MCWP 3-25

Control of Aircraft and Missiles

U.S. Marine Corps

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Washington, DC 20380-1775

26 February 1998

FOREWORD

The control of aircraft and missiles within the Marine Corps is exercised through the Marine air command and control system (MACCS). The MACCS provides the aviation combat element (ACE) commander with the means to exercise control of those organic and non-organic aviation assets necessary to support Marine air-ground task force (MAGTF) operations. The 3-25 series of warfighting publications addresses the functions of this system and each of its component agencies.

Marine Corps Warfighting Publication (MCWP) 3-25, *Control of Aircraft and Missiles*, supersedes Fleet Marine Force Manual (FMFM) 5-60, *Control of Aircraft and Missiles*. Designed for Marine air-ground task force, naval expeditionary force, and joint force commanders, their staffs, and any other Marine Corps personnel involved in the planning and execution of aviation command and control operations, MCWP 3-25 discusses how the control of aircraft and missiles is the function which integrates the six functions of Marine aviation into a cohesive effort. It further presents principles of aviation control; the Marine Corps' philosophy of centralized command and decentralized control; the integration of Marine control of aircraft and missiles in
Marine air-ground task force, naval expeditionary force, and joint force operations; the responsibilities of the Marine Corps forces component commander when designated as the airspace control authority; and how all this is effected in the Marine air command and control system.

By addressing these issues, this publication links the higher order doctrine contained in the Marine Corps Doctrinal Publications and MCWP 3-2, *Aviation Operations*, with the lower level tactics, techniques, and procedures contained in the MCWP 3-25 series, and provides commanders and their staffs with the requisite knowledge to plan for the control of aircraft and missiles.

Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

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DISTRIBUTION: 143 000046 00

Control of Aircraft and Missiles

Table of Contents

Chapter 1. Fundamentals

Chapter 2. Philosophy

Chapter 3. Planning

Chapter 4. Operations

Chapter 5. Training

Conclusion

Notes

Appendices

Chapter 1

Fundamentals

"From the very beginning the British had an extraordinary advantage which we could never overcome throughout the entire war: radar and fighter control."

—Adolf Galland, WWII Luftwaffe Ace [1]

Command and control is essential to all Marine air-ground task force operations and crucial to success in war. The linking of decision making and execution forms the basis of command and control. The use of combined arms is a tenet of the Marine Corps' maneuver warfare philosophy. The Marine air-ground task force uses command and control to exercise a combined arms effort by integrating the other warfighting functions (e.g., fires, maneuver, force protection, logistics, and intelligence). Marine aviation is a vital component of the Marine air-ground task force combined arms strategy. Command and control of Marine air-ground task force aviation is performed through the Marine air command and control system. Exercising control of aircraft and missiles is principal to the Marine air-ground task force's ability to plan, direct, and control the efforts of its aviation combat element.

The control of aircraft and missiles is one of six functions the aviation combat element commander is responsible to provide to the Marine air-ground task force. Because this function interacts continuously with the other five functions, it is necessary to examine all six functions of Marine aviation to understand how the aviation combat element controls aircraft and missiles.

MARINE AVIATION FUNCTIONS

The aviation combat element provides the Marine air-ground task force with the assets to perform the six functions of Marine aviation

Antiair Warfare. Antiair warfare destroys or reduces enemy air and missile threats. Antiair warfare methods are used to gain and maintain air superiority by destroying or reducing enemy air and missile threats. Antiair warfare includes offensive operations (offensive antiair warfare) and defensive operations (air defense) to gain and maintain air superiority.

Offensive Air Support. Offensive air support missions deliver firepower against enemy installations, facilities, and personnel by providing timely and accurate close air support (CAS) and deep air support (DAS). Close air support is performed by fixed-wing and rotary-wing aircraft and requires detailed coordination with friendly ground forces in order to engage hostile targets in close proximity to friendly units. Deep air support, consisting of air interdiction and armed reconnaissance, attacks targets not close to friendly ground forces, and does not require detailed integration with friendly ground forces.

Assault Support. Assault support ensures the rapid build-up of combat power by facilitating the quick maneuver of ground forces. It is the key to providing mobility to the Marine air-ground task force commander and his forces. Assault support operations provide air transportation of personnel, supplies, and equipment into or within the Marine air-ground task force's area of operations.

Electronic Warfare. Electronic warfare provides timely information on the enemy's electronic order of battle, increases combat power by disrupting the enemy's use of the

electromagnetic spectrum, and ensures our continuous use of the electromagnetic spectrum despite enemy actions to deny its use.

Air Reconnaissance. Air reconnaissance provides the Marine air-ground task force commander with information he can use to influence operations through the collection of tactical information on terrain, weather, hydrography, and the enemy situation.

Control of Aircraft and Missiles. Control of aircraft and missiles is used to integrate the other five functions by providing the means for the Marine air-ground task force commander to exercise command and control authority over Marine aviation assets. It involves the coordinated employment of facilities, equipment, communications, procedures, and personnel to plan, direct, and control the aviation combat element's efforts.

These six functions of Marine aviation provide the Marine air ground task force commander with a well rounded, robust combat arm. By performing these six functions, Marine aviation provides those capabilities essential to our truly unique Marine Corps integrated ground-air-logistics organizations—MAGTFs.

INTEGRATING FUNCTION

The aviation combat element commander's ability to command and control is facilitated through the Marine air command and control system. The Marine air command and control system provides the aviation combat element commander with the means to move and process information to effect the decision and execution cycle. The principal objectives of the Marine air command and control

system are to—

Enhance unity of effort. The Marine air command and control system facilitates informational and directional exchange between the aviation combat element commander and his subordinate commanders and control agencies. It extends the commander's influence and allows him to receive near real time feedback on mission execution. The Marine air command and control system is the medium through which the aviation combat element commander promulgates his commander's intent, allowing time critical decisions to be made in the control agencies and in the

cockpit.

Integrate the elements of the command and control system. A command and control system is made up of people, information, and the command and control support structure (Marine Corps Doctrinal Publication [MCDP] 6, *Command and Control*). The Marine air command and control system facilitates the aviation combat element commander's ability to integrate Marines, information, and the command and control support structure in a way that optimizes the processing of large amounts of information while avoiding information overload. Marines provide judgment, while automated data systems, part of the command and control support structure, provide rapid retrieval and manipulation of information. Crafting the proper balance between staff and automated systems, while properly focusing command responsibility and individual control agency authority, enhances the quality of information.

Disseminate common situational awareness. The Marine Corps warfighting philosophy demands that the Marine air command and control system create and disseminate, by all available media, a near real time common air picture that is both accurate and complete. The Marine air command and

control system provides participants with a common air picture, allowing commanders to maintain situational awareness. The ability to access, on demand, only the information critical to a localized area

of operations also avoids information overload.

The Marine air command and control system fulfills these primary objectives through execution of the control of aircraft and missiles function of Marine aviation. The control of aircraft and missiles integrates and focuses the other five functions of Marine aviation into a coordinated effort. Without it, the MAGTF commander has no way to alter the disposition and focus of his aviation assets to react to a dynamic battlespace. As such, the control of aircraft and missiles is the *integrating* function that allows the other five functions to manifest as cohesive, lethal, timely, and effective force multipliers (see figure 1-1 on page 1-6).

This function—control of aircraft and missiles—makes the aviation support possible for the Marine on the ground.

BATTLESPACE

The Marine air-ground task force's *battlespace* includes all aspects of the air, surface, subsurface, space, and electromagnetic spectrum that encompass the MAGTF's area of influence and area of interest.

The aviation combat element commander relates his forces to each other in terms of sea, air, and land operations and to the enemy in terms of time. Analysis of the battlespace includes not only the location of the forces spread throughout the battlespace, but also the speed with which the ACE can react to enemy initiatives and the speed with which the enemy reacts to the MAGTF. An understanding of time and space relationships as well as system

capabilities is essential to the aviation combat element commander's determination of reaction time. The aviation combat element commander considers the battlespace area and time factors to array the Marine air command and control system into a framework that allocates resources, provides air control measures, and integrates aviation combat element efforts through the control of aircraft and missiles to achieve a desired effect on the enemy in the deep, close, and rear battle.

Figure 1-1. The Integrating Function of Marine Aviation

The electromagnetic spectrum is an essential part of the battlespace in regards to the control of aircraft and missiles. The Marine air command and control system uses the electromagnetic spectrum for air surveillance, target acquisition, and voice and/or data transmission. The effectiveness of the Marine air command and control system's ability to control aircraft and missiles is severely degraded without free access to the electromagnetic spectrum.

Control and domination of battlespace are central to aviation combat element, Marine air-ground task force, and naval expeditionary force (NEF) operations. The Navy and Marine Corps combined arms forces generate offensive power at the decisive time and place through devastating firepower, rapid maneuver, and sustained logistical support. The aviation combat element can provide a potent combat arm to a MAGTF or naval expeditionary force when properly integrated with other land, sea, and air forces within the battlespace. Integration of aviation combat element assets is performed through the control of aircraft and missiles.

This discussion is essential to understanding the philosophy and techniques used to plan for and perform control of aircraft and missiles. Figure 1-2 on page 1-8 depicts a notional battlespace.

ROLE OF THE MARINE AIR COMMAND AND CONTROL SYSTEM

The management of the air portion of the Marine air-ground task force's battlespace is the first element Marine aviation performs to establish a foundation for the control of aircraft and missiles. Airspace management will be discussed in greater detail in subsequent chapters. The Marine air command and control system performs both the battlespace management and control requirements necessary for effective employment of MAGTF aviation. Managing the battlespace is performed at the *command* level of the Marine air command and control system, while the individual agencies of the Marine air command and control system perform the *control* function over aviation assets.

Figure 1-2. Battlespace

Up to this point, this chapter has addessed the fundamentals of the control of aircraft and missiles, and provided an introduction to the concept of battlespace. With this information in hand, we can now focus on the philosophy that provides the basis for controlling aircraft and missiles.

The Marine air command and control system provides the means for an integrating, feedback form of control (see MCDP 6*).* This allows the aviation combat element commander to influence the battle in support of the Marine air-ground task force. The Marine air command and control system utilizes both *mission control* and *detailed control*, with an emphasis on mission control, using, to the greatest extent possible, implicit communications. Information flow is facilitated to support the aviation combat element commander's decision making and execution by the aviation forces through both supply-push and demand-pull communication methods.

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Chapter 2

Philosophy

"The patron saint of Marine aviators [is] not Billy Mitchell but Alfred A.Cunningham . . ."

—LtGen Bernard E. Trainor, USMC [2]

The Marine approach to the control of aircraft and missiles is unique to the Marine Corps. To understand the reasons behind the Marine Corps' use of aviation and its approach to the control of aircraft and missiles, it is necessary to discuss the Marine aviation philosophy of *centralized command* and *decentralized control*.

CENTRALIZED COMMAND, DECENTRALIZED CONTROL

Marine air-ground task force aviation operates under the principal tenet of *centralized command and decentralized control*. The philosophy is based on the two fundamental requirements of the aviation combat element commander. First, the aviation combat element commander needs to plan, direct, and coordinate all aspects of aviation employment for the Marine air-ground task force, that is, perform *centralized command*. The aviation combat element commander also wants to optimize the flexibility, versatility, and responsiveness of aviation by allowing control of his assets
to be conducted by agencies both responsive to himself and in touch with the dynamic changes to the battle. This is *decentralized control*. Figure 2-1 on the following page depicts a graphical

representation of centralized command and decentralized control.

Figure 2-1. Centralized Command/Decentralized Control

The tasks the aviation combat element commander must accomplish to perform *centralized command* include—

Planning aviation operations.

Planning battlespace use.

Planning and coordinating the availability of aircraft, crews, ordnance, fuel, and facilities.

Coordinating the employment of MAGTF aviation with joint and multinational aviation resources.

Tasking MAGTF aviation.

Directing and coordinating the employment of MAGTF aviation.

The tasks the ACE commander expects the Marine air command and control system to perform through *decentralized control* include–

Executing aviation operations.

Providing air and missile defense to friendly units within the

operating area.

Managing and controlling the air portion of the MAGTF's battlespace.

Coordinating with joint and multinational air control agencies.

Executing the MAGTF's air tasking order.

Providing timely and accurate information to the ACE commander for tactical decisions, and to aviation assets to optimize mission success.

The emergence of the Marine air-ground task force commander as a warfighter—as the central commander who integrates all aspects of the MAGTF into a single battle focus—has brought a wider view of the employment of Marine aviation. Designating the aviation combat element as the MAGTF's main effort, using it as a combat arm that supports the entire Marine air-ground task force, using it as a maneuver element, and using it within a reserve are a few examples that typify the evolution of Marine aviation. Refer to MCWP 3-2, *Aviation Operations* (under development) for a more complete discussion of the evolution and employment of Marine aviation in maneuver warfare. The evolution of Marine aviation to date remains consistent with Marine aviation's principal tenet of centralized command and decentralized control.

AVIATION SUPPORT OF THE MAGTF

Today, the employment of Marine aviation has evolved to the point where the aviation combat element is considered a combat arm that supports the entire Marine air-ground task force and not just a supporting entity to the ground combat element. When tasked to meet requirements of the ground combat element, MAGTF aviation adds mobility far in excess of the ground combat element's organic capabilities, as well as considerable firepower. When providing support to the ground combat element, aviation is considered a supporting combat arm. Comparably, aviation tasked to support the combat service support element is a supporting combat arm to the combat service support element. In these examples, the aviation combat element is the *supporting* element, and the ground combat element and combat service support element are the *supported* elements.

Conversely, the Marine air-ground task force commander may designate the aviation combat element commander as the supported commander. When designated as the main effort, subordinate elements of the aviation combat element become the MAGTF commander's bid to achieve success through the application of force at the proper place and time. For example, when air superiority operations are paramount, the Marine air-ground task force commander might designate the aviation combat element as the main effort. As such, both the ground combat and combat service support elements would do everything possible to ensure the success of the ACE. Efforts to
this end could include such things as the suppression of enemy air defenses, security of a forward operating base, or priority in fuel and ammunition transport.

Whether the supported or a supporting effort, the aviation combat element must seamlessly integrate its capabilities and coordinate its actions with the rest of the Marine air-ground task force, Naval

expeditionary force, or joint force. Failure to perform proper coordination results in the inefficient use of combat force and raises the likelihood of fratricide.

DISTINCTIONS WITH OTHER SERVICES' PHILOSOPHIES

Centralized command and decentralized control and aviation as a combat arm that supports the entire Marine air-ground task force are philosophies unique to the Marine Corps.

The United States Air Force's philosophy of aviation employment is one of centralized command, centralized control, and decentralized execution (AFM 1-1, Volume II, *Basic Aerospace Doctrine of the United States Air Force*). While both Marine and Air Force philosophies support the idea of a centralized command authority, the Air Force's axiom of centralized control and decentralized execution fundamentally differs from Marine aviation's decentralized control. Centralized control means that the Air Force prefers to have all aerospace forces centrally controlled by an Air Force
commander to achieve synergies, capitalize on unique strategic and operational flexibilities, ensure unity of purpose, and minimize potential for conflicting objectives. Decentralized execution is performed to achieve effective span of control, responsiveness, and tactical flexibility. This tenet of aerospace power tends to drive the Air Force to employ a greater reliance on positive control methods and agencies for all its sorties.

This fundamental difference in command and control philosophy between the two Services has a direct impact on how each Service views the capabilities and techniques used to control aircraft and missiles. The Air Force, with robust airborne and ground-based air control capabilities, stresses positive control of each aviation

mission. The Marine Corps, with more limited airborne and ground-based control assets, stresses a blending of positive and procedural control, as appropriate. The differences between positive and procedural control will be discussed in the next chapter.

The Army's air command and control system is not similar to the air command and control systems of the other Services. As such, the Army relies almost exclusively on procedural control techniques to manage its airspace. Typically, the Army limits the use of positive control procedures to areas in and around aviation facilities and with its air defense artillery units. The Army relies on procedural control as the primary means of synchronizing airspace users in the main
battle area (FM 100-103, *Army Airspace Command and Control in a Combat Zone*).

The Navy, like the Air Force, possesses an abundance of airborne and surface-based air control platforms. Subsequently, similar to the Air Force for fixed-wing aircraft, the Navy uses positive control to the maximum extent possible; however, places primary reliance on procedural control of rotary-wing aviation assets. The exception to the latter occurs only in the immediate vicinity of its ships, where positive control of rotary-wing aviation assets is required to deconflict airspace.

The differing perspectives of aviation control held by each Service reflect upon their Service biases. The Air Force's perspective on aviation is based on the employment of primarily fixed-wing aviation to conduct the aerospace roles of aerospace control, force application, force enhancement, and force support. The Army is fundamentally concerned with the employment of rotary-wing aviation to support the ground effort. The Navy employs predominantly fixed-wing and, to a lesser extent, rotary-wing aircraft to project power and defend the fleet. The Marine Corps uses a fairly balanced amount of both fixed-wing and rotary-wing

aircraft to support the MAGTF. The Marine Corps is the only service with a balanced aviation force; one that consists of relatively equal amounts of fixed- and rotary-wing assets. As such, Marines routinely take *both* fixed-wing and rotary-wing operations into account when
designing an air control plan. The result is a blending of positive and procedural control methods. Table 2-1 highlights individual Service's preferred methods of air control.

Service	Preponderance of Aviation Assets	Aviation Command & Control System	Preferred Control Method
Army	Rotary-wing	Limited capabilities	Procedural
Navy	Primarily Fixed-wing	Robust surface and airborne assets	Positive
Air Force	Fixed-wing	Robust ground-based and airborne assets	Positive
Marine Corps	Balanced fixed- and rotary-wing	Robust ground-based and limited airborne assets	Combination of positive and procedural

Table 2-1. Services' Preferred Methods of Air Control

Marine Corps, Army, and Navy doctrine each present aviation as a supporting capability to their respective forces. Army doctrine states that Army aviation has four essential tasks: *support* the force commander's battle plan, *support* forces in contact, synchronize force operations, and sustain force operations (FM 1-100, *Army Aviation Operations*). The Navy views naval aviation as a supporting capability in all naval operations. Naval aviation supports surface and subsurface warfare with surveillance and attack assets. It also supports antiair warfare with surveillance, command and control, and defensive assets; and strike warfare

with strike, command and control, and battle damage assessment assets. In all of these naval warfare areas, naval aviation works in support of other naval assets also performing these operations.

Air Force doctrine does not refer to aviation as a supporting capability fundamental to other operations. Air Force doctrine seeks air superiority so that the bombers and strike aircraft may apply unimpeded pressure and force the enemy to eventually succumb to the air attack. This doctrinal difference affects how the Air Force views battlespace and how they control aircraft and missiles within it.

The Marines, Army, and Navy all plan the control of their aircraft and missiles *in relation to the actions* being taken by the rest of their Service component forces. Marines plan their control methods and systems based on the planned actions of all MAGTF elements. The Army plans its control methods to support the ground scheme of maneuver. The Navy plans its air control methods and systems based on the planned actions of the naval force, and potential threats to it. Conversely, the Air Force views the aerospace environment as a unique operating area that has only one distinct boundary—the earth's surface (AFM 1-1, Volume II). How differing perspectives affect the incorporation of different airspace control methods will be developed in the next chapter.

Having looked at Marine aviation's concepts relating to control of aircraft and missiles, and how they vary with the other Services, we can now discuss the methods and techniques used for aviation control.

Chapter 3

Methods of Aviation Control

"[T]he postulation by higher headquarters of minimum, rather than maximum, objectives; the freedom granted junior commanders to select their own way to the objective in accordance with the situation on the spot; and the willingness of superior headquarters to refrain from ordering about their subordinate's subordinates . . . are indispensable elements of . . . [a] mission-oriented command system."

—Martin Van Creveld [3]

The methods and techniques by which aviation is controlled are commonly used and understood by all Services. How they are employed, however, depends on the underlying aviation philosophies each Service holds. The Marine air command and control system uses different techniques to control aircraft and missiles within its designated area. The two types of control exercised by the Marine air command and control system are air direction and air control.

AIR DIRECTION

Air direction is the authority to regulate the employment of air resources including both aircraft and surface-to-air weapons to maintain a balance between their availability and the priorities assigned for their use. The purpose of air direction is to achieve a balance between the Marine air-ground task force's finite aviation assets and the accomplishment of the aviation combat element's

mission. Properly conducted, air direction results in efficient use of resources, heightened readiness, and shorter response times. Air direction includes—

Developing air tasking orders.

Fulfilling the requirements of air tasking orders (e.g., tasking aircraft to perform specific missions).

Changing or altering prescheduled missions.

Processing air support requests.

Collecting information concerning mission status.

Moving ground-based air defense assets to new firing positions.

Adjusting aircraft and surface-to-air weapon unit mission assignments within previously set parameters due to changes in the air or ground situation.

AIR CONTROL

Air control is the authority to direct the physical maneuver of aircraft in flight or to direct an aircraft or surface-to-air weapon unit to engage a specific target. An air controller performs air control when he maneuvers an aircraft by directing the pilot. Likewise, a missile controller performs air control when he directs a surface-to-air
weapons unit to engage a target. In contrast to air direction, air control does not require the same quantity of information from multiple sources. In most instances, the information is primarily single mission related, and the communications are between the aircrew/surface-to-air missile crew and the controller. Tasks

dealing with the actual maneuver of aircraft and surface-to-air weapons are air control tasks. Air control includes airspace management and airspace control.

Airspace Management

Airspace management is the coordination, integration, and regulation of the use of airspace of defined dimensions. Airspace management is used to optimize the use of available airspace to allow maximum freedom, consistent with the degree of operational risk acceptable to the commander. Effective airspace management uses airspace control methods and is predicated on the establishment of agreed upon points and procedures necessary to deconflict airspace users. Both positive and procedural methods are used to accomplish airspace management. The Marine air command and control system provides the ACE commander with the ability to conduct airspace management.

Airspace Control

Airspace control is the authority to direct the maneuver of aircraft so that the best use is made of an assigned airspace. Airspace control provides for the coordination, integration, and regulation of the use of a defined airspace. It also provides for identification of all airspace users. The authority to exercise airspace control is inherent to the commander whose unit is responsible for particular blocks of airspace, types of missions, or types of aircraft. Airspace control does not include measures to approve, disapprove, deny, or delay air operations.

Airspace Control Methods. Successful accomplishment of the broad range of aviation missions requires that these missions be deconflicted in time and space, coordinated with other aviation

missions, and integrated to optimize the effects of all aviation missions. Marine air command and control system agencies accomplish airspace control through the use of positive control, procedural control, or a combination of the two.

Positive Control. *Positive control* is a method of airspace control that relies on positive identification, tracking, and direction of aircraft within an airspace, conducted with electronic means by an agency having the authority and responsibility therein (Joint Pub 1-02). The characteristics
of positive control include the required use of radars, other sensors, identification friend or foe (IFF), digital data links for a shared air picture, and reliable and continuous communications with all aviation assets. Examples of positive control include ground control intercept (GCI) control, ground control approach (GCA) control, and radar flight following with traffic control direction.

One means of positive control that does not depend on electronic capabilities such as radars or IFF, but does require reliable and continuous communications is *terminal control*. Visual tracking of aircraft and identification of targets, landing zones, or expeditionary airfields often replaces the requirement for electronic tracking. Terminal control applies to those agencies that control the delivery of ordnance, cargo, or personnel by aircraft to a specific geographic location or air target. Because of its nature, *terminal control is always positive control*. Examples of terminal control agencies include forward air controllers, Marine air traffic control mobile teams, and helicopter support teams.

Procedural Control. *Procedural control* is a method of airspace control that relies on a combination of previously agreed upon and promulgated orders and procedures (Joint Pub 1-02). The characteristics of procedural control include comprehensive air defense

identification procedures and rules of engagement; aircraft identification maneuvers; fire support coordination measures; transit routes; and coordinating altitudes. Procedural control does not require the electronic or visual capabilities stipulated with positive control, including reliable and continuous communication with all aviation assets. Procedural control does require that all aviation assets understand, and adhere to, established and promulgated procedures. Examples of procedural air control measures include air defense engagement zones, minimum risk routes, coordinating altitudes, and all air control techniques that do not require radars, IFF, or communications to be executed.

Procedural airspace control measures, fire support coordination measures, and air defense control measures most commonly used to establish a procedural control system are provided as appendices A and B. It is important to understand that these airspace control measures and fire support coordination measures are routinely established to support the maneuver of the ground combat element. By ensuring *all* control measures relate to each other, planners ensure that the fires plan and aviation mission requirements are integrated with the scheme of maneuver, allowing for a seamless plan of action.

Positive versus Procedural Control. The degree to which either positive control or procedural control is used will be a direct reflection of the aviation force's command
and control capabilities. If the aviation force has a perfect capability to see all aviation activities within the airspace, to identify and track all friendly and hostile air activities, and to communicate with all aviation assets, positive control would be the preferred method of control.

Under most situations, however, the current technical capabilities of aviation forces to meet these theoretical conditions are limited. Not all air activities can be seen by our sensors and not all can be tracked and identified. Communications with all aviation assets is not always reliable and continuous, especially at low altitude, extended ranges, and while working through communications

jamming or interference. Procedural controls are implemented to cover the limitations in positive control capabilities.

Combination of Control Methods. In the absence of unlimited assets, the optimal method of controlling aircraft and missiles is by using a combination of positive and procedural control methods. The difficulty in determining the appropriate mix of positive and procedural means depends on the underlying concepts upon which the aviation force is based, how the aviation force envisions the battle unfolding, and the capabilities possessed to control the aviation force.

Based on the Marine Corps warfighting philosophy (refer to MCDP 1, *Warfighting*), we accept that uncertainty will be common on the modern battlefield. We will experience the fog of war, and feel the friction inherent in combat operations. We will have an opponent who attempts to asymmetrically attack our strengths in an attempt to weaken or eliminate our aviation capabilities. One of the MAGTF's unique strengths is its integral aviation capability. Because our method of controlling aviation is the integrating function that brings the other five functions of aviation together effectively, it is reasonable to expect that the enemy will direct his actions to minimize or eliminate our aviation control capabilities.

With this assumption as our basis, Marine aviation places a greater priority on establishing procedural control means, which our opponent can minimally affect, and augment this procedural control system with positive control means to enhance it. Should our opponent degrade or defeat part of our positive control capabilities, MAGTF aviation can continue its mission under the established procedural means.

Our vision of an established procedural control system, augmented by positive control capabilities, allows for a different combination control technique——positive control *by exception*. When using 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 possessed by the aviation asset.

This technique is based on two foundations. First, today's aviation assets have capabilities which in many cases are superior to our positive control agencies. These capabilities should be exploited. Secondly, control agencies may not always be available to provide positive control (the previous discussion of our expected opponent's actions applies). This is a departure from commonly held concepts of a positive air control system. Instead of positive controllers being responsible to control everything, they focus on essential positive control information pertinent now to on-going aviation missions. Absent any positive control input, aviation missions continue to conduct their planned and briefed missions using the established procedural control measures.

Figure 3-1 on page 3-8 depicts a graphical representation of the categories of air control and their subsets.

With an understanding of the methods of providing control of aircraft and missiles, and a realization that a combination of procedural and positive control methods is most commonly applied, we can now discuss the application of control of aircraft and missiles in an operational context.

Figure 3-1. Categories of Air Control

Chapter 4

Operations

"The militia and self-defense forces played a great role during the war. With 'plough in one hand and rifle in the other,' young and old people, men and women, in the countryside and the towns, actively participated in shooting down enemy planes, forming a low-altitude anti-aircraft fire network that covered the whole country. They closely cooperated with the air defense force and the air force in forming a fire network for different altitudes and directions, one that was mobile and able to fight in different conditions, covering large areas but concentrating on the defense of a number of key objective[s] . . . . Shooting at enemy planes flying at low altitude was clearly a new form of warfare in the land-against-air people's war."

—General Giap Nguyen [4]

Marine aviation, and our capability to control it, supports the full range of MAGTF operations. Our philosophy of command and control applies across the range of military operations. It supports operational maneuver from the sea and its associated concepts (e.g., ship-to-objective maneuver). Nevertheless, the requirements for Marine air-ground task force airspace control do vary with different types of operations, as
does the responsibility to plan for them.

AIR CONTROL IN MAGTF OPERATIONS

The Marine air-ground task force commander is responsible for all MAGTF operations, but delegates authority for air operations to the aviation combat element commander. The ACE commander is responsible for conducting the functions of Marine aviation required to perform the Marine air-ground task force's mission. He and his staff use the assigned mission, the MAGTF commander's intent, and the concept of operations to design the airspace and develop the airspace control plan (ACP). Considerations for the airspace control plan include—

Procedures that include rules of engagement, identification criteria, and disposition of air defense systems.

Situations that may adversely affect adherence to the airspace control plan.

Anticipated restricted areas based upon initial deployment of friendly forces.

Existing air traffic control areas, base defense zones, controlled or uncontrolled airspace, and overflight of neutral nations.

Mission profiles, combat radii, IFF, and other identification methods for aircraft that will operate in the airspace.

Enemy air defense capabilities.

Emergency procedures for aircraft experiencing difficulties.

Procedures for day or night operations and for aircraft experiencing adverse weather.

Procedures for terminal and en-route air traffic control procedures for aircraft transiting the airspace.

Procedures to support surge operations.

Enemy offensive air capabilities and long range artillery.

Enemy theater missile capabilities.

The airspace control plan is published in applicable operations orders or plans. A sample format for an airspace control plan is provided as appendix C.

As operations unfold, and as changes and updates to the airspace control plan are required, the aviation combat element commander publishes these changes in an airspace control order (ACO). Airspace control orders are usually, but not always, published in conjunction with the daily air tasking order (ATO). A generic example of an airspace control order can be found in appendix D. Another important document for the control of aircraft and missiles is the special instructions (SPINS). The special instructions is published with the air tasking order. It contains information reflecting specific time periods throughout the air tasking order cycle in which the air control measures identified in the airspace control plan and airspace control orders are to be activated. It can also contain updates to the rules of engagement and identification criteria. The three important air control documents are depicted on the following page in figure 4-1.

The Marine air command and control system is employed to execute the procedural and positive control required by the airspace control plan, airspace control orders, and SPINS. The capabilities of the Marine air command and control system deployed vary depending upon the size of the Marine air-ground task force and the scope of its mission. As such, the six functions of Marine aviation may or may not be provided in varying degrees. The inherent capabilities of the portion of the Marine air command and control system deployed with the task organized Marine air-

ground task force directly affect what procedural and positive control methods are incorporated in the airspace control plan and airspace control orders.

Figure 4-1. Important Air Control Documents

Marine Expeditionary Force

When the Marine air-ground task force is employed as a Marine expeditionary force (MEF), the aviation combat element normally conducts all six functions of Marine aviation. In most cases, a robust Marine air command and control system is deployed with a Marine expeditionary force to provide the full array of aviation control capabilities. Refer to MCWP 3-25.3, *Marine Air Command and Control System Handbook*, for further discussion on the capabilities of the Marine air command and control system in varying configurations. Accordingly, in MEF operations, aviation planners are reasonably unconstrained, with respect to available command and control assets, on how they develop the airspace control plan and
supporting airspace control orders.

Marine Expeditionary Unit

When a Marine expeditionary unit (MEU) is employed, the Marine air-ground task force possesses only limited aviation capabilities. Subsequently, the Marine air command and control system is proportionally limited in scope and capability. For Marine expeditionary units, air control planning is not developed as a Marine air-ground task force airspace control plan with supporting airspace control orders, as done with larger MAGTFs. Instead, the MEU and aviation combat element staffs consolidate their plan for

air control with the amphibious squadron (PHIBRON) commander's staff into a single airspace control plan, published by the PHIBRON commander. This integrated plan includes the roles, functions, and responsibilities of the Navy's air control agencies, the Marine expeditionary unit's air control capabilities, and the air control measures to be employed. In most cases, the Navy has limited capability to extend positive control over the shore. Similarly, the Marine expeditionary unit, itself, will probably possess only terminal control capabilities (e.g., forward air controllers, Marine air traffic control mobile teams, and helicopter support teams). Because of the lack of positive control agencies, the air control measures will be primarily procedural in nature.

Special Purpose MAGTF

The air control planning and execution responsibilities for a special purpose Marine air-ground task force (SPMAGTF) are dependent on the special purpose MAGTF's mission and scope of aviation assets assigned. Historically, most special purpose Marine air-ground task forces have deployed with a small number of aviation

assets. Because of the relatively few aviation assets and normally limited scope of operations, the air control planning process used by the Marine expeditionary unit has been the most appropriate for SPMAGTFs. The air control planning process may either be done in conjunction with the amphibious squadron commander, if embarked on Navy ships, or with the joint force commander if involved with limited operations ashore. The special purpose MAGTF would likely develop its own airspace control plan and orders in situations where it is primarily composed of aviation assets (including Marine air command and control system capabilities), and operating independent of other forces.

AIR CONTROL IN NAVAL EXPEDITIONARY FORCE OPERATIONS

When a Marine air-ground task force is employed as an integral part of a naval expeditionary force, the NEF commander and his staff are responsible for determining the naval expedition force's airspace control methods and means. Development of the airspace control plan is the responsibility of the NEF commander, who normally delegates
this responsibility to his composite warfare commander. The composite warfare commander, in turn, normally delegates responsibility for development of the airspace control plan to his air warfare commander and strike warfare commander.

The air warfare commander (AWC) plans, coordinates, and executes the airspace control plan elements relating to air defense of the naval expeditionary force. The strike warfare commander (SWC) plans and coordinates the airspace control elements for strike operations, and integrates and deconflicts his plan with the air warfare commander's plan. The air warfare commander's plan normally focuses on the battlespace in and around the naval force, while the strike warfare commander normally focuses on the

overland battlespace in which strike operations are planned.

When operating as part of a naval expeditionary force, the Marine air-ground task force's air control requirements should be closely coordinated with the composite warfare commander and his subordinate commanders. MAGTF airspace control planners must ensure that the airspace control methods and means to extend the air defense network (an antiair warfare function) over the elements ashore are coordinated with the air warfare commander for inclusion in the antiair warfare portion of the airspace control plan. The airspace control methods supporting Marine air-ground task force operations need to be incorporated with the strike warfare commander's plan to deconflict
with other naval expeditionary force strike missions and with the antiair warfare commander to deconflict the transition of MAGTF aviation to and from the naval platforms and their objectives ashore.

During execution, naval expeditionary force air operations are coordinated and controlled from the Navy's tactical air control center (TACC) or from the carrier battle group (CVBG), if one is present. It is essential that the Marine air-ground task force have appropriate representation in either to supervise and coordinate the MAGTF's portion of the airspace control plan and the performance of the employed elements of the Marine air command and control system.

Future naval expeditionary force operations planning, particularly operational maneuver from the sea and ship to objective maneuver, will incorporate a number of unique battlespace control measures. Landing penetration areas (LPAs) and landing penetration points (LPPs) are two examples of control measures evolving with these concepts. It is the Marine air-ground task force's responsibility to ensure that the naval expeditionary force commander and his subordinate commanders understand the control measures essential to the execution of operational

maneuver from the sea and ship-to-objective maneuver and include them in appropriate naval expeditionary force airspace control plans and orders.

Air Control in Amphibious Operations

For airspace control, the joint force commander, or a higher authority who assigns the amphibious operation assigns the commander, amphibious task force (CATF), specific airspace. This includes the amphibious objective area (if one is designated). All air operations and airspace control procedures in this airspace are the responsibility of the CATF until the amphibious operation is terminated. He is required to coordinate air and air control operations with the commanders responsible for adjacent airspace. As the operation progresses, principal Marine air command and control system agencies incrementally assume responsibility for conducting aircraft and airspace control ashore. Once the Marine air command and control system is fully capable of providing airspace management functions, control of the battlespace's airspace is phased ashore to the Marine air-ground task force from the Navy's air command and control system using established standing operating procedures. Once airspace control has passed ashore, the MAGTF assumes the responsibility to plan and disseminate subsequent airspace control orders, or, in joint operations, coordinate airspace requirements with the joint force commander or his designated airspace control authority (ACA). At the termination of the amphibious operation, the amphibious objective area is disestablished. Airspace control subsequently passes to the airspace control authority designated for that area by the joint force commander.

To recap, in naval expeditionary force operations, the Marine air-ground task force provides its requirements for air control methods and means to the composite warfare commander for inclusion in the NEF's airspace control plan. If the Marine air-ground task force

conducts sustained operations ashore, separate from the naval expeditionary force, it assumes responsibility for the airspace control plan and supporting airspace control orders. When a Marine air-ground task force conducting sustained operations ashore is part of a joint force, the MAGTF provides its requirements for air control to either the joint force commander or his designated airspace control authority.

AIR CONTROL IN JOINT OPERATIONS

All military operations in the future will be joint operations. The Marine Corps' most significant contribution to joint operations is the Marine air-ground task force. Marine aviation, whether influencing action within a MAGTF perspective or working in direct support of a joint service component, has significant capability to bring to a joint arena.

The Marine air-ground task force commander generally retains operational control of aviation combat element assets during joint operations. In this role, the aviation combat element supports MAGTF operations within the constraints of a joint operation. The Marine air-ground task force commander can also be tasked by the joint force commander to provide sorties for tasking through the joint force air component commander (JFACC). This tasking normally includes sorties for air defense, long-range interdiction, and long-range reconnaissance. Any sorties in excess of Marine air-ground task force direct support requirements are also made available to the joint force commander. The joint force commander uses the available sorties to support the joint force commander's operation, campaign objectives, or other components of the joint force. Sorties provided for air defense, long-range interdiction, and long-range reconnaissance are not considered *excess* sorties and will be covered in the air tasking order (Joint Pub 0-2, *Unified Action Armed Forces [UNAAF]*).

The Marine air-ground task force commander can also request aviation support from the joint force commander when organic aviation combat element assets are insufficient to meet MAGTF requirements. The guidelines for the relationship between the Marine air-ground task force commander and the joint force commander regarding aviation assets are contained in the *Policy for Command and Control of USMC TACAIR in Sustained Operations Ashore* (Joint Pub 0-2), that was previously known as the Omnibus Agreement.

Just as Marine aviation works with other joint aviation assets to meet both Marine air-ground task force and joint mission requirements, the Marine air command and control system works not only to support the MAGTF but also works as part of the joint airspace control system. The role the Marine air command and control system fills as part of the joint airspace control system depends
on the capabilities the other Services provide and on the tasks assigned to it in the airspace control plan.

The joint force commander can either retain battlespace (including airspace) planning and coordination with his joint staff, or he may designate one of the joint force's components as the airspace control authority. The joint force commander's decision on which option to select will depend on the scale, tempo, and complexity of joint air operations as well as the requirements for airspace coordination. Should the scale, tempo, or complexity of joint air operations exceed the joint force commander's staff's capabilities, he will normally designate an airspace control authority.

The airspace control authority is responsible for developing, coordinating, and publishing air control procedures and for operating the airspace control system in the joint operations area. This manifests itself in the publication and dissemination of the airspace control plan and airspace control orders. All air missions

are subject to the ACP and ACOs (Joint Pub 3-56.1, *Command and Control of Joint Air Operations*). The method of control to be used by the Marine air command and control system and the role it satisfies as part of the joint airspace control system must be planned, coordinated, and approved by the airspace control authority.

In joint operations, the Marine air-ground force's area of operations is designated by the joint force commander. Generally, the assigned area of operations includes the airspace above and within those assigned boundaries. Marine air command and control system planners develop an array of air control measures to best support Marine air-ground task force operations within its assigned airspace. Marine air command and control system planners then request approval of the proposed airspace control measures from the airspace control authority. Once approved, the Marine air-ground task force's airspace control measures are incorporated into the joint airspace control plan or a follow-on joint airspace control order. In this way, the Marine air-ground task force ensures that any joint aviation assets operating in support of the MAGTF, or transiting its area, knows the air control methods and means being employed.

Normally, it is appropriate for the Marine air-ground task force to request an airspace sector from the joint force commander. This airspace sector is normally controlled by the Marine air command and control system. This is not always practical if the Marine air-ground task force's battlespace is either too small or constricted relative to the rest of the joint operations area. It may also not be practical if the MAGTF/NEF does not possess the necessary air command and control assets to perform airspace management and control functions. When appropriate, assigning an airspace sector to the MAGTF simplifies procedures for establishment of air control measures within the sector as operations continue, and enhances the flexibility of control by the Marine air command and control system. As with related activities, the

MAGTF retains the responsibility to update the airspace control authority regarding any changes to air control methods or airspace control measures within its assigned sector.

Joint Pub 3-52, *Doctrine for Joint Airspace Control in the Combat Zone*, provides further details applicable to airspace control in joint operations.

AIR CONTROL IN MOOTW

Air control issues relating to military operations other than war (MOOTW) need to be examined in two separate contexts: military operations other than war within the United States and those outside the United States.

Military operations other than war within the United States (e.g., fire fighting, humanitarian operations after natural disasters, riot control augmentation to civilian authorities, counterdrug operations) normally have air control procedures established by the Federal Aviation Administration (FAA), as the sole source of air control authority. Should military air control capabilities be needed to augment or replace existing FAA control centers, the Federal Aviation Administration procedures normally in use will be executed by augmenting military air control agencies. Additional specific air control procedures needed by military aviation to support military operations other than war in the United States normally are coordinated and approved by the FAA, and published to all air users via appropriate notices to airmen (NOTAMs).

Planning for airspace management and control in military operations other than war outside the United States requires the identification of the International Civil Aviation Organization's (ICAO's) procedures established for the specified area (e.g., identified airways, established air control areas). Additional airspace control
procedures and means necessary to execute the military operation other than war are coordinated with the ICAO and the supporting country prior to implementation, *if at all possible*. Where operational necessity does not allow for this prior coordination, needed airspace control procedures should be implemented in the most restrictive means possible to preclude interference with international civilian aviation flights. The required coordination

with the International Civil Aviation Organization and host country should then be conducted as soon as practical.

Peace operations are one type of military operation other than war that warrant additional discussion. Air control in peace operations will generally follow the same methods and procedures used in joint and Marine air-ground task force operations. Two exceptions normally apply. First, the political context of peace operations often provide guidance designed to minimize or eliminate the possibility of civilian casualties. Accordingly, the most restrictive airspace control procedures are normally employed in peace operations, as well as a high degree of positive air control. Second, because the countries requiring peace intervention will often have their own civilian air control services disrupted or destroyed prior to the intervention, it is not uncommon for the intervening military force to provide airspace control services for civilian air operations.

By providing restrictive procedures and positive control over military air operations, and civilian air control service augmentation or replacement, the Marine air-ground task force ensures that air operations support the objectives of peace operations. Airspace control agencies need to be familiar with International Civil Aviation Organization procedures so that the military airspace control procedures used are not in conflict, and that appropriate procedures to control civilian aviation are used.

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Chapter 5

Airspace Control Authority

"There is no question about the quality or quantity of Marine air support. It worked exactly as we had planned, over the years. General Horner adhered to the [Policy for Command and Control of USMC TACAIR in Sustained Operations Ashore], with respect to allocation of sorties, and the ATO served a useful purpose and generally worked—although it's still a bit too large, too complicated, and too slow. We provided excess sorties to the Air Force, as promised, and the Air Force made no attempt to assume operational control of Marine aviation. The air support picture was not entirely problem-free, but all in all it worked pretty damned well."

—General Walter C. Boomer, USMC [5]

The Marine air-ground task force will operate as part of a joint force. In a joint operation, the MAGTF may well have the preponderance of aviation assets, and the ability to control them and the battlespace, at any given time. This is especially likely during the early introduction of the joint force into a theater, or in military operations other than war where the MAGTF may provide the major element of the joint force.

JOINT OPERATIONS

If the joint force commander's staff cannot coordinate certain joint force functions because of the complexity, tempo, etc. of the operation, the joint force commander normally assigns

responsibility for coordination of those functions to the Service component commander who possesses the preponderance of that function's assets *and the ability to plan, task, and control* them. As such, the joint force commander normally designates a joint force air component commander, an airspace control authority, and an area air defense commander (AADC). Because of the integrated relationship between airspace control measures and air defense operations, the airspace control authority and area air defense commander duties are normally performed by the same person, who may also be the joint force air component commander (Joint Pub 3-52). Although these three functions are interrelated, joint doctrine does not mandate that all three functions be assigned to one individual. It is practical to expect that occasions will arise that favors separation of the three functions.

COMMARFOR as JFACC

The commander, Marine Corps forces (COMMARFOR) may be designated as the joint force air component commander when he possesses the preponderance of air assets and the capability to control and direct air operations. When so designated, he will likely assign the aviation combat element commander to act as his agent in performance
of the joint force air component commander's functions. The JFACC's command post is called the joint air operations center and is typically hosted by the most capable air command and control agency in theater.

The joint force air component commander and joint air operations center support joint air operations. As such, the JFACC is a functional component commander directly responsible to the joint force commander. The aviation combat element commander and his support infrastructure support Marine air-ground task force operations. As such, the aviation combat element commander is responsible to the Marine air-ground task force commander, who

in turn is responsible to COMMARFOR. Dual-hatting of individuals and dual use of equipment and communications assets may occur, but two distinct staffs should operate to avoid conflicts of interest between joint and MAGTF air operations. Any extensive Marine air-ground task force commitment to perform JFACC functions or to host the joint air operations center will generate significant requirements for command and control capabilities beyond those of the aviation combat element. For detailed information concerning joint force air component commander responsibilities and the role of the Marine Corps forces component when acting in that capacity, refer to Joint Pub 3-56.1, *Command and Control for Joint Air Operations*, and MCWP 3-2, *Aviation Operations* (Under Development), respectively.

COMMARFOR as AADC

The joint force commander may designate COMMARFOR as the area air defense commander when he is the component commander with the preponderance of air defense capability and the command, control, communications, computers, and intelligence capability to plan, coordinate, and execute integrated air defense operations. When designated as the area air defense commander, COMMARFOR will most likely assign the aviation combat element commander as his agent to perform area air defense commander functions.

The area air defense commander is responsible for planning, coordinating, and directing the air defense operations of the joint force. As the supported commander for theater-wide active air defense operations, the area air defense commander establishes weapons control procedures and measures for all air defense weapons systems and forces. Joint doctrine states that the AADC and ACA should normally be assigned to one individual. If so, coordination of area air defense commander requirements with the

airspace control authority is vastly simplified. Should they be different individuals, coordination of area air defense commander airspace requirements and control agencies' responsibilities to the area air defense commander must be identified early in the airspace control authority's planning process. The force protection provided to the joint force by the AADC's air defense system usually has priority in the ACA's airspace planning.

For detailed information concerning the responsibilities of the area air defense commander and the role of the Marine Corps forces component when acting in that capacity, refer to Joint Pub 3-01, *Joint Doctrine for Countering Air and Missile Threats* (Under Development), and MCWP 3-22, *Antiair Warfare* (Under Development), respectively.

The remainder of this chapter discusses the issues involved when the Marine Corps forces component is designated as the airspace control authority.

COMMARFOR AS ACA

All air missions are subject to the airspace control order of the airspace control authority; however, centralized direction by the ACA does not imply operational control or tactical control over any air assets (Joint Pub 3-56.1). The airspace control authority is not a functional component commander as are the joint force air component commander and area air defense commander. Rather, he is an authority who provides guidance and direction concerning the control and coordination of the joint operations area's airspace.

Although not a functional component commander, the airspace control authority is not a subordinate authority to either the area air defense commander or the joint force air component commander. Instead, they are coequal subordinates to the joint force

commander. As such, difficulties may occur if the Service designated as AADC emphasizes minimum procedural control measures (limited engagement zones, no minimum risk routes, etc.) and maximum positive control by available agencies. A separate ACA from another Service may assess the available air control agencies to be limited in their ability to conduct continuous positive control of all missions and want incorporation of more procedural control measures. Differences in perspective on how best to control airspace can normally be resolved through coordination and education. However, when a conflict can not be resolved, the issue is elevated to the joint force commander for resolution.

When designated the airspace control authority by the joint force commander, the commander Marine Corps forces assumes responsibility to plan and manage the airspace portion of the joint force's battlespace. The land boundaries of each joint force component are assigned by the joint force commander. These boundaries are an integral part of the airspace control authority's plan. The coordination and planning of airspace into a cohesive, supporting dimension of the battlespace is critical to the joint force's success. The airspace control authority must seamlessly integrate all adjoining component airspace so that it functions as one joint airspace. There is only one joint airspace control plan.

COMMARFOR is ideally suited to function as the airspace control authority. Marines routinely perform air, ground, and sea based operations. Battlespace integration is normal for Marine forces operations. Our common naval heritage and terminology ease the coordination process for Navy airspace requirements. Our common view of air defense and rotary-wing operations facilitates the understanding of Army airspace requirements. Finally, our understanding of Air Force employment concepts, and our commonality to it with Marine fixed-wing operations, simplify understanding of Air Force airspace control requirements.

The joint force commander may designate COMMARFOR as the airspace control authority in situations where the Marine forces have the best ability to plan, control, and coordinate joint airspace control requirements. When COMMARFOR is so designated, he will likely delegate airspace control authority responsibilities to the Marine air-ground task force commander, who, in turn, will designate the ACE commander as his *agent* for airspace control authority functions.

The airspace control authority utilizes a staff to assist in the planning for and coordinating of joint airspace. The ACA's staff is a joint staff that includes Service component staffing and augmentation representative of the joint force's composition. The size, composition, and role of the airspace control authority's staff are situationally dependent, and are influenced by the tempo and scope of the joint force's
airspace control responsibilities. Liaison cells may be used to facilitate information exchange between the airspace control authority and the Service components.

When COMMARFOR is designated airspace control authority responsibilities, the preponderance of the his staff most likely will consist of Marines from the Marine air control group. Regardless of staff composition, the airspace control authority's focus must be on joint airspace control and coordination. Service biases should play no role. The ACA staff should be completely separate from the MAGTF's airspace planning staff to properly focus on joint force, and not only Marine air-ground task force, requirements.

The airspace control authority may choose to establish a joint airspace control center (JACC). The joint airspace control center is typically located with or in the immediate vicinity of the component air command and control agency responsible for conducting airspace control and coordination. This often means that the JACC operates within the existing support structure of a Service's senior air command and control facility for economy of

resources (e.g., communications, workspaces, security). As the case with the composition of the airspace control authority's staff, it is important to recognize the division of responsibilities and distinct orientation between the joint airspace control center and the Service's air command and control facility. Because of this functional difference—orientation on joint versus Service operations—a Service's air
command and control facility can be said to be *hosting* the JACC vice serving as the JACC. In those situations where COMMARFOR is designated airspace control authority, the tactical air command center will likely be the air command and control agency specified to host the joint airspace control center. The joint airspace control center is manned by representatives from each component of the joint force, and by multinational representatives if appropriate. Refer to MCWP 3-25.1, *Multiservice Procedures for Integrated Combat Airspace Command and Control (ICAC²)*, for further discussion of a joint airspace control center.

ACA Tasks

When designated as the airspace control authority by the joint force commander, the commander of Marine Corps forces will—

Develop broad policies and procedures for airspace control.

Coordinate and integrate the use of the airspace control area with all elements of the joint force.

Establish an airspace control system that is responsive to the needs of the joint force commander and deconflict user requirements.

Integrate the airspace control system with the host nation.

Develop the airspace control plan and, after joint force

commander approval, promulgate it throughout the joint operations area.

Publish subsequent airspace control orders to clarify and, when necessary, refine the air control plan.

Provide the flexibility needed within the airspace control system to react to a dynamic battlefield.

ACA Requirements

To provide the joint force commander with the responsive airspace control system he needs, COMMARFOR, when designated the airspace control authority requires—

Knowledgeable representatives assigned to his staff at the joint airspace control center from each component of the joint staff.

Frequent updates from the joint force commander on modifications to the battlespace assigned to each component.

Continuous appraisals from each component concerning airspace and airspace control requirements.

Access to an airspace control planning and dissemination system that allows for rapid integration of all airspace requirements into cohesive airspace control orders.

BATTLESPACE MANAGEMENT TECHNIQUES

To manage the battlespace, the airspace control authority must become familiar with the airspace control processes already in use by the host country and international aviation agencies within the designated airspace control area. He also must satisfy the airspace

control requirements of the area air defense commander. The AADC is concerned with air control measures such as fighter engagement zones, minimum risk routes, base defense zone, tanker tracks, and theater missile defense missile engagement zones.

With the foundation in place, the airspace control authority identifies the airspace control requirements of each element of the joint force, as well as the control capabilities each joint force element contributes to the joint airspace control system. It is important to remember that the airspace control authority is involved with more than just airspace. He needs to have a firm understanding of the ground maneuver control measures and the fire support control measures to effectively integrate surface and air requirements into the airspace control plan. From this information, the airspace control authority develops and publishes the joint force commander's airspace control plan and the first of many airspace control orders.

The airspace control authority monitors the execution of the air control plan through input received from the deployed air control agencies. When necessary, the ACA modifies the airspace control plan through publication of subsequent airspace control orders. It is through this dynamic process that the airspace control authority best manages the changing requirements for battlespace management and the control of aircraft and missiles within the battlespace. The process
consists of two separate and interrelated components—input from the joint force commander and each joint force element in developing an airspace control plan, and input from the airspace control authority's observation of airspace control execution from appropriate airspace control agencies.

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Appendix A

Airspace Control Measures

Airspace control measures (ACMs) are used to assist aircrew and controllers in deconflicting the use of friendly airspace and reducing the chance of committing fratricide against friendly aircraft. There are five jointly accepted airspace control measures and several Service-specific airspace control measures.

Joint Airspace Control Measures

The jointly agreed upon airspace control measures are—

Coordinating Altitude. Coordinating altitude (figure A-1 on page A-2) is a procedural method to separate fixed- and rotary-wing aircraft by determining an altitude below which fixed-wing aircraft normally will not fly and above which rotary-wing aircraft normally will not fly. The coordinating altitude is normally specified in the airspace control plan and may include a buffer zone for small altitude deviations. (Joint Pub 1-02)

Fixed- or rotary-wing aircraft planning extended penetration of this altitude will notify the appropriate airspace control facility. However, approval acknowledgment is not required prior to fixed-wing aircraft operating below the coordinating altitude or rotary-wing aircraft operating above the coordinating altitude.

Figure A-1. Coordinating Altitude

High Density Airspace Control Zone. The high density airspace control zone (HIDACZ) (figure A-2) is airspace designated in an airspace control plan or airspace control order, in which there is a concentrated employment of numerous and varied weapons and airspace users. A high density airspace control zone has defined dimensions, which usually coincide with geographical features or navigational aids. Access to a high density airspace control zone is normally controlled by the maneuver commander. The maneuver commander can also direct a more restrictive weapons status within the high density airspace control zone. (Joint Pub 1-02)

Figure A-2. High Density Airspace Control Zone

The volume of traffic within a HIDACZ demands careful coordination to limit the potential conflict among aircraft needed for mission essential operations within the high density airspace control zone and other airspace users. When establishing a HIDACZ, the following topics should be considered—

Minimum risk routes into and out of the HIDACZ and into the target area.

Air traffic advisory as required. Procedures and systems also must be considered for air traffic control service during instrument meteorological conditions.

Procedures for expeditious movement of aircraft into and out of the HIDACZ.

Coordination of fire support, as well as air defense weapons control orders or status within and in the vicinity of the HIDACZ.

Location of enemy forces inside of and within close proximity to the HIDACZ.

Establishment of a high density airspace control zone is nominated by the ground commander and approved by the airspace control authority.

Restricted Operations Area and Restricted Operations Zone. The restricted operations area (ROA) (figure A-3) and restricted operations zone (ROZ) are synonymous terms for

defining a volume of airspace set aside for a specific operational mission or requirement. These areas or zones restrict some or all airspace users until termination of the mission. The airspace is normally used for drop or landing zone activity, search and rescue operations, and such activities. Controlling authority requirements for the ROA/ROZ are similar to those required for a HIDACZ. (MCWP

3-25.1)

A restricted operations area/zone can adversely affect air defense operations. Therefore, air defense mission may have priority over the ROA or ROZ.

Establishment of a ROA/ROZ is approved by the airspace control authority.

Figure A-3. Restricted Operating Area/Zone

Minimum Risk Route. Minimum risk routes (MRRs) (see figure A-4 on page A-6) are temporary corridors of defined dimensions recommended for use by high-speed, fixed-wing aircraft that present minimum known hazards to low-flying aircraft transiting the combat zone (Joint Pub 1-02). MRRs are established considering the threat, friendly operations, known restrictions, known fire support locations, and terrain.

The MRR is an airspace control measure used primarily by cross-forward line of own troops operations. Close air support aircraft do not usually use MRRs in the vicinity of the target area. Low-level transit routes are used in NATO for similar purposes.

Figure A-4. Minimum Risk Route

Minimum risk routes are recommended by airspace users and should be coordinated with all ground commanders over which the MRR is established. The airspace control authority is the establishing authority for MRRs.

Standard Use Army Aircraft Flight Route. Standard use Army aircraft flight routes (SAAFRs) (figure A-5) are routes established below the coordinating altitude to facilitate the movement of Army aviation assets. Routes are normally located in the corps through brigade rear areas of operation and do not require approval by the airspace control authority. (Joint Pub 1-02)

If altitudes for the standard use army aircraft flight route are at or below the coordinating altitude, the SAAFR is implemented by the using authority. If a coordinating altitude has not been established, an air corridor is established by the airspace control authority at the request of the appropriate ground commander.

Figure A-5. Standard Use Army Flight Route

Army Airspace Coordination Measures

Army aviation operations rely on freedom of movement to and from the forward area and lean heavily toward procedural (vice positive) control. Army-specific types of airspace control measures include—

Air Corridor. An air corridor is a restricted air route of travel specified for use by friendly Army aircraft and established to prevent friendly forces from firing on friendly aircraft (MCWP 3-25.1). Air corridors are used to route aviation combat elements between such areas as forward arming and refueling points, holding areas, battle positions, etc. Altitudes of an air corridor do not exceed the coordinating altitude, if a coordinating altitude is established.

If a coordinating altitude has been established, an air corridor is implemented by the using authority. If a coordinating altitude has not been established, an air corridor is established by the airspace control authority at the request of the appropriate ground commander.

Air Axis. An air axis is similar to a ground axis of advance and is assigned for control, which graphically depicts a commander's intentions (MCWP 3-25.1).

Air Control Point and Aerial Checkpoint. An air control point or aerial checkpoint is a predetermined point on the ground used as a means of coordinating or controlling friendly Army aircraft movement (MCWP 3-25.1).

Initial Point and Release Point. An initial point and a release point are predetermined points on the ground used to initiate a control procedure (for initial point) or terminate the conduct of a control procedure (for release point) (MCWP 3-25.1).

Battle Positions. A battle position is a defensive location oriented on the most likely enemy avenue of approach from which a unit may defend or attack. A unit assigned a battle position is located within the general outline of the battle position (MCWP 3-25.1).

Engagement Area. An engagement area is an area in which the commander intends to trap and destroy and enemy force with massed fires of all available weapons. Engagement areas and sectors of fire are not intended to restrict fires, but are used as a tool to concentrate fires and to optimize their efforts (MCWP 3-25.1).

Naval Airspace Coordination Measures

In naval aviation operations, airspace control is a multifunctional effort consisting of surveillance, warning, launch and engagement authority, air movement control, and communications. Emphasis is placed on positive control of air traffic as much as possible, commensurate with the communications and identification means available. Airspace control measures unique to the Naval services include—

Positive Identification and Radar Advisory Zone. A positive identification and radar advisory zone (PIRAZ) is capable of positively identifying and tracking friendly aircraft in defended airspace before they pose a threat to the vital area. A naval tactical data systems cruiser in the surveillance area is normally assigned PIRAZ control (MCWP 3-25.1). The PIRAZ is normally delineated by the air warfare commander.

Return to Force Profile. A return to force profile is a specific maneuver or track that friendly aircraft will fly when returning to the fleet in order to reduce the possibility of being engaged by friendly surface-to-air missiles or fighters in the fleet air

defense network. Instructions (altitudes, course, speed, ingress points, safety corridors, and approach sectors) are defined in operations messages generated by the air warfare commander (MCWP 3-25.1).

Joining Procedures. Joining procedures are similar to return to force procedures. Friendly, non-organic aircraft follow these procedures to ensure safe passage through the fleet surveillance area en route to support fleet operations (MCWP 3-25.1).

Amphibious Objective Area. An amphibious objective area (AOA) is a geographical area delineated in the initiating directive for purposes of command and control within which is the objective(s) to be secured by the amphibious task force. This area must be of sufficient size to ensure accomplishment of the amphibious task force's mission and must provide sufficient area for conducting necessary sea, air, and land operations (Joint Pub 1-02). The airspace above the amphibious objective area is an integral part of the AOA and is controlled by the commander, amphibious task force. It can be loosely compared to a HIDACZ. When the AOA is disestablished, control of that airspace reverts to the airspace control authority.

Special Purpose Airspace

Special purpose airspace refers to airspace control measures that are used for a specific purpose. An example of commonly used special purpose airspace is the combat air patrol/orbit area.

Combat Air Patrol/Orbit Areas. A combat air patrol/orbit area is essentially a restricted operating zone that is designated for use by specialized aircraft (air defense, AWACS, and other special asset orbits). Limits are defined vertically and horizontally along with times for initiation and completion.

(MCWP 3-25.1)

Air Defense Control Measures

Air defense control measures refer to airspace control measures

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

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

Air Defense Area. An air defense area is a specifically defined airspace for which air defense must be planned and provided (MCWP 3-25.1). It defines, in an area of operations, the area to be defended. An air defense area is a planning (division-of-responsibility) aid; it is

not used as an airspace control measure. The air defense area is delineated by the area air defense commander.

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

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

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 (Joint Pub 1-02). These include fighter engagement zones; various types of missile engagement zones; and joint engagement zones. The design of the weapons engagement zone is dependent on specific weapon system capabilities. Weapons engagement zones are defined by the area air defense commander.

Fighter Engagement Zone. In air defense, a fighter engagement zone (FEZ) is that airspace of defined dimensions within which the responsibility for engagement normally rests with fighter aircraft (Joint Pub 1-02). Fighter engagement zones are an alternative type of engagement operation if the detailed control aspects of joint engagement operations cannot be met. The fighter engagement zone is an air defense control measure. From an air defense perspective, the fighter engagement zone is normally used when fighter aircraft have the clear operational advantage over surface-based systems. These advantages could include range, density of fire, rules of engagement, or coordination requirements. From an airspace control perspective, it provides airspace users with location of the engagement zone for fighter aircraft for mission planning

purposes. Coordination and flexibility within the combat airspace control system may be a limiting factor with fighter engagement zones. Surface-to-air missile systems will not be allowed to fire weapons into a

fighter engagement zone 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 rules of engagement. The area air defense commander establishes the locations of fighter engagement zones.

Missile Engagement Zone. A missile engagement zone is an airspace of defined dimensions within which the responsibility for engagement normally rests with missiles (Joint Pub 1-02). In joint doctrine, missile engagement zones (MEZs) are divided into high-altitude and low altitude missile engagement zones. The principal difference between high- and low-altitude missile engagement zones are the type of missile system being employed and the altitude limits of the missile zone. Missile engagement zones are designated by the area air defense commander.

Joint Engagement Zone. A joint engagement zone (JEZ) is airspace of specified dimensions within which multiple air defense weapon systems (surface-to-air weapons and aircraft) of are simultaneously employed to engage air threats (Joint Pub 1-02). Joint engagement zones are highly dependent on correct differentiation between friendly, neutral, and enemy aircraft. The joint engagement zone is established by the area air defense commander.

Base Defense Zone. The base defense zone (BDZ)is an air defense zone established around an air base (or forward operating base) and limited to the engagement envelope of short-range air defense weapons systems defending that base.

Base defense zones have specific entry, exit, and identification, friend or foe procedures established. (Joint Pub 1-02) In the case of the MAGTF, low altitude air defense (LAAD) assets employ at BDZs.

Low altitude air defense assets will integrate with the Marine air traffic control detachment operating at the forward operating base around the BDZ. Pre-planned base defense zones are published in the airspace control plan, while requests for activation of these zones are made to the ACE/MAGTF commander. Three critical elements are required to establish a base defense zone—

Controlling agency (e.g., Marine air traffic control detachment, tactical air operations center, or a joint/multinational air traffic control system).

Radar.

Weapon system.

Firepower Umbrella. The firepower umbrella is an area of specified dimensions defining the boundaries of the airspace over a naval force at sea within which the fire of a ship's antiaircraft weapons can endanger aircraft, and within which special procedures have been established for the identification and operation of friendly aircraft. (Joint Pub 1-02) The firepower umbrella is designated by the Navy's air warfare commander.

Vital Area. A vital area is a designated area or installation to be defended by air defense units (Joint Pub 1-02). It contains facilities, units, and installations necessary for the MAGTF to accomplish its mission. More than one vital area can exist, dependent upon the scope of the operation. Vital areas can include airfields, command and control systems, combat service support units, ground combat element units, and the MAGTF command element. The Marine air-ground task force commander identifies vital areas through establishment of his air defense priorities.

Air Defense Warning Conditions. Air defense warning conditions indicate a degree of air raid probability (Joint Pub 1-02). They are passed by the senior air control agency to all elements of the MAGTF. 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.

Rules of Engagement. 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 engagement with other forces encountered (Joint Pub 1-02). As this relates to the aviation combat element, ROE identify the exact conditions under which aircraft and missile batteries may engage a target (airborne or on the ground). The rules of engagement under military operations other than war tend to be more restrictive in nature, designed to prevent death or damage to friendly forces, as well as noncombatants. In comparison, wartime rules of engagement are designed to afford local commanders maximum flexibility to accomplish their mission while minimizing collateral damage to property and noncombatants. The equipment, discipline, and fundamental principles for the employment of MAGTF aviation, under the different rules of engagement, do not change. What is mitigated is the degree of force applied. Rules of engagement will always allow the right of self-defense.

Identification Criteria. Closely related to rules of engagement are identification criteria. Identification criteria describe the conditions required to declare unknown personnel or equipment as either friendly or hostile. Rules of engagement cannot be applied until identification occurs. Generally, it is more difficult to

distinguish hostiles from friendlies, or neutrals, in MOOTW than in combat. This difficulty results in more restrictive rules of engagement. There is an inverse relationship between the ease of identification and the restrictiveness of rules of engagement.

Weapons Control Status. Weapons control statuses define the restrictions on firing air defense weapons for a particular area

and time period. Weapons control statuses may be varied to apply only to specific aircraft, weapons systems, or targets. An example would be 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. Weapons control statuses are defined as—

Weapons Free. Fire at any target which 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.

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Appendix B

Fire Support Coordination Measures

Fire support coordination is the continuous process of implementing fire support planning and the management of all available assets. It provides the means to deconflict attacks, reduce duplication of effort, facilitate shaping the battlefield, and avoid fratricide. Fire support coordination measures (FSCMs) are employed by land or amphibious commanders to facilitate the rapid engagement of targets and simultaneously provide safeguards for friendly forces. Locations for FSCMs are disseminated by message and/or overlay through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units. Typically they are further disseminated to each level of command, to include the establishing command and all concerned fire support agencies. Not all measures may apply to a joint operation. Knowledge of the various fire support control measures is necessary for the effective use of fire support.

All fire support coordination measures must complement the supported commander's concept of operations. The depths of subordinate units' areas of operation are key considerations in the placement of FSCMs, which in turn influence the allocation of target acquisition and fire support assets. The change of a fire support coordination measure established by the ground commander
is typically initiated by his operations cell at the recommendation of the ground commander's fire support coordinator. Conditions which dictate the change of a fire support coordination measure should be coordinated with the direct air support center. As

conditions are met, the new FSCM effective time can be projected and announced. Following direction to execute the change, the operations cell should confirm that the direct air support center has informed the appropriate control nodes. This ensures affected sorties are aware of new fire support coordination measure locations.

Permissive Measures

The purpose of permissive fire support coordination measures is to facilitate the attack of targets. When established, permissive measures permit the engagement of targets beyond the line or into an area without further coordination.

Coordinated Fire Line. The coordinated fire line (CFL) is a line beyond which conventional surface fire support means (e.g., mortars, field artillery, and naval surface fire ships) may fire at any time within the zone of the establishing headquarters without additional coordination (FMFRP 0-14, *Marine Corps Supplement to the DOD Dictionary of Military and Associated Terms*).

The purpose of the coordinated fire line is to expediate the attack of targets beyond the line without coordination with the ground commander in whose zone of action targets are located. It also provides the ground commander with an area within his zone where his forces can operate in safety from friendly surface delivered indirect fires.

Maneuver battalion commanders are responsible for selecting or approving a recommended coordinated fire line location for their zone of action or sector of defense. Supporting artillery commanders and artillery liaison officers at every echelon should make appropriate recommendations concerning its

location. The location of the battalion's CFL is forwarded to the infantry regiment through both infantry and artillery fire support coordination channels, where it is approved, consolidated, and forwarded to division level as appropriate. A consolidated coordinated fire line may be established for the ground combat element as a whole, but this is not practical in all cases.

The selected location of the coordinated fire line at all echelons is based on such factors as the scheme of maneuver, patrol plans, locations of security forces, and the troop safety desires of the ground commander. There is no requirement for the CFL to be placed on identifiable terrain. However, additional considerations are the limits of ground observation, the location of the initial objectives in the offense, and the requirement for maximum
flexibility in both maneuver and the delivery of supporting fires.

The location of the coordinated fire line is portrayed on maps, charts, and overlays by a dashed black line with the letters CFL followed by the establishing headquarters in parentheses above the line and the effective date-time group below the line. The fire support coordination center (FSCC) of the establishing commander disseminates the location of the coordinated fire line to the fire support coordination agencies of subordinate, adjacent, and higher headquarters, as required. It is further disseminated to each level of command, to include the establishing command, and all concerned fire support agencies.

Fire Support Coordination Line. The fire support coordination line (FSCL) is a line established by the appropriate land or amphibious force commander to ensure coordination of fire not under the commander's control but which may affect current tactical operations. The fire support coordination line is

used to coordinate fires of air, ground, or sea weapons systems using any type of ammunition against surface targets. The fire support coordination line should follow well-defined terrain features. The establishment of the fire support coordination line must be coordinated with the appropriate tactical air commander and other supporting elements. Supporting

elements may attack targets forward of the fire support coordination line without prior coordination with the land or amphibious force commander, provided the attack will not produce adverse surface effects on, or to the rear of, the line. Attacks against surface targets behind this line must be coordinated with the appropriate land or amphibious force commander (Joint Pub 1-02).

Naval surface fires, to include ship launched surface-to-surface missiles, may engage targets beyond the fire support coordination line. Normal fire support planning and coordination ensures that air and naval surface fires are not unintentionally delivered on the same target. However, if the trajectory of naval surface fires could endanger landing force aircraft, coordination with the landing force should be made.

The primary purpose of the fire support coordination line is to provide a measure for coordination between amphibious task force surface-to-surface fires and amphibious task force (which includes MAGTF) and supporting forces air-to-surface fires without endangering friendly troops on the ground or requiring additional coordination with the establishing headquarters. The fire support coordination line serves several purposes—

It facilitates the attack of targets beyond the FSCL.

It provides ground commanders with sufficient control of aircraft short of the FSCL to maximize troop safety.

It maximizes employment of weapons where they are most effective, and provides aviation commanders, air control agencies, and pilots with sufficient information to identify the area in which control or coordination is required before aircraft can attack ground targets.

In amphibious operations, the fire support coordination line is normally established by the commander, landing force after coordination with the commander, amphibious task force. When air forces external to the amphibious task force are supporting the amphibious operation, the commander, landing forces coordinates with the supporting forces through the commander, amphibious task force. In joint or combined operations, the fire support coordination line may be established by headquarters above the Marine air-ground task force level. Prior to establishment, consultation should be made with appropriate ground and air elements.

In addition to having the fire support coordination line follow well defined terrain features, which are easily identified from the air, its positioning must address the tactical situation. This should include the scheme of maneuver or plan of defense, weather, terrain, type and source of aircraft, and overall flexibility of maneuver and fire support. A key factor is the range of landing force artillery. The fire support coordination line may be positioned at the extreme range of landing force artillery, but never beyond this range, as this would create a gap between landing force artillery fires and the FSCL, beyond which aviation can freely engage enemy targets without coordinating with ground forces.

The fire support coordination line is disseminated by the establishing commander's fire support coordination center (e.g., the Marine air-ground task force fire support coordination center in the case of a MAGTF) to the fire support coordination centers of subordinate, adjacent, and higher headquarters, as required. It is further disseminated at each level of command, including the establishing command, to all concerned fire support agencies such as the direct air support center, tactical air command center, fire direction center, supporting arms coordination center, and naval surface fire ships.

The location of the fire support coordination center is graphically depicted on fire support maps, charts, and overlays by a solid black line with the letters FSCL followed by the establishing headquarters in parentheses above the line and the effective date-time group below the line.

Free-Fire Area. A free-fire area (FFA) is a specifically designated area into which any weapons system may be fired without any additional coordination (FMFRP 0-14). Its purpose is to expedite fire and to allow jettisoning of close air support munitions if an aircraft is unable to drop on a target. A free fire area is preferably established on identifiable terrain by higher headquarters.

Restrictive Measures

The primary purpose of restrictive fire support coordination measures is to provide safeguards for friendly forces. When established, a restrictive measure imposes certain requirements for specific coordination prior to the engagement of those targets affected by the measure.

Restrictive Fire Line. The restrictive fire line (RFL) is a line established between converging friendly forces that prohibits fires, or effects from fires, across the line without coordination with the affected force. The purpose of a restrictive fire line is to prevent interference between converging friendly forces (FMFRP 0-14). It is established on identifiable terrain by the common commander of the converging forces.

No-Fire Area. A no-fire area (NFA) is a designated area into which no fires or effects of fire will occur (FMFRP 0-14).

There are two exceptions—

The establishing headquarters may approve the fires temporarily.

When an enemy force within the NFA engages a friendly force and the engaged unit leader determines there is no time for coordination.

The purpose of the no-fire area is to prohibit fires or their effects in the area, normally to protect a national asset, population center, or shrine. The situation may require NFAs be used to protect reconnaissance forces or scouts.

Restrictive Fire Area. A restrictive fire area (RFA) is an area in which specific firing restrictions are imposed and into which fires that exceed those restrictions will not be delivered without coordination with the establishing headquarters. The purpose of the restrictive fire area is to regulate fires into an area according to the stated restrictions (FMFRP 0-14). This means that fires or certain types of ordnance can be controlled in an area where friendly forces are or will be located. An RFA may be established by any ground unit commander within his own zone; however, it is not normally established below the battalion level.

Airspace Coordination Area. An airspace coordination area (ACA) is a block of airspace in the target area in which friendly aircraft are reasonably safe from friendly surface fires (FMFRP 0-14). Airspace coordination areas are established by the appropriate ground commander. The airspace coordination area may be formal or informal.

Formal airspace coordination areas, usually established by regimental or higher headquarters, require detailed planning and are usually in effect longer than informal ACAs. Informal airspace coordination areas are used when time for coordination is limited. They are usually in effect for a
very short period of time and are not as widely disseminated as formal ACAs. They use lateral, altitude, or timed separation and are normally used for immediate air strikes. Informal airspace coordination areas are usually established by battalion or higher headquarters.

The purpose of an airspace coordination area is to act as a safety measure for friendly aircraft while allowing the other supporting arms to continue fire in support of the ground force.

Other Measures

Although not technically classified as fire support coordination measures zones of fire and zones of action relate to the employment of fires. The following definitions are given to clarify their relationship to fire support coordination measures.

Zone of Fire. A zone of fire is an area into which a designated ground unit or fire support ship delivers, or is prepared to deliver, fire support. Fire may or may not be observed. (Joint Pub 1-02)

Zone of Action. A tactical subdivision of a larger area, the responsibility for which is assigned to a tactical unit; generally applied to offensive action. A zone of action is not a fire support coordinating measure. (Joint Pub 1-02)

Appendix C

Airspace Control Plan

Description

The airspace control plan (ACP) is the centerpiece of a theater's air command and control system. The airspace control plan is generated by the airspace control authority, with the agreement of the component commanders, and approved by the joint force commander. After approval by the joint force commander, the airspace control authority issues the plan to appropriate agencies, including component commanders.

The airspace control plan provides specific planning guidance and procedures for the airspace control system. It is designed to—

Summarize the joint force commander's guidance on airspace control.

Define the joint force airspace control organization.

Outline the airspace control process.

Explicitly define those airspace control responsibilities delegated to subordinate agencies within the theater's airspace control organization, if responsibilities are delegated.

Normally, the airspace control plan is included as an annex to the joint force operations plan or operations order. However, depending on time constraints, it may be distributed separately.

Considerations

The airspace control plan serves as the playbook for effectively operating the theater airspace control system. Each functional and Service component commander should ensure that airspace control, fire support and supporting arms coordination, and air defense representatives are available to the airspace control authority to assist in development of the ACP. Some considerations that should be addressed in the airspace control plan's development, coordination, approval, and execution process include—

Preliminary Input. The joint force commander and the joint force staff define the joint operations area or theater and assigned missions by determining—

Operational objectives.

Existence of an operation plan for the assigned area and missions.

Operational capabilities of the component forces.

Any constraints imposed by, or as a result of, the area of operations and missions.

The joint force commander and the joint force staff determine the necessity for airspace control authority, joint force air component commander, and area air defense commander functions under one individual or separating these entities.

Appointing the airspace control authority, joint force air component commander, and area air defense commander, as necessary.

Defining the authority, responsibility, and relationships to

be assigned.

The joint force commander and the joint force staff—

Define the airspace control area.

Document means for adjudication when airspace issues cannot be resolved between the airspace control authority and component commanders.

Document host nation agreements, multinational forces considerations, and special mission requirements.

Development. The airspace control authority, component commanders, and their staffs identify airspace control assets and—

Determine airspace control assets required to support the airspace control function.

Identify airspace control assets available within the joint force.

Determine the need for airspace control assets beyond those assigned by the joint force.

The airspace control authority, component commanders, and their staffs identify phased approach to airspace control in the airspace control plan by—

Analyzing time-phased force deployment.

Identifying the first airspace control assets to arrive in the theater and considering their roles.

Considering the sequencing of airspace control toward achieving a mature airspace control system.

The airspace control authority, component commanders, and their staffs develop an airspace control system by—

Identifying procedures for airspace control as forces flow into or build up in the theater.

Identifying procedures and processes for transitioning to war or hostilities. This step includes considering the use of host nation airspace (if applicable), determining the impact on civilian-use air traffic, and considering the integration of joint force airspace control assets with forces of other nations for multinational operations.

Assigning airspace control sectors or air defense regions commensurate with each component's capabilities, ensuring due consideration is given to the size, shape, and geography of the joint operations area and other special areas (e.g., amphibious objective area).

Identifying airspace command and control links.

Identifying all airspace users that will be covered by procedures.

Identifying priority of airspace use by mission or airspace user type. Planners should develop procedures that allow for flexibility and ease of transition to different priorities of airspace use as the battlespace situation changes or the joint force commander/component commander needs dictate. Planners should consider requirements for: aviation missions and functions; ground missions and

functions; and requirements for aerial refueling, airborne early warning, Joint STARS, etc.

Determining joint, Service, and multinational airspace control means to be used and standardizing them within the theater. Planners should consider joint and Service-specific airspace control means, fire support coordination measures, and air defense measures. Planners should also establish airspace control means parameters, considering special procedures for different types of airspace users.

Considering cross-sector procedures for all airspace users. Procedures should be responsive and not restrictive to user's needs.

Determining rules of engagement, IFF, and return to force procedures.

Determining navigational and geographic references to be used. Consider universal transverse mercator versus latitude and longitude. Consider capabilities of various airborne and ground-based targeting and weapons delivery platforms available for use in the theater.

Defining the airspace control order process and procedures. Consider communications means available. Consider cycle, time table, suspense date, time for airspace request submissions. Outline means for deconfliction and resolution of airspace conflicts/issues. Standardize terminology. Define procedures for real-time deconfliction of assets such

as the Army tactical missile system (ATACMS) and unmanned aerial vehicles (UAVs).

Defining procedures for maintaining continuity during periods of degradation.

Identifying procedures and processes for transitioning from war or hostilities to a peacetime environment. Consider any impact that the war or hostilities have had on host nation airspace and civilian traffic, if applicable.

Establishing the joint airspace control center. Identify the structure of the joint airspace control center. Identify the permanent staff to support the JACC and identify liaison requirements to supplement the staff.

Formatting and drafting the airspace control plan.

Coordination, Approval, and Execution. The airspace control authority coordinates the plan with component commanders, the joint force commander approves the plan, and the airspace control authority executes the plan in coordination with component commanders.

Format

Airspace control plans are catered to the particular exercise/operation for which they are to be used. A sample airspace control plan format is provided below that outlines key areas which, when appropriate, should be addressed.

I. Promulgation Instructions
- Effective Times
- ACP Synopsis
- Implementation

II. Table of Contents

III. Changes

IV. Basic Document
- Annex A - Airspace Control Measures

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Appendix D

Airspace Control Order

Description

The airspace control order and the airspace control plan are the two most critical documents pertaining to airspace control within a joint operations area. The ACO is a jointly approved message published by the airspace control authority to provide specific, detailed information on airspace control and airspace control measures to all theater airspace users.

The airspace control order notifies appropriate air-ground systems nodes of the effective times, altitudes, distances, and the controlling agency for all airspace control measures. It will include all airspace control measures in use within the joint operations area. The ACO may also include other pertinent airspace information, such as fire support and air defense control measures, that are deemed necessary by the airspace control authority to minimize chances of fratricide and maximize combat effectiveness.

Requests for airspace are sent to the airspace control authority using the airspace control means request (ACMREQ). The ACMREQ is used by the originator to request that a defined block of airspace be designated as having special significance for air operations within the joint operations area.
Once approved, the requested airspace control measure is included in the affected airspace control order.

Production

Should the commander, Marine Corps forces be designated the airspace control authority and placed into the position of airspace control order production, production would most likely be accomplished via the contingency theater automated planning system (CTAPS), or a follow-on system such as theater battle management core system, through use of the ACO Deconfliction Software (ADS). This software is designed for the planning, deconfliction, and modification of airspace. The end result of the ADS input is an airspace control order that may be disseminated via the tactical data network as a portion of the air tasking order or may be exported as a United States message text format (USMTF) message for distribution via autodin.

Should CTAPS be unavailable, the airspace control order can be published as a USMTF message and disseminated via autodin or orally by using a USMTF voice template if electronic or hard copy dissemination means are not available. The preformatted USMTF format for the airspace control order is available from the *USMTF User Formats (Version 2.0), Electronic Documentation System* compact disk implemented on 1 January 1997.

As with any USMTF message, the header information includes from, to, and information addressees. The remainder of the test follows—

SET 1: The EXER set provides the designated code name or nickname, if the message supports an exercise. The EXER set is not used if the OPER set is used.

```
EXER/EXERCISE NICKNAME (1 - 56 ANBS) (mandatory)/
EXERCISE MESSAGE ADDITIONAL IDENTIFIER (1 - 16 ANBS)
(optional)//
```

SET 2: The OPER set provides the designated code name or nickname, if the message supports an operation. The OPER set is

NOTE:
The sets ACOID through CONTAUTH form a mandatory segment to report more than one airspace control area.

not used if the EXER set is used.

```
OPER/OPERATION CODEWORD (1 - 32 ANBS) (mandatory)/
PLAN ORIGINATOR AND NUMBER (1 - 23 ANS) (optional)/
OPTION NICKNAME (1 - 23 ANBS) (optional)/ SECONDARY
OPTION NICKNAME (1 - 23 ANBS) (optional)//
```

SET 3: The MSGID set provides the message identification and originator. The first field of the MSGID set must equal "ACO."

```
MSGID/MTF IDENTIFIER (1 - 20 ANBS) (mandatory)/
ORIGINATOR (1 - 30 ANBS) (mandatory)/ MESSAGE SERIAL
```

NOTE:
The sets ACM through CONTAUTH form an operationally determined nested segment to report multiple airspace control means. If used, the segment must start with either the ACM or ACMID set.

```
NUMBER (1 - 7 ANBS) (optional)/MONTH NAME (3 A)
(optional)/QUALIFIER (3 A) (optional)/SERIAL NUMBER OF
QUALIFIER (1 - 3 N) (optional)//
```

SET 4: The REF set provides both USMTF and non-USMTF references. The REF set may be repeated for each additional reference.

```
REF/SERIAL LETTER (1 A) (mandatory)/TYPE OF REFERENCE
(1/20 ANBS) (mandatory)/ ORIGINATOR (1 - 30 ANBS)
(mandatory)/DATE AND/OR TIME OF REFERENCE (6/13 AN)
(mandatory)/SERIAL NUMBER OF REFERENCE (1 - 10 ANBS)
(optional)/SPECIAL NOTATION (5 A) (optional)/SSIC CODE
OR FILING NUMBER (1/10 ANBS)//
```

SET 5: The AMPN set provides additional information on the preceding REF set. Additionally, the AMPN set provides identifying information for a non-USMTF reference. The AMPN set is mandatory if the "TYPE OF REFERENCE" field in the REF set is a communication type and only one reference is used.

```
AMPN/FREE TEXT (unlimited ANBS)//
```

SET 6: The NARR set provides additional information on the preceding two or more REF sets. Additionally, the NARR set provides identifying information for non-USMTF references.

The NARR set is mandatory if the ref set is repeated one or more times and the "TYPE OF REFERENCE" field of one or more REF sets cites a communication type.

```
NARR/FREE TEXT (unlimited ANBS)//
```

SET 7: The ACOID set defines the area of authority and the serial number of the airspace control order.

```
ACOID/AREA OF VALIDITY (2 - 20 ANBS) (mandatory)/ACO
SERIAL      NUMBER      (2-3      AN)      (optional)//
```

SET 8: The PERIOD set provides the effective time period of the airspace control order.

```
PERIOD/START TIME (7 - 11 AN) (mandatory)/STOP TIME (7
- 11 AN) (mandatory)/STOP TIME MODIFIER (7/11 AN)
(optional)//
```

SET 9: The ACM set provides the identification of previously defined airspace control means. The ACM set is mandatory if the ACMID set is not used, otherwise, the ACM set is prohibited.

```
ACM/TYPE OF AIRSPACE CONTROL MEANS (2 - 6 A)
(mandatory)/AIRSPACE CONTROL MEANS (1/30 ANBS)
(mandatory)//
```

SET 10: The ACMID set provides and defines the spatial structure/area of the airspace control means. The ACMID set is mandatory if the ACM set is not used, otherwise, the ACM set is prohibited.

```
ACMID/TYPE OF AIRSPACE CONTROL MEANS (2 - 6 A)
(mandatory)/AIRSPACE CONTROL MEANS (1/30 ANBS)
(mandatory)/POSITION OR POINT (1/18 ANS) (mandatory)//
```

SET 11: The SIZE set defines the horizontal dimensions of the airspace control means.

```
SIZE/WIDTH OR RADIUS (2/7 ANBS) (mandatory)/WIDTH OR
RADIUS (2/7 ANS) (optional)//
```

SET 12: The EFFLEVEL set defines the horizontal dimensions of the airspace control means.

```
EFFLEVEL/VERTICAL DIMENSION (3/19 ANS) (mandatory)//
```

SET 13: The PERIOD set defines the effective time period of the airspace control means.

```
PERIOD/START TIME (7/11 AN) (mandatory)/STOP TIME
(3/11 AN) (mandatory)/STOP TIME MODIFIER (7/11 AN)
(optional)//
```

SET 14: The EFDT set defines the time period for which the airspace control means is effective.

```
EDTF/EFFECTIVE DAY-TIME (7 AN) (mandatory)/EFFECTIVE
MONTH (3 A) (optional)//
```

SET 15: The CONTAUTH set identifies the agency/unit that will control the airspace control means.

```
CONTAUTH/OPERATIONAL CONTROL AUTHORITY (1 - 20 ANBS)
(mandatory)/FREQUENCY (1/14 ANS) (mandatory)//
```

SET 16: The DECL set provides declassification or downgrading instructions if the message is classified.

```
DECL/DOWNGRADING OR DECLASSIFICATION MARKINGS (1 - 25
ANBS) (mandatory)//
```

Sample ACO

The airspace control order message can be used to provide the initial listing of airspace control means or to update previously published airspace guidance. Airspace control means which may be included in the airspace control order commonly include—

Restricted operating areas.

High-density airspace control zones.

Minimum risk routes.

Low-level transit routes (LLTRs).

Transit levels (TLs - NATO-peculiar).

Transit corridors (TCs - NATO-peculiar).

Air routes (ARs).

Weapons free zones (WFZs).

Base defense zones.

Special corridors (SCs).

Coordinating altitude.

Remarks.

The following is a sample airspace control order message that might be released by the airspace control authority to the joint force's airspace users. From, to, and information addressees are omitted.

```
EXER/JTFX 98-X//
MSGID/ACO/ACA/022//
REF/A/ACMREQ/AADC/7JUN98//
REF/B/ACMREQ/MAGTF 98-X/070800ZJUN98//
ACOID/CPNC//
PERIOD/100001Z/102400Z//
ACM/AR/15/18-22/25/27-32//
ACMID/AR/23/LFI/GSO/GSB/NKT//
ACM/TC/C12/C15-C16/C21-C25/C30/C33//
ACMID/TC/C34/JAX/3025N0815OW/CHS//
PERIOD/100300Z/100900Z//
ACM/TL/MTL25/HTL07//
AMPN/LTL BELOW 3000 FT AGL, EXCEPT OVER WATER//
ACMID/LLTR/LL22/BO25/PK34/DU90/SR72//
```

8 MCWP 3-25

```
    ACMID/LLTR/AUTOMATE1/DOS2/CPU1/LSU/RCC/BDU//
    AMPN/CPU1 IS RR BRIDGE//
    PERIOD//100115Z/102300Z//
    ACM/SC/LS01/LS03//
ACMID/SC/LS04/KU33/KX22/PP19/32WDL123123/XC23//
SIZE/WDTH:5NM/WDTH:8KM//
AMPN/KILOMETER WIDTH IS ESTIMATED DUE TO ROUNDING//
EFFLEVEL/FL230-280//
PERIOD/272320Z/UFN//
CONTRAUTH/ICEPACK/GREEN//
ACM/BDZ/NOCHNG//
DECLAS/150800ZJUN98//
```

Appendix E

Glossary

SECTION I. ACRONYMS.

AADC	area air defense commander
ACA	airspace control authority; airspace coordination area
ACE	aviation combat element
ACM	airspace control measure
ACMREQ	airspace control means request
ACO	airspace control order
ACP	airspace control plan
ADIZ	air defense identification zone
ADS	ACO deconfliction software
AFM	Air Force Manual
AOA	amphibious objective area
AOR	area of responsibility
AR	air route
ATACMS	Army tactical missile system
ATO	air tasking order
AWC	air warfare commander
BDZ	base defense zone
CAS	close air support
CATF	commander, amphibious task force
CFL	coordinated fire line
CLF	commander, landing force
COMMARFOR	commander, Marine Corps forces
CTAPS	contingency theater automated planning system
CVBG	carrier battle group
CWC	composite warfare commander
DAS	deep air support

DASC	direct air support center
FAA	Federal Aviation Administration
FEZ	fighter engagement zone
FFA	free-fire area
FM	field manual
FSCC	fire support coordination center
FSCL	fire support coordination line
FSCM	fire support coordination measure
GCA	ground controlled approach
GCI	ground controlled intercept
HIDACZ	high density airspace control zone
ICAC2	integrated combat airspace command and control
ICAO	International Civil Aviation Organization
IFF	identification, friend or foe
JACC	joint airspace control center
JEZ	joint engagement zone
JFACC	joint force air component commander
JSEAD	joint suppression of enemy air defenses
LAAD	low altitude air defense
LLTR	low-level transit route
LPA	landing penetration area
LPP	landing penetration point
MACCS	Marine air command and control system
MAGTF	Marine air-ground task force
MATCD	Marine air traffic control detachment
MCDP	Marine Corps doctrinal publication
MCWP	Marine Corps warfighting publication
MEF	Marine expeditionary force
MEU	Marine expeditionary unit
MEZ	missile engagement zone
MOOTW	military operations other than war
NEF	naval expeditionary force
NFA	no-fire area
NOTAM	notice to airmen
PHIBRON	amphibious squadron
PIRAZ	positive identification radar advisory zone

RFA	restricted fire area
RFL	restricted fire line
ROA	restricted operations area
ROE	rules of engagement
ROZ	restricted operations zone
SAAFR	standard use Army aircraft flight route
SPINS	special instructions
SPMAGTF	special purpose Marine air-ground task force
SWC	strike warfare commander
TACC	tactical air command center (USMC); tactical air control center (USN)
TADC	tactical air direction center
TAOC	tactical air operations center
TC	transit corridor
UAV	unmanned aerial vehicle
USMTF	United States message text format
UNAAF	Unified Action Armed Forces
WEZ	weapons engagement zone
WFZ	weapons fire zone

SECTION II. DEFINITIONS.

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. (FMFRP 0-14)

air control agency - An organization possessing the capability to exercise air control. (FMFRP 0-14)

air direction - The guidance and supervision which a commander employs to focus his resources on mission accomplishment. Air direction occurs as a sequence of the following activities: apportionment, allocation, tasking, and fragmentary orders.

(FMFRP 0-14) The authority to regulate the employment of air resources (aircraft and SAW units) to maintain a balance between their availability
and the priorities assigned for their usage. (FMFM 5-60)

air reconnaissance - The acquisition of intelligence information by employing visual observation and/or sensors in air vehicles. (Joint Pub 1-02)

air support element - The air support element (ASE) is an element task organized by the Marine air support squadron to perform various air support control functions for the Marine expeditionary unit. The ASE is not a direct air support center, but is capable of assisting in the control of direct air support operations for a limited period of time in a limited area. The air support element can function as an extension of the Navy tactical air control center/helicopter direction center, in conjunction with the battalion tactical air control party. (FMFRP 0-14)

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. (Joint Pub 1-02)

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

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

airspace coordination area - A block of airspace in the target area in which friendly aircraft are reasonably safe from friendly surface fires. (FMFRP 0-14)

airspace management - The coordination, integration, and regulation of the use of airspace of defined dimensions. (Joint Pub 1-02)

allocation (air) - The translation of the air apportionment decision into total numbers of sorties by aircraft type available for each operation or task. (Joint Pub 1-02)

allotment - The temporary change of assignment of tactical air forces between subordinate commands. The authority to allot is vested in the commander having combatant command (command authority). (Joint Pub 1-02)

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 or geographic areas for a given period of time. (Joint Pub 1-02)

area of operations - An operational area defined by the joint force commander for land and naval forces. Areas of operation do not typically encompass the entire operational area of the joint force commander, but should be large enough for component commanders to accomplish their missions and protect their forces. Also called AO. (Joint Pub 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. (Joint Pub 1-02)

area of responsibility - 1. The geographical area associated with a combatant command within which a combatant commander has authority to plan and conduct operations. 2. In naval usage, a predefined area of enemy terrain for which supporting ships are responsible for covering by fire on known targets or targets of opportunity and by observation. Also called AOR. (Joint Pub 1-02)

command and control - The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. Also called C2. (Joint Pub 1-02)

composite warfare commander - The officer in tactical command is normally the composite warfare commander. However, the composite warfare commander concept allows an officer in tactical command to delegate tactical command to the composite warfare commander. The composite warfare commander wages combat operations to counter threats to the force and to maintain tactical sea control with assets assigned; while the officer in tactical command retains close control of power projection and strategic sea control operations. Also called CWC. (Joint Pub 1-02)

direct air support center - The principal air control agency of the US Marine air command and control system responsible for the

direction and control of air operations directly supporting the ground combat element. It processes and coordinates requests for immediate air support and coordinates air missions requiring integration with ground forces and other supporting arms. It normally collocates with the senior fire support coordination center within the ground combat element and is subordinate to the tactical air command center. Also called DASC. (Joint Pub 1-02)

direct air support center (airborne) - An airborne aircraft equipped with the necessary operations and communications facilities, and manned by the essential personnel, to function, in a limited role, as a DASC. Also called DASC(A). (FMFRP 0-14, proposed modification to Joint Pub 1-02)

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

joint operation - A general term to describe military actions conducted by joint forces, or by Service forces in relationships (e.g., support, coordinating authority), which, of themselves, do not create joint forces. (Joint Pub 1-02)

maneuver warfare - A warfighting philosophy that seeks to shatter the enemy's cohesion through a variety of rapid, focused, and unexpected actions which create a turbulent and rapidly deteriorating situation with which the enemy cannot cope. (MCDP 1)

Marine air command and control system - A US Marine Corps air command and control 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. (FMFRP 0-14, proposed modification to Joint Pub 1-02)

Marine air traffic control detachment - The principal terminal air traffic control organization within the Marine air command and control system. Two Marine air traffic control detachments are structured to operate as subordinate elements of the Marine air control squadron. Each Marine air traffic control detachment is organized and equipped to provide continuous all-weather air traffic control services to an independent and geographically separated main air base or air
facility and one remote air site or point. Also called MATCD. (MCWP 3-25.8)

positive control - A method of airspace control that relies on positive identification, tracking, and direction of aircraft within an airspace, conducted with electronic means by an agency having the

authority and responsibility therein. (Joint Pub 1-02)

procedural control - A method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures. (Joint Pub 1-02)

rules of engagement - Directives issued by competent military authority which delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered. Also called ROE. (Joint Pub 1-02)

tactical air command center - The principal US Marine Corps air command and control agency from which air operations and air defense warning functions are directed. It is the senior agency of the US Marine air command and control system which serves as the operational command post of the aviation combat element commander. It provides the facility from which the aviation combat element commander and his battle staff plan, supervise, coordinate, and execute all current and future air operations in support of the Marine air-ground task force. The tactical air command center can provide
integration, coordination, and direction of joint and combined air operations. Also called Marine TACC. (Joint Pub 1-02)

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

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

tactical air operations center - The principal air control agency of the US Marine air command and control system responsible for airspace control and management. It provides real time surveillance, direction, positive control, and navigational assistance for friendly aircraft. It performs real time direction and control of all antiair warfare operations, to include manned interceptors and surface-to-air weapons. It is subordinate to the tactical air command center. Also called TAOC. (Joint Pub 1-02)

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. (NATO, Joint Pub 1-02)

Appendix F

References and Related Publications

Air Force Manuals (AFM)

1-1	Basic Aerospace Doctrine of the United States Air Force (Volume II)

Army Field Manuals (FM)

1-100	Army Aviation Operations
100-103	Army Airspace Command and Control in a Combat Zone

Joint Publications

0-2	Unified Action Armed Forces (UNAAF)
1-02	Department of Defense Dictionary of Military and Associated Terms
3-0	Doctrine for Joint Operations
3-01.4	Joint Tactics, Techniques, and Procedures for Joint Suppression of Enemy Air Defenses
3-01.5	Doctrine for Joint Theater Missile Defense
3-02	Joint Doctrine for Amphibious Operations
3-52	Doctrine for Joint Airspace Control in a Combat Zone

3-56.1	Command and Control for Joint Air Operations
5-0	Doctrine for Planning Joint Operations

Fleet Marine Force Manuals (FMFM)

2-7	Fire Support in MAGTF Operations
3-1	Command and Staff Action
3-30	Communications
5-1	Organization and Function of Marine Aviation
5-10	Air Reconnaissance
5-30	Assault Support
5-40	Offensive Air Support
5-41	Close Air Support and Close-in Fire Support
5-42	Deep Air Support
5-45	Suppression of Enemy Air Defenses
5-50	Antiair Warfare
6-18	Techniques and Procedures for Fire Support Coordination

Fleet Marine Force Reference Publications (FMFRPs)

0-14	Marine Corps Supplement to the DOD Dictionary of Military and Associated Terms
5-61	ICAC2: Multiservice Procedures for Integrated Combat Airspace Command and Control
5-62	TAGS: Multiservice Procedures for the Theater Air-Ground System
5-71	MAGTF Aviation Planning Documents

Marine Corps Doctrinal Publications (MCDP)

1	Warfighting
5	Planning
6	Command and Control

Marine Corps Warfighting Publications (MCWP)

3-25.3	Marine Air Command and Control System Handbook
3-25.5	Direct Air Support Center Handbook
3-25.6	Sector Antiair Warfare Coordinator Handbook
3-25.7	Tactical Air Operations Center Handbook
3-25.8	Marine Air Traffic Control Detachment Handbook

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Conclusion

"I think of command and control as two different things . . . I believe that the more control a senior places on a subordinate the less command capability he has. And the more a commander is capable of commanding, the less control he requires."

—LtGen Ernest C. Cheatham, USMC [6]

Marine aviation provides the Marine air-ground task force commander with a potent and flexible combat arm that supports overall MAGTF requirements. To provide this support, Marine aviation performs six doctrinal functions which cover the complete distribution of MAGTF requisites: antiair warfare, offensive air support, assault support, air reconnaissance, electronic warfare, and control of aircraft and missiles.

This publication has focused on control of aircraft and missiles. In the strictest sense, control of aircraft and missiles is not a singular function, but a combination of tasks that integrate all the functions of Marine aviation. It integrates these functions by providing the MAGTF commander with the means to focus all the capabilities provided by Marine aviation into a coordinated effort.

The Marine air-ground task force commander is responsible for all MAGTF operations, but delegates air operation authority to the aviation combat element commander. The ACE commander exercises his authority to influence the battlespace through the control of aircraft and missiles. The Marine air command and control system is the medium through which the ACE commander exercises this authority.

The Marine air command and control system provides the aviation combat element commander with the means to exercise *centralized command and decentralized control* over MAGTF aviation assets. Centralized command allows for unity of effort. Decentralized control within the Marine air command and control system allows the operational flexibility required to react to ever changing tactical situations.

There are several forms of control which can be exercised by commanders and delegated representatives over Marine aviation assets. The Marine air command and control system utilizes air direction and air control. Air direction is the authority to regulate the employment of aviation assets to balance mission priorities and asset availability. Air control is the authority to direct the physical movement of aircraft in flight or to direct the engagement of a target by a specific weapons system. A subset of air control is airspace control.

The Marine air command and control system exercises three forms of airspace control: positive control, procedural control, or a combination of the two. Positive control relies on positive identification, tracking, and direction of aircraft within an airspace, conducted by electronic means by an agency having the authority and responsibility therein. Procedural control relies on a combination of previously agreed upon and promulgated orders, procedures, and airspace control measures. Procedural control is more restrictive than positive control, but is less vulnerable to interference by electronic and physical attack. The MACCS normally uses a combination of these two methods of control by establishing procedural control means, which the enemy can minimally effect, and augmenting it with positive control means to enhance its functioning. A subset of positive control is terminal control. It applies to those agencies which control the delivery of ordnance, cargo, or personnel by aircraft to a specific location or target.

Military operations are joint operations. The Marine air command and control system must be able to perform the control of aircraft and missiles in joint and multinational environments. In joint operations, the joint force commander normally designates an airspace control authority to assume responsibility for the configuration and control of the joint airspace. The ACA coordinates with all the component and functional commanders to ensure airspace requirements are satisfied and integrated with the overall plan. The ACA publishes the baseline airspace configuration in the form of the airspace control plan. As airspace requirements change, subsequent modifications
to the airspace control plan are published in follow-on airspace control orders. COMMARFOR may be designated as the airspace control authority in situations where the Marine forces have the best ability to plan, coordinate, and control joint airspace. This situation would most likely arise in an immature theater or in low-scale military operations other than war. For the MAGTF to successfully perform as the joint force's airspace control authority, a clear understanding of underlying aviation philosophies, joint airspace control procedures, and joint airspace control system operations is required.

This publication has presented the control of aircraft and missiles as the integrating function which focuses the other functions of Marine aviation into a coordinated effort. Its pages contain the answers to questions concerning how Marine aviation assets are integrated to provide aviation support to Marines on the ground.

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Notes

1 Adolf Galland, *JTTP for Joint Suppression of Enemy Air Defenses* (Washington, D.C.: Joint Chiefs of Staff, 1995) p. I-1.

2 LtGen Bernard E. Trainor, USMC, and Michael R. Gordon, *The General's War* (Boston: Little, Brown, and Company, 1995) p. 311.

3 Martin Van Creveld, *Command in War* (Cambridge, Ma.: Harvard University Press, 1985) p. 270.

4 General Giap Nguyen, Peter Macdonald, *Giap: The Victor in Vietnam* (New York: W. W. Norton & Company, 1993) p. 316.

5 General Walter C. Boomer, USMC, Charles D. Melson, Evelyn A. Englaner, Capt. David A. Dawson, *USMC, U.S. Marines in the Persian Gulf, 1990-1991: Anthology and Annotated Bibliography* (Washington, D.C.: History and Museums Division, Headquarters Marine Corps, 1991) p. 93.

6 LtGen Ernest C. Cheatham, USMC, *Naval Command and Control* (Washington, D.C.: Department of the Navy, 1995) p. 10.

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