set target location error.
- Aircraft radar homing and warning gear indicates the presence of radar systems.

C.5 AIRCREW TACTICS—ATTACK TACTICS AND TECHNIQUES

- Direct attacks flown without support.
    - Low-altitude attacks use terrain to conceal/mask attack.
    - Medium/high-altitude attacks use precision-guided munitions (laser/GPS).
    - Target marking (as in CAS missions), if possible.
- Direct attacks flown with EA or antiradiation missile support.
    - Self-antiradiation missile (support yourself)
    - EA support provided by the attacking aircraft. (Critical timing is easily coordinated using this method)

C.6 Standoff Anti-radiation Missile Support

Scheduled:

- Critical timing is required between aircraft.
- The system must emit or missiles may be wasted.

On-call:

- Enemy system must shoot.
- Package may consist of F-35 and F/A-18 working in a coordinated fashion.

Immediate:

- Short time of flight required if shot is to cover aircraft in the system's envelope.
- If OCA operations support CAS, place antiradiation missile on station to react to threats, backed up by bombers, if possible.

Appendix D
GLOSSARY

SECTION I: ACRONYMS

Acronym	Definition
AADC	Area Air Defense Commander
AAW	Anti-air Warfare
ACA	Airspace Coordination Area
ACE	Aviation Combat Element
ACI	Air Combat Intelligence
ADAFCO	Air Defense Artillery Fire Control Officer
ADIZ	Air Defense Identification Zone
AMD	Air and Missile Defense
AOA	Amphibious Objective Area
ATO	Air Tasking Order
AWACS	Airborne Warning And Control System
BDA	Battle Damage Assessment
BDZ	Base Defense Zone
C4I	Command, Control, Communications, Computers, And Intelligence
CAP	Combat Air Patrol
CCM	Counter Cruise Missile
CEC	Cooperative Engagement Capability
CLF	Commander, Landing Force
CWC	Composite Warfare Commander
DASC	Direct Air Support Center
DCA	Defensive Counterair
EAB	Expeditionary Advanced Base
EMCON	Emission Control

Acronym	Definition
EW	Electronic Warfare or Early Warning
FEZ	Fighter Engagement Zones
FSCC	Fire Support Coordination Center
FSCL	Fire Support Coordination Line
GBDL	Ground-based Data Link
GCE	Ground Combat Element
HD	Homeland Defense
HF	High Frequency
HIDACZ	High Density Airspace Control Zone
HVAA	High Value Airborne Asset
IADS	Integrated Air Defense System
IAMD	Integrated Air and Missile Defense
ICAC2	Integrated Combat Airspace Command And Control
IFF	Identification, Friend, Or Foe
IP	Internet Protocol
IPB	Intelligence Preparation Of The Battlespace
JEZ	Joint Engagement Zone
JEZs	Joint Engagement Zones
JFC	Joint Force Commander
JLTV	Joint Light Tactical Vehicle
JP	Joint Publication
JPORT	JREAP Port Number
JRE	Joint Range Extension
JREAP	Joint Range Extension Application Protocol

Acronym	Definition
JTIDS	Joint Tactical Information Distribution System
JU	JTIDS Unit
LAAB	Littoral Anitair Battalion
LAAD	Low Altitude Air Defense
LCE	Logistics Combat Element
LCT	Littoral Combat Team
LDR	Low Data Rate
LLB	Littoral Logistics Battalion
LLTRs	Low-level Transit Routes
LOS	Line-of-sight
LVT	Low Volume Terminal
MACCS	Marine Air Command and Control System
MADL	Multi-functional Advanced Data Link
MAG	Marine Aircraft Group
MAGTF	Marine Air-Ground Task Force
MATCC	Marine Air Traffic Control Company
MCDP	Marine Corps Doctrinal Publication
MCRPs	Marine Corps Reference Publications
MCTPs	Marine Corps Technical Publications
MCWP	Marine Corps Warfighting Publications
MD	Missile Defense
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
MEZ	Missile Engagement Zones
MIDS	Multifunctional Information Distribution System
MLR	Marine Littoral Regiment
MPF	Maritime Prepositioning Force
MRR	Minimum Risk Routes

Acronym	Definition
MWCS	Marine Wing Communications Squadron
NATOPS	Naval Air Training And Operating Procedures Standardization
NEF	Naval Expeditionary Force
NWP	Naval Warfighting Publication
OCA	Offensive Counterair
OMFTS	Operational Maneuver From The Sea
RADC	Regional Air Defense Commander
RF	Radio Frequency
ROA	Restricted Operations Area
ROE	Rules Of Engagement
ROZ	Restricted Operations Zone
RTF	Return To Force
SAAFR	Standard Use Army Aircraft Flight Route
SADC	Sector Air Defense Commander
SADF	Sector Air Defense Facility
SAM	Surface-to-Air Missile
SEAD	Suppression Of Enemy Air Defense
SHORAD	Short Range Air Defense
SHORADEZ	Short-range Air Defense Engagement Zone
SOC	Special Operations Capable (e.g. MEU SOC)
SPINS	Special Instructions
SPMAGTF	Special Purpose Marine Air Ground Task Force
STT	Small Tactical Terminal
TACAN	Tactical Air Navigation System

Acronym	Definition
TACC	Tactical Air Command Center
TADC	Tactical Air Direction Center
TDL	Tactical Digital Information Link
TAGS	Theater Air-Ground Systems
TALD	Tactical Air Launched Decoys
TAOC	Tactical Air Operations Center
TCP	Transmission Control Protocol
TDL	Tactical Data Link
TTP	Tactics, Techniques, And Procedures
TTR	Tacnet Tactical Radio
UAS	Unmanned Aircraft Systems
UDP	User Datagram Protocol
UHF	Ultra-high Frequency
VID	Visual Identification
VMF	Variable Message Format
WEZ	Weapons Engagement Zone

SECTION II. DEFINITIONS

active air and missile defense – Direct defensive action taken to destroy, nullify or reduce the effectiveness of hostile air and missile threats against friendly forces and assets. It includes the use of aircraft, air defense weapons, electronic warfare, and other available weapons. (JP 1-02)

air control – The authority to effect the maneuver of aircraft. The elements of air control are: air control agency, air controller, airspace control, operational control, positive control, procedural control, radar control, and terminal control. (MCRP 1-10.2)

air defense – All defensive measures designed to destroy attacking enemy aircraft or missiles in the Earth's envelope of atmosphere, or to nullify or reduce the effectiveness of such attack. (JP 1-02)

air direction – The guidance and supervision which a commander employs to focus resources on mission accomplishment. Air direction occurs as a sequence of the following activities:

apportionment (Air) – The determination and assignment of the total expected air effort by percentage and/or by priority that should be devoted to the various air operations and/or geographic areas for a given period of time.

allocation (Air) – The translation of the air apportionment decision into total numbers of sorties by aircraft type available for each operation or task.

tasking – The process of translating the allocation into orders and passing these orders to the units involved. Each order normally contains sufficient detailed instructions to enable the executing agency to accomplish the mission successfully.

fragmentary order – An abbreviated form of an operation order, usually issued on a day-to-day basis, that eliminates the need for restating information contained in a basic operation order. It may be issued in sections. (Extract from MCRP 1-10.2, under "Marine air command and control system".)

air superiority – That degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea and air forces at a given time and place without prohibitive interference by the opposing force. (JP 1-02)

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

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

Area Air Defense Commander – Within a unified command, subordinate unified command, or joint task force, the commander will assign overall responsibility for air defense to a single commander. Normally, this will be the component commander with the preponderance of air defense capability and the command, control, and

communications capability to plan and execute integrated air defense operations. Representation from the other components involved will be provided, as appropriate, to the area air defense commander's headquarters Also called AADC. (JP 1-02)

combat air patrol – An aircraft patrol provided over an objective area, over the force protected, over the critical area of a combat zone, or over an air defense area, for the purpose of intercepting and destroying hostile aircraft before they reach their target. (JP 1-02)

command – The authority that a commander in the military service lawfully exercises over subordinates by virtue of rank and assignment. (JP 1-02)

command and control – 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)

Commander, Amphibious Task Force – The US Navy officer designated in the initiating directive as commander of the amphibious task force. Also called CATF. (JP 1-02)

Commander, Landing Force – The officer designated in the initiating directive for an amphibious operation to command the landing force. Also called CLF. (JP 1-02)

control – The physical or psychological pressures exerted with the intent to assure that an agent or group will respond as directed. (JP 1-02)

counterair – A term for air operations conducted to attain and maintain a desired degree of air superiority by the destruction or neutralization of enemy forces. Both air offensive and air defensive actions are involved. The former range throughout enemy territory and are generally conducted at the initiative of the friendly forces. The latter are conducted near or over friendly territory and are generally reactive to the initiative of the enemy air forces. (JP 1-02)

destruction area – An area in which it is planned to destroy or defeat the enemy airborne threat. The area may be further subdivided into air intercept, missile (long-, medium-, and short-range), or antiaircraft gun zones. (JP 1-02)

electronic attack – Actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum, such as jamming and electromagnetic deception, and employment of weapons that use either electromagnetic or directed energy as their primary destructive mechanism (lasers, radio frequency weapons, particle beams). (JP 1-02)

fighter engagement zone – An airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with fighter aircraft. Also called FEZ. (JP 1-02, under "weapon engagement zone")

joint engagement zone – An airspace of defined dimensions within which multiple air defense systems (surface-to-air missiles and aircraft) are simultaneously employed to engage air threats. Also called JEZ.
(JP 1-02, under "weapon engagement zone")

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

joint theater missile defense – The integration of joint force capabilities to destroy enemy theater missiles in flight or prior to launch or to otherwise disrupt the enemy's theater missile operations through an appropriate mix of mutually supportive passive AMD; active AMD; attack operations; and supporting command, control, communications, computers, and intelligence measures. Enemy theater missiles are those that are aimed at targets outside the continental United States. Also called JTMD. (JP 1-02)

Marine Air Command and Control System – A system which provides the aviation combat element commander with the means to command, coordinate, and control all air operations within an assigned sector and to coordinate air operations with other Services. It is composed of command and control agencies with communications electronics equipment that incorporates a capability from manual through semiautomatic control. (JP 1-02)

missile engagement zone – The airspace of defined dimensions within which the responsibility for engagement normally rests with missiles. Also called MEZ. MEZs may be designated within the missile intercept zone. (MCTP 3-20F)

offensive counterair – Those operations conducted against enemy air assets and air defense systems before they can be launched or assume an attacking role. OCA operations in or near the objective area consist mainly of air attacks to destroy or neutralize hostile aircraft, airfields, radars, air defense systems, and supporting areas. Also called OCA.

passive air and missile defense – Includes measures, other than active AMD, taken to minimize, mitigate, or recover from the consequences of attack aircraft and missiles. These measures include camouflage, concealment, deception, dispersion, hardening, redundancy, detection and warning systems, and the use of protective construction. (JP 3-01)

planning – The art and science of envisioning a desired future and laying out effective ways of bringing it about. (MCDP 5)

point defense – The defense or protection of special vital elements and installations; e.g., command and control facilities and air bases. (JP 1-02)

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

surface-to-air weapon – A surface-launched weapon for use against airborne targets. Future developments in air defense systems may lead to the employment of weapons other than missiles. Examples include rockets, directed-energy weapons, and air defense guns. (JP 1-02)

Tactical Air Command Center – The principal U.S. 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 U.S Marine air command and control system which serves as the operational command post of the aviation combat element commander. It provides the facility from which the aviation combat element commander and their 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 Operations Center – The principal air control agency of the U. S. Marine air command and control system responsible for airspace control and management. It provides real time surveillance, direction, positive control, and navigational assistance for friendly aircraft. It performs real time direction and control of all antiair warfare operations, to include manned interceptors and surface-to- air weapons. It is subordinate to the tactical air command center. Also called TAOC. (JP 1-02)

theater missile – A missile, which may be a ballistic missile, a cruise missile, or an air- to-surface missile (not including short-range, non-nuclear, direct fire missiles, bombs or rockets such as Maverick or wire- guided missiles), whose target is within a given theater of operation. (JP 1-02).

vital area - A designated area or installation to be defended by air defense units. (JP 1-02)

weapon engagement zone – An airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with a particular weapon system. Also called WEZ. (JP 1-02)

Weapons of mass destruction – In arms control usage, weapons that are capable of a high order of destruction and/or of being used in such a manner as to destroy large numbers of people. Can be nuclear, chemical, biological, and radiological weapons, but excludes the means of transporting or propelling the weapon where such means is a separable and divisible part of the weapon. Also called WMD. (JP 1-02)

Appendix E
REFERENCES AND RELATED PUBLICATIONS

Joint Publications (JP)

0-2	Unified Action Armed Forces
1-02	Department of Defense Dictionary of Military and Associated Terms
3-0	Joint Operations
3-01	Joint Doctrine for Countering Air and Missile Threats
3-02	Joint Doctrine for Amphibious Operations
3-07	Joint Doctrine for Stability
3-30	Joint Air Operations
3-52	Joint Airspace Control

Marine Corps Doctrinal Publications (MCDPs)

1	Warfighting
2	Intelligence
3	Expeditionary Operations
4	Logistics
5	Planning
6	Command and Control

Marine Corps Warfighting Publications (MCWP)

3-20	Aviation Operations
5-10	Marine Corps Planning Process

Marine Corps Reference Publications (MCRPs)

3-20F.2	Marine Tactical Air Command Center Handbook
3-20F.4	Multi-Service Tactics, Techniques, and Procedures for Airspace Control
3-20F.5	Direct Air Support Center Handbook
3-20F.6	Tactical Air Operations Center Handbook
3-20F.7	Marine Air Traffic Control Detachment Handbook
3-20F.8	Low Altitude Air Defense Battalion Handbook
3-22.2A	Multi-Service Tactics, Techniques, and Procedures for Joint Suppression ofEnemy Air Defenses
3-25F	Multi-Service Tactics, Techniques, and Procedures for the Theater Air-Ground System (TAGS)

Marine Corps Technical Publications (MCTP)

5-10A	MAGTF Aviation Planning
3-20F	Control of Aircraft and Missiles
10-10B	Air and Missile Defense (AMD)

Manuals

TM EABO Tentative Manual for Expeditionary Advance Base Operations, First Edition (Feb 2021)

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