

Counterair Operations



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FOREWORD

The mission of the United States Air Force (USAF) is to defend the United States through the exploitation of air and space. A major function of the USAF is **to gain and maintain control of the air and space environment**. Control of the air is a necessity in modern warfare. Airmen have sought and gained air superiority in every major US conflict since World War II. Air superiority is normally the first priority of US forces whenever the enemy possesses a credible air and/or missile threat.

Counterair is more than just force protection or air and missile defense. *It must also attack the enemy's capabilities forcing them to react.* **And counterair is more than just airpower. Counterair is a joint team effort,** *gained and maintained by a combination of command and control systems, intelligence, surveillance, and reconnaissance platforms, air-to-air and air-to-ground aircraft and missiles as well as air defense weapons. Counterair is the primary function used to gain and maintain air superiority.*



Air and space superiority—A USAF core competency

Air superiority is not normally an end unto itself. *Air superiority provides enormous military advantages, allowing all our forces greater freedom of action to carry out their assigned missions (freedom to attack) while minimizing their vulnerability to enemy detection and attack (freedom from attack).* The success of any major air, land, or sea operation may depend on the degree of air superiority achieved. This Air Force Doctrine Document (AFDD) provides Air Force doctrine for planning, integrating, coordinating, and executing counterair operations. It provides operational doctrine to counter enemy air and missile threats to gain and maintain control of the air. As such, it focuses on how air forces can be organized, trained, equipped, and operated to conduct counterair.

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INTRODUCTION

If you don't control the air, you'd better not go to war.

General Charles Horner

Air superiority is a necessity. Since the German attack on Poland in 1939, no country has won a war in the face of enemy air superiority, no major offensive has succeeded against an opponent who controlled the air, and no defense has sustained itself against an enemy who had air superiority.

Colonel John A. Warden III
The Air Campaign: Planning for Combat

PURPOSE

Air Force Doctrine Document (AFDD) 2-1.1 provides Air Force doctrine for counterair operations and supports basic air and space doctrine. It replaces AFM 2-4.

APPLICATION

This AFDD applies to all active duty, Air Force Reserve, Air National Guard, and civilian Air Force personnel. This doctrine is authoritative but not directive; commanders are encouraged to exercise judgment in applying this doctrine to accomplish their missions.

SCOPE

Counterair operations will be necessary to a greater or lesser degree throughout the range of operations. These operations run the gamut from striving for air supremacy in a major theater war, to enforcing a no-fly zone in a peacekeeping operation, to mostly passive defensive measures in a humanitarian relief operation.

CHAPTER ONE

COUNTERAIR OPERATIONS

The first objective of all commanders in the Pacific War, whether ground, sea or air, whether American, Allied, or Japanese, was to assure control of the air.

The United States Strategic Bombing Surveys

The war in the Persian Gulf provided a textbook example of what air supremacy means both for the country that gained it, and for the country ceding it.

General A. Malyukov
Soviet Air Force Chief of Staff

GENERAL

Control of the air is a necessity for the American way of war, providing enormous military advantages. It gives land, sea, and air forces greater freedom of action while reducing their vulnerability to enemy detection and attack. Thus, *air superiority is normally the first priority of US forces whenever the enemy possesses air and missile assets capable of threatening friendly forces*. Providing air superiority is a core competency for the United States Air Force (USAF). Counterair is the primary function used in gaining and maintaining air superiority and consists of offensive and defensive operations to destroy or neutralize enemy air and missile forces. The success of any major air, land, or sea campaign may depend on the degree of air superiority achieved.

COUNTERAIR OBJECTIVES

The objectives of the counterair function are to facilitate friendly operations against the enemy and protect friendly forces and vital assets through control of the air. *Counterair is directed at enemy forces and target sets that directly (airborne aircraft, surface-to-air missiles [SAMs], etc.) or indirectly (airfields; petroleum, oils, and lubricants [POL]; production facilities; etc.) challenge control of the air.* Airmen should expect to conduct intensive and continuous counterair operations aimed at gaining varying degrees of air superiority at the place and time of their choosing. *Air*



Air superiority facilitates friendly operations through the battlespace.

superiority can range from local superiority in a specific area to control over the entire theater of operations. Control may vary over time. As seen during the Gulf War, air superiority may not totally eliminate air and missile opposition. *Some aircraft may continue to fly and some missiles may be launched in spite of air superiority.* However, air superiority provides the most favorable environment for friendly forces to perform their tasks without prohibitive interference, while limiting the enemy's ability to function effectively.

COUNTERAIR OPERATIONS

Counterair consists of offensive and defensive operations. Counterair is coordinated and integrated at all levels to exploit the mutually beneficial effects of these offensive and defensive operations to destroy or neutralize enemy air and missile threats both before and after launch. *These operations include such measures as the use of aircraft, surface-to-surface and surface-to-air missiles, air-to-surface missiles, cruise missiles, and information warfare elements (e.g., electronic warfare [EW]) to counter the air and missile threat.* Operations are conducted over enemy and friendly territory. They range from taking the initiative of seeking out and destroying the enemy's ability to conduct air and missile attacks to taking reactive measures to minimize the effectiveness of enemy air and missile attacks. The overall situation and the concept of operations determine when, where, and how these operations are used to gain the desired degree of air superiority.

Offensive Counterair

Offensive Counterair (OCA) consists of offensive operations aimed at destroying, disrupting, or limiting enemy air and missile

threats. Ideally, most OCA operations will prevent the launch of aircraft and missiles by destroying them and their supporting systems on the ground. Otherwise, OCA operations seek out and destroy these targets as close to their source as possible. These operations range throughout enemy territory and are generally conducted at the initiative of friendly forces. *OCA operations include targets such as enemy air defense systems (aircraft, antiaircraft artillery [AAA], and SAMs), airfields, and supporting infrastructure; theater missiles (TMs), ground-, sea-, and air-based launch plat-*

D-Day, 1944

Over the decades, the Normandy invasion and breakout have become the classic example of Second World War combined-arms, mechanized, air-land, coalition warfare. Fortunately, the Allies possessed not merely air superiority, but air supremacy, making victory on the ground that much easier. The Al-



lies had won the critical battle for air supremacy, not over the beachhead, but in several years of air war that had gutted the Luftwaffe. To those inclined to minimize the value of air to the Normandy operation, the final word must come from General Eisenhower himself.

In June 1944, John S. D. Eisenhower, Ike's son, (*pictured above with his father*) graduated from West Point—ironically on the same day that Allied forces stormed ashore at Normandy. June 24 found the new lieutenant riding through Normandy with his father, observing the invasion's aftermath:

The roads we traversed were dusty and crowded. Vehicles moved slowly, bumper to bumper. Fresh out of West Point, with all its courses in conventional procedures, I was offended at this jamming up of traffic. It wasn't according to the book. Leaning over Dad's shoulder, I remarked, "You'd never get away with this if you didn't have air supremacy." I received an impatient snort:

"If I didn't have air supremacy, I wouldn't be here."

John S. D. Eisenhower
Strictly Personal

forms, and supporting infrastructure; as well as command, control, communications, computers, and intelligence (C⁴I) nodes. OCA operations enable friendly use of contested airspace and reduce the air and missile threat posed against friendly forces. OCA is often required to enable the successful execution of other air operations such as strategic attack, interdiction, and close air support.

Defensive Counterair

The objective of defensive counterair (DCA) is to protect friendly forces and vital interests from enemy air and missile attacks and is synonymous with air defense. *DCA consists of active and passive air defense operations including all defensive measures designed to destroy attacking enemy air and missile threats or to nullify or reduce the effectiveness of such attacks should they escape destruction.* The basic active defense criteria to detect, identify, intercept, and destroy remains the same for air and missile threats. DCA generally reacts to the initiative of the enemy forces and is subject to the fire control procedures and measures of the area air defense commander (AADC).

- ★ **Active air defense** is *direct defensive action taken to destroy attacking air and missile threats or to reduce their effectiveness against friendly forces and assets.* Engaging enemy aircraft or missiles with friendly aircraft or SAMs is an example of an active air defense measure.
- ★ **Passive air defense** includes *all measures, other than active air defense, taken to minimize the effectiveness of hostile air and missile attacks.* Camouflage, concealment, and deception (CCD); dispersal; and the use of protective construction (hardening) are examples of passive air defense measures.

Air and Missile Threats

The continuing proliferation of advanced technology and systems and the potential mating of these systems with weapons of mass destruction (WMD) make the attainment of air superiority and force protection more important and dynamic than ever. Several nations are expected to have advanced surface-to-air and surface-to-surface missiles by 2005. These advanced systems will have longer ranges and improved command guidance. **Mobile theater ballistic missiles (TBM) pose a significant threat to friendly forces, and the ability to locate and destroy these systems prior to launch remains a challenge for effective counterair**

operations. A dramatic increase in new generation fighters, along with emerging hybrid fighters with improved avionics and weapons packages, will make achieving and maintaining air superiority even more complex.

Overall, detection capabilities, engagement ranges, mobility, and lethality have increased for aircraft and missiles. The ability to distinguish aircraft from cruise missiles will rapidly diminish as newly developed stealthy aircraft are fielded, making them as difficult to detect, identify, and engage. *Successful counterair operations are dependent upon an accurate assessment of the specific air and missile threats for the particular area of responsibility/operations.*

INFORMATION OPERATIONS

Information operations (IO) enhance air warfare functions by attacking, protecting, and exploiting information systems and information functions. *IO assists counterair to achieve desired objectives by affecting the adversary's perception of the battlespace.* Disrupting vital information transmissions can degrade the enemy's capability to recognize the situation until it is too late to take appropriate action. Inserting erroneous information into the adversary's systems can create false perceptions and may cause reactions favorable to friendly objectives. Additionally, information protection, in the form of ensuring availability, integrity, and authenticity of information, is critical to counterair operational effectiveness.

INTELLIGENCE REQUIREMENTS

The survivability and effective conduct of counterair operations require timely collection, processing, analysis, production, and dissemination of reliable and accurate intelligence. *Continuous information from air-, surface-, and space-based sensors is needed to provide warning and attack assessment.* Intelligence, surveillance, and reconnaissance (ISR) information is also needed to identify and exploit enemy centers of gravity; to help formulate objectives; to detect, identify, characterize, and monitor counterair threats; and to support all combat forces. Collection requirements are tailored to support the targeting cycle and threat environment. Target development, weapon selection, mission planning, and combat assessments depend on well-integrated collection and analysis.

The contribution of intelligence to counterair varies widely depending on the mission area or task. For example, offensive counterair operations



Intelligence, surveillance and reconnaissance platforms such as the U-2 increase battlespace awareness.

require essentially the same threat status reporting or display and target development (e.g., weaponeering) efforts as those needed for planning and executing strategic attacks against enemy centers of gravity. Meanwhile, both active and passive defensive counterair operations need highly granular order of battle data bases on enemy air defense (and offense) forces, well-founded tactics estimates, and precise specifications and signature data on enemy weapons. Intelligence preparation of the battlespace (IPB) can determine where a theater missile may or may not be located, thus narrowing down the area for surveillance and reconnaissance assets and TBM combat air patrols.

CHAPTER TWO

COMMAND AND CONTROL

Air power is indivisible. If you split it up into compartments, you merely pull it to pieces and destroy its greatest asset—its flexibility.

Field Marshall Bernard Montgomery

The air ocean and its endless outer space extension are one and indivisible and should be controlled by a single homogeneous force.

Alexander P. de Seversky

GENERAL

Centralized control and decentralized execution is a fundamental tenet of US airpower. *Command and control (C²) systems are tailored to support this tenet.* Centralized control is exercised from the highest appropriate command level while permitting decentralized execution of counterair operations. *Integrated C² systems enhance unity of effort and facilitate the decision making needed to effectively execute counterair operations.* These systems expedite C² functions through fast, reliable, flexible, and secure exchange of information throughout the chain of command. Effective and interoperable C² systems are vital to planning, employing, and sustaining successful counterair operations.

COMMAND RELATIONSHIPS

Command relationships for counterair are in accordance with Joint Pub 0-2, *Unified Action Armed Forces (UNAAF)*. In future contingencies, US armed forces will generally fight as a joint team. Airmen should expect most counterair operations to be joint efforts. *Effective C² systems provide the Commander, Air Force Forces (COMAFFOR) with the means to function, if so designated by the joint force commander (JFC), as the joint force air component commander (JFACC), airspace control authority (ACA), and*

Joint Force Priorities

The air planners' first priority was gaining command of the air. This goal was a basic tenet of air operations, and its achievement would generate at least three specific advantages in the war. First, the incapacitation of airfields and the air defense system would allow sustained prosecution of attacks against the other target sets. Second, command of the air would prevent Iraqi offensive strikes against Coalition forces, in particular strikes delivering chemical weapons. Third, the Coalition would prevent Iraqi reconnaissance flights that might uncover the shift of ground forces to the west, the surprise to be sprung at the start of the ground offensive. The planners therefore directed their most intense and immediate attention to destroying the Iraqi defensive systems through the use of F-117s, other aircraft employing antiradiation missiles to attack radar systems, and a vast array of electronic countermeasures.

Gulf War Airpower Survey

area air defense commander (AADC). The following command relationships, responsibilities, and authorities of these various commanders pertain to the execution of counterair operations.

Joint Force Commander

The Joint Force Commander (JFC) provides direction and guidance to subordinate commanders on counterair objectives, priorities, missions, and apportionment. The JFC exercises combatant command (command authority) (COCOM) if the JFC is also the commander in chief (CINC), and/or has operational control (OPCON) over assigned and attached forces to ensure unity of effort. *The JFC is responsible for the employment of forces assigned, attached, or otherwise made available to accomplish the assigned mission or objective.*

Key to the JFC's responsibilities is the development of objectives and priorities for the joint forces. These objectives and priorities provide the basis for all subordinate and supporting plans.

Joint Force Air Component Commander

The Joint Force Air Component Commander (JFACC), when designated by the JFC, is the Service component commander having the preponderance of air assets and the capability to plan, task, and control joint air opera-

tions. In most cases the COMAFFOR will be the JFACC. *Although some counterair assets are assigned to different components, the JFACC is normally the supported commander for counterair operations.* Routinely, the JFACC has OPCON, tactical control (TACON), and/or a supported relationship to conduct counterair operations employing augmenting forces that remain assigned to other components. *The JFACC's authority, guidance, and responsibilities are assigned by the JFC and include planning, coordinating, allocating, and tasking based on the JFC apportionment decision. The JFACC's functions include air defense, airspace control, and ISR efforts.* Using the JFC's guidance and authority, and in coordination with component and supporting commanders, the JFACC recommends to the JFC apportionment of air effort to various functions (including counterair) or geographic areas. **The responsibilities of the JFACC as AADC and ACA are interrelated and should normally be assigned to one individual.**

Area Air Defense Commander

Within a unified command, subordinate unified command, or joint task force, **the JFC normally assigns overall responsibility for air defense to a single commander designated as the AADC.** *The AADC is responsible for integrating the entire air defense effort and should be the component commander with the C⁴I capability to plan and execute integrated air defense operations with other air operations. The JFACC should normally be designated the AADC.* In those instances where the JFACC is not designated the AADC, the AADC should be assigned as a subordinate of the JFACC for the air defense effort. Air defense operations are coordinated with all other components conducting operations in the same theater of operations.

Airspace Control Authority

The JFC will normally designate the JFACC as the ACA. *The ACA is responsible for operating the airspace control system within the airspace control area and coordinating and integrating the use of the airspace control area.* The ACA develops policies and procedures for airspace control and for the coordination required among components within the theater. The ACA establishes an airspace control system for the JFC, integrates the airspace control system with that of the host nation, and coordinates and deconflicts user requirements. *The ACA develops these procedures into an airspace control plan (ACP) and, after JFC approval, promulgates it throughout the theater.* The ACP is then implemented through the airspace control

order (ACO). A key responsibility of the ACA is to provide the flexibility needed within the airspace control system to meet contingency situations that necessitate rapid employment of forces.

COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE RESOURCES AND REQUIREMENTS

Effective counterair operations require a reliable command, control, communications, computers, intelligence, surveillance, and reconnaissance (C⁴ISR) capability that includes space-based assets. **C⁴ISR assets should be capable of exchanging information rapidly; interfacing with other Services, components, and coalition partners; and displaying information of common concern while employing guard technologies that allow the secure interchange of data.** The information flow supports the chain of command and should be as complete, secure, and near real time as possible. The system should be flexible enough to redirect selected forces, even when they are airborne.

The information exchange between different Services and components and between all levels of command should be survivable, interoperable, and flexible, even if an intermediate level is disabled. This is achieved with the Global Command and Control System (GCCS.) GCCS provides a common operational picture (COP) of the battlespace to the warfighter, within a modern C⁴ system capable of providing effective support well into the 21st century. *The JFACC uses the following C⁴I resources to conduct counterair operations.*

Theater Air Control System

The Theater Air Control System (TACS) provides the JFACC/AADC/ACA an overarching means of controlling counterair functions. *It includes the personnel, procedures, and equipment necessary to plan, direct, and control air operations and to coordinate air operations with other components.* It is composed of control agencies and communications-electronic facilities to provide centralized control and decentralized execution of air operations. The radar-equipped C² elements of the TACS provide mobility and communication information interface, as well as automation. TACS ground elements use the Modular Control System (MCS). Airborne elements include the Airborne Warning and Control System

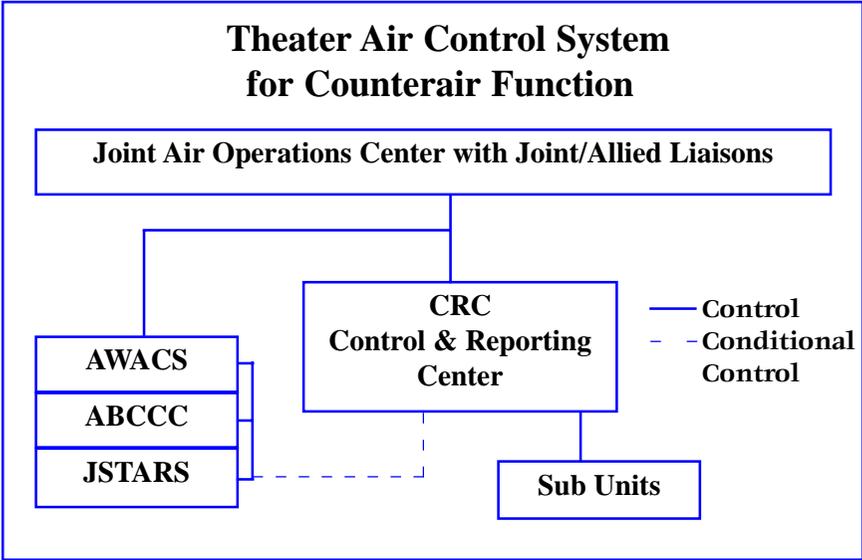


Figure 2.1 Theater Air Control System for Counterair Function

(AWACS), airborne battlefield command and control center (ABCCC), and the joint surveillance, target attack radar system (JSTARS).

Air Operations Center

The Air Operations Center (AOC) is the principal air operations installation from which aircraft and air warning functions of combat air operations are directed, controlled, and executed. *It is the senior element of the TACS and the senior agency of the area coordination center from which command and control of air operations are coordinated with other Services and components.* If the COMAFFOR is appointed JFACC, then the AOC becomes the joint air operations center (JAOC). *The AOC includes the equipment and personnel necessary to accomplish the planning, directing, controlling, and coordinating of theaterwide air operations.* Within the AOC, the airspace control center plans, coordinates, and integrates the use of airspace in the theater. It has the capacity to display the current air and surface situation, using data from many sources, and is responsible to the ACA for developing airspace control procedures and coordinating airspace control activities. The AOC plans mission requirements and uses the ACP to deconflict missions and targets. The AOC ensures that the ACP is compatible with current operational requirements and capabilities.

Normally all Service components should have liaison teams in the AOC. *These include such liaison teams as: the Army battlefield coordination detachment (BCD), the special operations liaison element (SOLE), the Navy/Marine naval and amphibious liaison element (NALE), and the Air Force Space Support Team (AFSST).*

Control and Reporting Center

The Control and Reporting Center (CRC) is the senior control and surveillance radar facility directly subordinate to the AOC and implements theater mission control through employment of C² elements of the TACS. *The CRC is assigned a geographical control and surveillance area of operations (AO) by the AOC.* It manages and directs control and surveillance activities of all subordinate radar elements within that AO.

The CRC's primary mission is to provide airspace management and airspace control to include: air traffic detection, tracking and identification, scramble or airborne orders, data link management, and management of air defense activities within its AO. Additionally, it establishes C² liaison, mission control, navigational air rescue assistance, aircraft threat warning, and coordination with artillery warning control centers and the friendly artillery warning service. The CRC may further delegate control and surveillance areas to other radar units or AWACS within its AO for optimum radar and radio coverage and management of air operations. These areas will normally remain static unless mission requirements or equipment status dictate adjustment.

In a TACS environment, the CRC communicates up to the AOC, down to subordinate units, and laterally to other TACS/joint/allied units. *It provides management of air operations, weapons control, air surveillance and identification functions, and also directs the region or sector air defense.* The CRC relays instructions and information from the AOC to subordinate or lateral units, determines ground rules, and coordinates assignment of targets to ensure defensive assets of all components are employed in mutually supporting roles within its assigned AO. The CRC also detects, identifies, collects, and reports all air activity within its assigned AO and provides the digital data link interface between Air Force, Army, Navy, and Marine Corps joint tactical air operations systems, as well as those of allied nations. *The CRC performs the airspace control function within the AO.*

The CRC battle staff directs fighter aircraft and air defense artillery assets necessary to defend its assigned area. The CRC battle commander normally establishes ground rules for initial assignment of airborne targets to air defense artillery. *All air defense elements coordinate continuously with air defense artillery fire coordination units to eliminate duplication of efforts and to ensure adequate commitment of assigned weapons against hostile threats.* The authority to exercise TACON of weapon systems may be delegated to the CRC. The authority to declare a hostile in the area of surveillance and identification may also be delegated.

Airborne Warning and Control System

The Airborne Warning and Control System (AWACS) provides the TACS with a flexible and capable airborne radar platform. *It provides an initial battle management function and command and control capability and should be among the first systems to arrive in any new theater of operations.* It provides early warning, radar surveillance, management of air operations, and weapons control functions. *The AWACS allows detection of low-flying aircraft and missiles and provides control of aircraft beyond the coverage of ground-based radar.* Through voice and data connectivity, AWACS issues air defense warning, directs aircraft, manages air refueling, monitors counterair missions, provides an air picture to joint air defense



E-3 Airborne Warning and Control System (AWACS) aircraft are a key element of C².

forces, assists with navigation, and coordinates air rescue efforts. AWACS can detect and identify hostile airborne threats and assign weapon systems to engage enemy targets.

AWACS may carry an airborne battle staff or airborne command element (ACE) authorized to redirect forces under the authority of the JFACC. When employed with an ACE, AWACS can scramble and divert aircraft conducting counterair operations and recommend changes in air defense warning conditions. The AWACS can perform many, but not all, CRC functions.

Airborne Battlefield Command and Control Center

The Airborne Battlefield Command and Control Center (ABCCC) is an integral part of the airborne elements of the TACS. **It is a specialized airborne command, control, and communications (C³) center equipped with extensive communications systems providing the capability to perform both the AOC and air support operations center (ASOC) functions.** *ABCCC's primary function is battle management of tactical air operations—directing air support to ground operations in the forward area.* As an extension of the AOC, ABCCC can scramble or divert assets as mission requirements dictate, while assisting the ASOC by providing C² services in the forward area beyond the ASOC's communications range.



Airborne Battlefield Command and Control Center (ABCCC) provides critical C³ functions in the Theater Air Control System.

Constant communications with most air and ground agencies in the TACS keeps the ABCCC battlestaff abreast of developing air and ground situations and maintains higher headquarters coordination for positive control of counterair assets. Although not radar equipped, ABCCC's computerized tactical battle management system (TBMS) is linked with the joint tactical information distribution system (JTIDS) and other intelligence, surveillance, and information fusion systems providing capability for improved situation awareness. The ABCCC can deploy in an initial response to world events and to provide C² services as the theater situation matures. ABCCC is also well suited to support combat search and rescue (CSAR) and counterair theater missile operations.

Joint Surveillance, Target Attack Radar System

The Joint Surveillance, Target Attack Radar System (JSTARS) is a long-range, airborne sensor system which provides real time radar surveillance information on moving and stationary surface targets, via secure data links to air and surface commanders. Although JSTARS was not "officially" operational during DESERT STORM, it identified and targeted SCUD missiles and launchers, convoys, trucks, tanks, SAM sites, and artillery pieces. *JSTARS information builds situational awareness for the JFC and JFACC to manage air operations, to update target information, and to provide real time targeting.*

RIVET JOINT

RIVET JOINT is an airborne signals intelligence (SIGINT) collection and reporting platform. Working in conjunction with the AWACS and JSTARS aircraft, RIVET JOINT *provides near-real-time assessment of hostile airborne-, land-, and sea-based electronic emitters via secure communications.* RIVET JOINT capabilities "round out" the radar tracking information provided by the AWACS and JSTARS by correlating location, emitter type, and mode of intercepting signals.

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 initiate and/or continue combat engagement with other forces encountered." (Joint Pub 1-02) *Effective operations, especially DCA, require the establishment and promulgation of easily understood ROE.* The optimum employment of defen-



RC-135 Rivet Joint provides battlespace assessment.

sive weapon systems depends on early separation of friend from foe. Positive identification of hostiles allows for maximum beyond-visual-range engagement and minimizes fratricide. Just as importantly, self-defense ROE related to air-to-surface and surface-to-surface threats for both OCA (particularly for time-sensitive targets) and DCA situations must be developed and understood. The JFC is responsible for developing and implementing ROE unless it is established by higher authority or existing plans. The JFC may ask for inputs from the JFACC, AADC, and other component commanders. *The components and supporting commanders are responsible for ensuring compliance with established ROE.*

AIRSPACE CONTROL

Theater airspace control can become very complex since all military components, and possibly civilian traffic, can execute operations in the same airspace. **The timely exchange of information over reliable, interoperable means of communication is required to effectively coordinate, integrate, and deconflict the airspace used for friendly air operations.** *The ACA develops and implements an ACP based on the JFC's guidance.* Execution of the plan is accomplished through ACOs which provide specific airspace control procedures applicable for defined periods of time. *The main goals are deconfliction of all airspace users and their*



The Theater Air Control System plans, directs, and controls air operations.

air assets, enhancement of combat operations, and protection of friendly forces from enemy air and missile attacks.

Standardized procedures and close coordination help to facilitate common understanding, reduce the possibility of confusion, and contribute to the overall effectiveness of counterair operations. *The JFC establishes the geographic boundaries within which airspace control is to be exercised and also provides priorities and restrictions regarding the use of the airspace.* Airspace control is normally one of the primary functions of the Air Force TACS. The Air Force's C² system is structured to conduct airspace control, OCA and DCA operations, and other air operations to minimize the risk of harm to friendly forces. Since different components have OPCON of specific counterair assets, *the C² structure is designed to integrate with other components to provide responsive and timely support. Integration with host-nation airspace and air defense control structures is also essential.*

Friendly and Enemy Combat Identification

The objective of combat identification (CID) is to maximize mission effectiveness by providing high confidence, positive identification of friend or foe. *Accurate and timely identification (ID) enhances real time tactical decisions and optimizes weapons employment, allowing timely*

engagement of enemy aircraft and missiles, conserving resources, and reducing risk to friendly forces.

CID information may be obtained from onboard or off board surface, air, and space systems, and through airspace control measures documented in the ACP or ACO. *To be most effective, this CID "system of systems" requires a common data link backbone with the goal of seamless near-real-time information sharing between theater platforms.* To avoid a single point of failure, no one node will act as an exclusive conduit of all CID information. Electronic methods, which provide the most rapid and reliable means of identification, are normally used when available. Visual and procedural means of identification are not as practical but may be essential in some scenarios. Individual weapons systems retain an autonomous CID capability.

Airspace control requires an effective combination of positive and procedural ID. Both are intended to effectively provide safe and flexible use of the airspace. **Positive identification** *relies on a high confidence ID derived from visual observation, radar observation of point of origin, and/or electronic means by an authorized control facility.* **Procedural control** *relies on a combination of airspace control measures documented in the ACP or ACO.* For most scenarios, a combination of positive and procedural ID techniques is used to identify friendlies, neutrals, and foes.

Coordination and Integration of Airspace Control and Counterair Operations

Unity of command is imperative to employ forces effectively. *Because of the integrated relationships and responsibilities between airspace control and OCA and DCA operations, the **ACA and AADC duties should normally be performed by the JFACC.*** These functions often rely on the same resources and are frequently executed simultaneously in the same airspace. Assigning responsibility and authority to coordinate and integrate airspace control and counterair operations to one air commander *greatly enhances the effort to gain and maintain control of the air environment.* The ACP is tied to all other air operations plans. These operations are closely coordinated and integrated with each other, as well as with other operations in the air, on land, and at sea. **Centralized control of these operations provides unity of command, optimizes weapon systems and target pairings, and minimizes the possibility of fratricide.**

CHAPTER THREE

OFFENSIVE COUNTERAIR OPERATIONS

Offense is the essence of airpower.

General “Hap” Arnold

The best way to defend the bombers is to catch the enemy before it is in position to attack. Catch them when they are taking off, or when they are climbing, or when they are forming up. Don't think you can defend the bomber by circling around him. It's good for the bombers morale, and bad for tactics.

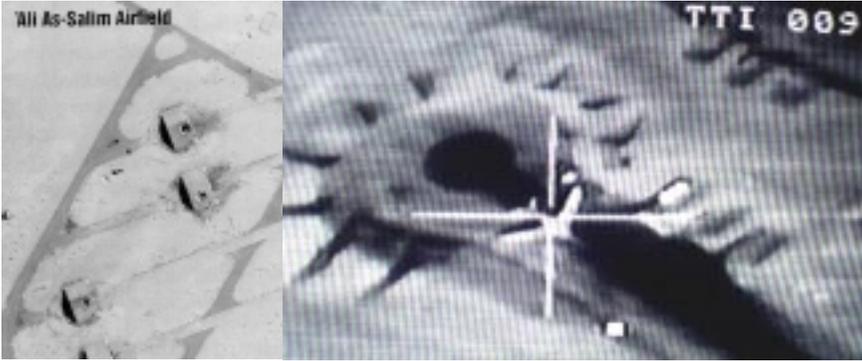
Brigadier General Robin Olds

GENERAL

Offensive counterair (OCA) should be the highest priority Air Force function for as long as the enemy has the capability to significantly threaten friendly forces with air and missile attacks. The degree of success of other special operations forces (SOF), air, land, and sea operations may depend on the success of OCA operations. *Successful OCA operations limit the risk of enemy attacks and allow friendly forces to concentrate more on mission accomplishment and less on self-protection from enemy air and missile attacks.*

OCA TARGETS

OCA target sets are those which directly or indirectly challenge our control of the air environment. The JFC's guidance and objectives, coupled with intelligence assessments of enemy threats, locations, and capabilities help determine OCA target selection, target priority, and sequencing. Airmen may plan targets prior to hostilities and keep them current based on the latest intelligence. Planners evaluate target defenses, to include active and passive systems, and determine the vulnerability of each target. They also determine the presence of weapons of mass destruction (WMD) within the target area, consider means and resources to minimize collateral effects, and prepare to initiate consequences management procedures, if a WMD-related target is attacked. **Ideally, OCA**



DESERT STORM's dominating offensive counterair strikes left the Iraqis with no effective command and control and little offensive or defensive air capability.

concentrates on attacking targets as close to their source as possible (i.e., aircraft on airfields, TBMs and SAMs in storage, etc.).

Otherwise, OCA missions seek and attack targets wherever found: on the ground, in the air, or at sea. The following are examples of OCA target sets:

- ★ **Airfields and Operating Bases.** *Destruction of hangars, shelters, maintenance facilities, POL, and other storage areas degrades the enemy's ability to generate aircraft sorties.* The destruction of WMD weapons or facilities in proximity to airfields may further reduce the enemy's sortie generation by forcing its crews to operate in protective equipment or remain sheltered until effects abate or decontamination has been performed. Planners may require permission from the National Command Authorities (NCA) before striking a WMD target. *Damaging runways or taxiways may prevent use of the airfield for short periods, thus preventing subsequent takeoff and forcing returning aircraft to more vulnerable or distant locations.*
- ★ **Aircraft.** *This category includes enemy fixed-wing and rotary-winged aircraft and unmanned aerial vehicles (UAV).* In most situations, *aircraft on the ground are the most lucrative targets for OCA operations.* With advanced technology, timely intelligence, and precision-guided munitions, aircraft on the ground can be destroyed whether they are in revetments, shelters, or in the open. *Aircraft in flight or on ships are also targets for OCA operations.*
- ★ **Theater Missiles (TMs) and Support Infrastructure.** Theater missiles refer to *ballistic missiles, cruise missiles, and air-to-surface missiles*

whose targets are within a given theater of operations. TMs pose a significant challenge for all levels of friendly forces. These missiles may possess conventional as well as nuclear, biological, and chemical (NBC) capabilities. *OCA operations are most effective when conducted against these missiles before they are launched.* Destruction of known missiles, launch platforms, support facilities, and infrastructure greatly limits effective TM attacks against friendly forces. Surface ships with aircraft and cruise missiles are also targets for OCA operations. OCA missions must be capable of being rapidly retasked to attack time sensitive targets (TSTs), such as mobile launchers, once they are located.

- ✦ **C⁴ISR Systems.** C⁴ISR systems can be critical to the effective employment of forces and assets and **should be given a high priority during OCA targeting.** *Intelligence gathering, warning, and control systems include ground-controlled intercept, early warning, acquisition, and other sensors and space-based systems, together with their supporting facilities.* Destruction of such sites could substantially reduce the enemy's capability to detect,

On Air Offense

The most difficult and costly place to attack the aircraft chain is in the air. In the aggregate, one friendly plane can destroy one enemy plane. One pilot in one airplane may well shoot down more than one enemy aircraft in a single mission, but that is rare.

Col John A. Warden, USAF
The Air Campaign

The Germans destroyed more than 4,000 Russian aircraft on the ground between 22 and 30 June 1941. The Germans had less than 1,400 bombers and fighters on the entire Russian front during this period.

The Israelis had similar results from their attacks on Arab air in 1967: with 196 operational combat aircraft, they destroyed almost 400 Arab aircraft on the ground in two days.

In the Pacific, the Battle of Wewak in August 1943 dealt a crippling blow to the Japanese air forces. After the war, General Tanikawa of the Fourth Air Army testified, "We lost 100 planes...it was a decisive Allied victory...our air power was severely crippled. Consequently our air power was rapidly diminishing and was unable to aid our ground forces effectively which, in the end, constituted one of our chief reasons for losing the war."

George Odgers
Air War Against Japan, 1943-1945

react, and bring forces to bear against friendly forces. These targets may have hardened facilities but with certain components exposed during operations. Hardened facilities are usually fixed in location and may be easier to locate than mobile or tactical systems. Attacks on fixed sites can be preplanned with appropriate weapons to increase the probability of kill. Space-based systems present unique challenges to attack. Attacking the associated ground facilities (receiving and tracking stations, launch facilities, etc.) may deny the enemy effective use of space-based systems. *Attacking C⁴ISR systems is part of OCA and may also be part of strategic attack.*

- ✪ **Enemy Forces and Air Defense Systems.** *Disruption or destruction of enemy air defense systems and the personnel who control, maintain, and operate them may render those systems ineffective against counterair operations.* For more detailed information on suppression of enemy air defenses (SEAD), refer to the SEAD portion of this chapter.

OCA RESOURCES AND FORCES

The effectiveness of OCA operations to destroy the array of targets previously listed depends on the availability and capabilities of certain resources and systems. The choice of system depends upon the situation, threats, weather, and available intelligence. **Whenever possible, use systems and methods which minimize risk to friendly counterair forces.**

For example, don't use SOF when the mission can be accomplished with aircraft and don't use direct attack munitions when standoff weapons can be used. The following are some of the forces and weapon systems used to conduct OCA:

- ✪ **Aircraft.** Air Force *fighter and bomber aircraft* provide the primary contribution and forces for OCA operations. Aircraft from other Services and allies also contribute to OCA operations.
- ✪ **Missiles.** Missiles include *surface-to-surface, air-to-surface, air-to-air guided missiles*, as well as air-, land-, and sea-launched cruise missiles. Many



Photo by R.A. Hoskinson

A destroyed ZSU-23 air defense system.



Unmanned aerial vehicles.



of these weapons have long launch ranges and *some have very quick reaction times which can eliminate or reduce the risk of harm to friendly forces.*

- ✦ **Unmanned Aerial Vehicles (UAVs).** UAVs may be used in counterair operations to provide *surveillance, reconnaissance, deception, jamming, decoy, or harassment of enemy forces and air defense systems.* Although UAVs are primarily used in an enhancement role, UAVs will soon be used in all functional areas. These vehicles may be preprogrammed or remotely piloted. They provide valuable intelligence to friendly forces while providing confusing and erroneous information to the enemy. *UAVs reduce the risk to friendly forces by making the enemy use valuable weapons and resources to evaluate and attack these vehicles.*
- ✦ **Special Operations Forces (SOF).** SOF **enhance OCA operations** in a number of ways. SOF can *conduct direct attacks, collect intelligence, and provide terminal guidance for attacks against valuable enemy targets.* The employment of SOF may free other air assets to strike other priority targets. In surgical operations, SOF strike enemy targets which may be beyond the capability of precision munitions. Examples include targets concealed by triple canopy jungle or “safe haven” targets. SOF may also be used in a synergistic attack role with other air operations to locate, positively identify, and then designate targets for friendly forces to destroy. *JFACC planners in the AOC coordinate with the SOLE for timely integration, coordination, and deconfliction with special operations assets.*



Typical offensive counterair weapons systems.

- ✦ **Surface Fire Support.** **Artillery and naval surface fire support** may be employed in OCA operations when enemy targets are within their range. *With the proper coordination, this may be a very effective way to destroy enemy targets while minimizing risk to friendly forces.*
- ✦ **C⁴ISR Systems.** These systems include **early warning and surveillance systems, satellites, radar, identification systems, communications systems, and surface-, air-, and space-based sensors.** These systems *enhance OCA operations by providing vital warning, intelligence, and targeting data, as well as C² of friendly forces.*
- ✦ **Information Warfare (IW).** **IW is another resource to save valuable sorties during a high tempo air war.** Many OCA targets, such as C⁴I, theater missiles and support infrastructure, and airfields/operating bases can be affected by various IW techniques such as malicious codes, electronic warfare, or electromagnetic pulse (EMP) generators. *Some of these IW techniques afford the JFACC access to a target that may be inaccessible by other means.*

Counterair on the Ground

In World War II the British sent commandos to knock out an effective German bomber unit on Crete; MacArthur and Kenney used ground forces to seize airfields.

From the war of 1973 to the 1982 Lebanon incursions, the Israelis used naval and ground forces to knock holes in ground-based air defense systems. The Israelis even won complete



air superiority without use of air weapons during their rescue raid at Entebbe. On that operation, a group of commandos by themselves destroyed the enemy's air force.

Col John Warden III, USAF
The Air Campaign

OCA MISSIONS

Different types of OCA operations are used to achieve specific counterair objectives. Tasked units have decentralized execution authority and are given much latitude in the detailed planning and coordination of the tasks. *Primary OCA missions are listed on the following pages.*

- ✦ **Surface Attack.** Surface strike/attack missions are intended to *disrupt or destroy select targets on the ground.* These missions are directed against enemy air and missile threats and their support infrastructure (e.g., airfields, launch sites, launchers, runways) before launch. *The main goal is to prevent enemy air and missile assets from being employed.* When unable to prevent missile launches, attack assets can be immediately directed to locate and destroy launchers before they can reload or relocate.
- ✦ **Fighter Sweep.** The fighter sweep is *an offensive mission by fighter aircraft to seek out and destroy enemy airborne target sets* such as aircraft, airborne missile launch platforms, and airborne targets of opportunity in an allotted area of operations.
- ✦ **Escort.** *Escort missions are protection sorties flown over enemy territory against enemy aircraft and air defense systems.* Friendly aircraft, en route

to or from a target area, may be assigned escort aircraft to protect them from enemy air-to-air and surface-to-air threats. Escort aircraft may be tasked to protect such missions as interdiction, reconnaissance, airlift, search and rescue, aerial refueling, airborne C², and electronic warfare.



Figure 3.1 Offensive Counterair Missions

✪ **Suppression of Enemy Air Defenses (SEAD).** *SEAD is a primary OCA mission designed to neutralize, destroy, or temporarily degrade enemy surface-based air defenses by destructive or disruptive means.* SEAD requirements may vary according to mission objectives, system capabilities, and threat complexity. SEAD objectives are specified by the JFC, who considers the unique capabilities of each component to contribute to counterair operations.

SEAD operations fall into three categories: air defense suppression, localized suppression, and opportune suppression. Area of responsibility (AOR)/joint operations areas (JOA) **air defense suppression** *consists of operations conducted against specific enemy air defense systems to degrade or destroy their effectiveness.* It targets high payoff air defense assets that result in the greatest degradation of the enemy's total system and permits effective friendly operations. **Localized suppression** *is normally confined to geographical areas associated with specific ground targets or friendly transit routes, contributing to local air superiority.* Finally, **opportune suppression** *is usually unplanned and includes aircrew self defense and attack against targets of opportunity.* The JFC will establish ROE for opportune suppression. Each of these categories reduces attrition and creates favorable conditions for friendly air operations by disabling enemy air defense systems or major capabilities of those systems. Therefore, SEAD is an integral part of all planning and air operations.

EXECUTION OF OCA OPERATIONS

OCA operations are often flown deep within enemy territory, relying on integrated C⁴I systems for deconfliction with other operations. Against fixed targets, OCA operations place great emphasis on detailed planning, accurate and timely intelligence, target selection and time-over-target deconfliction, and ROE. This emphasis enhances mission effectiveness while minimizing fratricide and interference with other operations.

Based on the latest intelligence, strike packages can be augmented with dedicated escorts or fighter sweep, while AWACS and other C⁴I platforms warn of real time, air-to-air threats.

A responsive, integrated C⁴I system is required to assign the optimum weapon system against mobile time-sensitive targets such as SAMs or ballistic and cruise missile launchers. Because the situation is constantly changing and cannot be accurately predicted, C⁴I systems constantly monitor the status of offensive weapons, sensors, and many other systems to maintain full flexibility to modify preplanned courses of action to execute timely attacks. With proper planning, timing, and weapons loads, most aircraft can be retasked to conduct attacks against time-sensitive and high-value surface targets.

Three important aspects of OCA planning are setting objectives, determining targets, and coordinating efforts. An understanding of the JFC's objectives is necessary at all planning levels to ensure a concerted effort. Targeting is a process through which installations and forces or their component parts are selected for attack. Focal points of the main effort are determined and target priorities established. The following **five criteria have vital importance in establishing target priorities.**

- ✦ **Threat.** The threat posed by enemy forces includes *an assessment of the urgency or the need to counter them.* An NBC capable SCUD launcher would normally merit diversion of assets from a lesser threat, such as a SAM site.

Offensive Counterair Planning Criteria

Threat
Desired Effect
Residual Effect
Forces Available
Risk Calculation

Figure 3.2 Offensive Counterair Planning Criteria

- ✦ **Desired Effect.** Desired effect is *the degree of positive effect, in terms of degrading enemy capability or enhancing friendly operations, which can be reasonably expected to result from a successful attack.*
- ✦ **Residual Effect.** Residual effect defines *the time between the initial engagement and the desired effect*; i.e., delay, disruption, diversion, or destruction of the target. Concentration of effort may compress that time.
- ✦ **Forces Available.** The *forces available are assessed against the number, types, and priority of targets that can be attacked.* Sufficient and capable forces must be provided to ensure that the desired results are obtained.
- ✦ **Risk Calculation.** Risk calculation involves *weighing the risk to friendly forces against expected gains from target attack.*

CHAPTER FOUR

DEFENSIVE COUNTERAIR OPERATIONS

The whole art of war consists of a well-reasoned and extremely circumspect defensive followed by a rapid and audacious attack.

Napoleon Bonaparte

It is a doctrine of war not to assume the enemy will not come, but rather to rely on one's readiness to meet him; not to presume that he will not attack, but rather to make one's self invincible.

Sun Tzu

GENERAL

Defensive Counterair (DCA) operations provide a secure area from which all elements of the joint force can operate effectively. DCA operations *defend friendly lines of communication and protect friendly forces and assets while denying the enemy the freedom to carry out offensive air and missile operations.* DCA encompasses both active and passive air defenses. **Active air defense** operations are conducted using a mix of weapon and sensor systems supported by secure and highly responsive C⁴I systems to *detect, identify, intercept, and destroy or track enemy aircraft and missiles in flight.* Active air defense actions are taken to destroy and reduce the effectiveness of hostile air and missile threats against friendly forces and assets. **Passive air defense** measures are required by all commanders to *provide maximum protection for friendly forces and assets and to complicate the enemy's identification, surveillance, and targeting processes.* It includes such measures as camouflage, concealment, and deception (CCD); hardening; reconstitution; and dispersal.

ACTIVE AIR DEFENSE OPERATIONS

Active air defense neutralizes and degrades the effectiveness of enemy attacks and protects friendly forces and interests through the direct employment of weapons systems. *Integrated employment of air-to-air and surface-to-air defense systems through coordinated detection, identification, engagement, and assessment of enemy forces is necessary to blunt*

On Air Defense

Because of hostile domination of the air, travel anywhere in the forward area was an exciting business. Lookouts kept a keen watch of the skies and the appearance of any plane was the signal to dismount and scatter... Truck drivers, engineers, artillerymen and even the infantrymen in the forward areas had constantly to be watchful. Their dislike of the situation was reflected in the constant plaint, "Where is this bloody Air Force of ours? Why do we see nothing but Heinies? When the enemy has air superiority the ground forces never hesitate to curse the 'aviators.'"



**Gen Dwight D.
Eisenhower**

enemy attacks and protect friendly forces. Airspace control in an active air defense environment is extremely difficult. Rapid, reliable, and secure means of identification are critical to the survival of friendly aircraft and facilitate effective defense against enemy air and missile attacks.

Active Air Defense Targets

Active air defense targets may include airborne fixed-wing or rotary-wing aircraft and TMs. Because no air defense system is guaranteed to be 100 percent effective, active air defense is conducted in close coordination with passive air defense operations to minimize the effectiveness of enemy systems that escape destruction.

Active Air Defense Resources and Forces

Air defense systems are integrated to provide efficient control and exchange of essential

real time information to all air defense resources. Counterair is inherently a joint operation. **Services work in unison and provide a mix of dedicated weapon systems to maximize the effectiveness of air defense operations.** When working in unison, the limitations of some assets are balanced by the advantages of other assets. Some of the primary assets used in conducting active air defense missions are discussed below.

- ✦ **Aircraft.** Aircraft include fighter interceptors, EW and reconnaissance and surveillance aircraft, armed helicopters, AWACS, and JSTARS.



Typical defensive counterair weapons systems.

- ★ **Antiaircraft Artillery (AAA) and Surface-to-Air Missiles (SAMs).** These weapons include antiaircraft artillery and short-, medium-, and long-range SAMs.
- ★ **C⁴ISR Systems.** These systems include early warning and surveillance systems using a combination of sensors, satellites, radar, and identification systems.

Active Air Defense Measures

Units employed to achieve air defense objectives have **decentralized execution authority** and latitude in the detailed planning and coordination of the assigned DCA tasks. *The following missions are directly connected to active air defense operations.*

- ★ **Area Defense.** Area defense missions are conducted for the *defense of a broad area* using a combination of weapon systems. There can be

specialized applications of area defense when friendly assets to be protected are spread over a large geographical area with defined threat boundaries.

- ✦ **Point Defense.** Point defense missions are conducted for the *protection of a limited area*, normally in defense of the vital elements of forces and installations.
- ✦ **Self-defense.** Self-defense missions are conducted by friendly units to defend themselves against direct attack or threat of attack through the use of organic weapons and systems. *Inherent to all ROE and weapon control procedures is the right of self-defense.*
- ✦ **High Value Airborne Asset (HVAA) Protection.** HVAA protection uses fighter aircraft to protect critical airborne theater assets such as AWACS, RIVET JOINT, and JSTARS.

Passive Defense

- Camouflage
- Concealment
- Deception
- Hardening
- Reconstitution
- NBC Capability
- Redundancy
- Detection & Warning
- Dispersal
- Mobility

PASSIVE AIR DEFENSE OPERATIONS

Passive air defense includes all measures, other than active air defense, **taken to minimize the effectiveness of hostile air and missile attacks.** Tactical warning initiates many passive defense measures. Warnings are general or specific. **General warnings indicate that attacks are imminent or have occurred.** **Specific warnings signify that specific units or areas are in danger of attack.** Passive air defense does not involve the active employment of any lethal weapons, but it improves survivability of friendly forces by reducing the potential effects of enemy attacks. Depending on the situation and time available in the area of operations, a variety of actions can be taken to improve the passive air defense posture of friendly forces. *Passive air defense requires preplanning and practice during peacetime.*

Figure 4.1 Passive Defense

✦ **Camouflage, Concealment, and Deception (CCD).** Camouflage, concealment, and deception *deny accurate location and targeting of friendly assets by misleading and feeding false information to the enemy.* These measures reduce vulnerability of friendly assets by limiting their exposure to targeting. They are conducted continuously over time, in response to warning, or under the cover of darkness to deny an enemy vital data about friendly forces. *Timely and accurate intelligence concerning the overflight of enemy satellite and aircraft collection systems enhances the effectiveness of CCD.* This may cause enemies to abort, delay, or modify an attack, or deplete valuable resources by attacking false targets.

✦ **Hardening.** Valuable assets and their shelters are hardened to *protect against hostile attacks and provide protection against EMP and transient radiation on electronics.* Hardening actions should be accomplished during peacetime. However, hardening may be a continual process throughout operations.

✦ **Reconstitution.** This capability provides for the rapid repair of damage resulting from enemy attacks and the return of damaged units to a desired level of combat readiness. Reconstitution includes the ability to *repair valuable assets* such as airfields, communications, warning and surveillance systems, and to *restore essential services* such as power, water, and fuel supplies.

✦ **Nuclear, Biological, and Chemical (NBC) Defensive Equipment and Facilities.** NBC equipment and facilities allow collective protection from WMD by providing contamination detection and avoidance, identification, and decontamination. Use of individual protective equipment (including full-body ensembles for friendly forces) permits continuation of vital functions and missions in an NBC environment.



We must be able to conduct operations in a nuclear, biological and chemical environment.

✦ **Redundancy.** Duplication of critical capabilities allows continued operations of vital systems even when critical nodes are destroyed or

damaged. *Redundancy includes dual, contingency, or back-up capabilities* which can assume primary mission functions, in whole or in part, upon failure or degradation of the primary system.

- ✳ **Detection and Warning Systems.** Timely detection and warning of air and missile threats *provide maximum reaction time* for friendly forces to seek shelter or take appropriate action against enemy attacks. Missile warning is especially vital to friendly forces when considering the compressed timelines for detection and warning of TMs. *Connectivity of available communications and sensor systems is required* to transmit accurate, real time data to friendly forces. A combination of air-, space-, and surface-based detection and communication assets is established to maximize opportunities for missile detection and warning times. *“All clear” procedures* are established to notify forces when a warning is false or the threat has passed.

- ✳ **Dispersal.** Dispersal *complicates the enemy's ability to locate and target friendly assets by spreading them out and bringing them together in concentration only at the time and place of our choosing.* Combined with mobility and deception, dispersal increases uncertainty as to whether a location is occupied or will remain occupied. It forces the enemy to search more locations, requiring more resources and time.

- ✳ **Mobility.** Mobility is the capability of easily *moving from one location to another* and is facilitated by keeping a small footprint. Frequent movement of units, inside the enemy's decision cycle, can be of critical importance. *Mobility reduces vulnerability and increases survivability of friendly assets* by complicating enemy surveillance, reconnaissance, and targeting.

EXECUTION AND INTEGRATION OF DCA OPERATIONS

Joint forces practice and employ all levels of defensive measures to provide maximum protection for friendly forces and assets. Units defend against air and missile attacks by using organic weapons and passive measures. *The AADC is the central control agent responsible for the integration of all air defense efforts in the theater of operations.* The AADC develops engagement procedures for all air defense weapons based on the JFC's objectives and guidance. Execution of efficient air defense operations requires a surveillance and reporting system capable of near-

real-time production and dissemination of tracking data necessary for the effective engagement of targets. Target track production is a sequential process that begins with the surveillance function. As a track is detected, it is identified and labeled; this information is disseminated as rapidly as possible. The track data provided is sufficiently detailed and timely to permit the C² system to evaluate the track, determine the significance of the threat, and either designate air defense forces for interception or engagement, or advise units of the passage of friendly aircraft.

The effective use of counterair forces requires the establishment and understanding of published and easily understandable ROE. *The AADC assists the JFC in establishing and implementing these rules.* The component and supporting commanders are responsible for ensuring compliance with the established ROE. *To be effective, engagement control procedures are centrally imposed, requiring standardized ROE.* The optimum employment of air defense weapon systems involves the earliest possible discrimination of friend from foe to maximize beyond-visual-range engagement and to avoid fratricide.

Control and Coordination of DCA Weapons

Centralized control of all DCA assets, by the AADC, is the preferred method of operation. DCA weapon systems are normally capable of autonomous operations if centralized control fails or is not available. In the absence of centralized control, procedural means are used to permit the safe passage of friendly aircraft and to enable the effective use of air defense weapons. *Since many DCA assets are owned by different Services and allies, integration, coordination, and normal airspace control procedures are required to enhance the synergistic capabilities of the various systems.*

Area control measures include fighter engagement zones and missile engagement zones. These zones are defined as dimensions of airspace in which the responsibility for engagement rests with a particular weapon system. The ideal aim of area control measures, based on advanced signature technology, is to have *a joint engagement zone where all air and ground defense systems employ and operate simultaneously, in the same airspace.* Advanced technologies will allow for the identification of all airborne objects. Only those airborne objects positively identified as hostile will be targeted and engaged. This reduces fratricide and minimizes overly restrictive airspace control procedures. ROE remains simple, giving air de-

fense systems the flexibility to operate beyond the current constraints of procedural control measures.

- ✦ **Fighter Aircraft.** When the CRC or AWACS detects a hostile, potential hostile, or unknown target, they can assign or commit fighter aircraft to intercept the target. When possible, *aircraft remain under the close control of the initiating control agency and are continuously directed until the pilot confirms visual or radar contact.* If required, this control may be transferred to adjacent sectors of responsibility. Intercept control can be transferred to the pilot when the aircraft is in positive contact with the target or when the environment precludes positive direction by the controlling agency. In the latter situation, alternative procedures such as a broadcast “air picture” of enemy activity or autonomous action by the aircrew may be required.
- ✦ **Armed Helicopters.** Armed helicopters conduct DCA operations when required. The *Army retains OPCON of armed helicopters on DCA missions, while the AADC exercises TACON* and/or a support relationship over the helicopters when conducting DCA operations.
- ✦ **Surface-to-Air Weapons.** *Surface-to-air weapons effectiveness requires a highly reliable centralized linkup with air operations and an adequate identification process.* This precludes engagement of friendly aircraft and unnecessary expenditure of valuable resources. Weapons control measures (weapons free, weapons tight, and weapons hold) and ROE are used to control surface-to-air engagements. Therefore, *all available surface-to-air defense assets in the theater of operations are incorporated into the overall DCA plan and are subject to the integrated procedures and weapons control measures imposed by the AADC.* The point-defense nature of short-range air defense (SHORAD) weapons and units are difficult to



Short-range air defense weapon systems: Avenger, left, and Stinger, right.

control. SHORAD systems use procedural control through established ROE and operating criteria established by the AADC.

DCA Weapons Employment

Defense-in-depth, *the siting of mutually supporting defensive positions designed to absorb and progressively weaken the enemy, is invaluable to DCA. Early warning of enemy attack is vital if defense-in-depth is to be obtained.* Airmen develop defenses to permit the destruction of intruding enemy aircraft and missiles as early as possible and as far away as feasible. To maximize attrition to the enemy force, *the engagement process is continuous* throughout the threat's approach, entry to and departure from, the friendly operational area. Control of available defensive assets is required. *Available DCA weapons should be targeted on inbound threats as a higher priority than outbound threats.*

- ✦ **Fighter Aircraft.** *DCA missions for fighters include HVAA protection, point defense, and area defense.* A combat air patrol (CAP) can be used to accomplish these missions, with the objective of intercepting and destroying hostile missiles and aircraft before they can reach their intended targets. CAP allows rapid reaction to enemy intrusion and may be positioned well ahead of forces being protected. *HVAA protection sorties are generally flown to protect high value assets such as refueling aircraft and AWACS to ensure their freedom of operation.*
- ✦ **Armed Helicopters.** *Armed helicopters can engage such suitable targets as enemy helicopters, battlefield air defenses, and other targets within their combat range.*
- ✦ **Surface-to-Air Weapons.** *Surface-to-air missiles (SAMs) are employed in area or point defense operations.* These weapons can offer tremendous firepower and quick responsiveness to defended assets. Since optimum range and altitude capabilities of each weapon system are different, *the employment of various types of surface-to-air weapons must be fully coordinated and integrated into the overall air defense system for maximum effect.* This coordination and integration ensures minimum risk to friendly aircraft and the means to deconflict employment of surface-to-air weapons and aircraft.

Integration of surface-to-air systems provides mutual support and the most efficient coverage available. Normally, surface-to-air weapons made available to the AADC for DCA are provided in direct support. Regardless

of the command relationship, *all active defense forces are subject to the ROE, airspace, weapons control measures, and fire control orders established by the AADC*. The AADC is granted the necessary authority to deconflict and control engagements and to exercise real time battle management. However, *the right of self-defense is implied for any force or system*.

The future battle on the ground will be preceded by battle in the air. This will determine which of the contestants has to suffer operational and tactical disadvantages and be forced throughout the battle into adopting compromise solutions.

General Erwin Rommel

At the very Heart of Warfare lies Doctrine...

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GLOSSARY

Abbreviations and Acronyms

AAA	antiaircraft artillery
AADC	area air defense commander
ABCCC	airborne battlefield command and control center
ACA	airspace control authority
ACE	airborne command element
ACO	airspace control order
ACP	airspace control plan
AFDD	Air Force Doctrine Document
AFSST	Air Force Space Support Team
AO	area of operations
AOC	air operations center
AOR	area of responsibility
ASOC	air support operations center
AWACS	Airborne Warning and Control System
BCD	battlefield coordination detachment
C ²	command and control
C ³	command, control, and communications
C ⁴ I	command, control, communications, computers, and intelligence
C ⁴ ISR	command, control, communications, computers, intelligence, surveillance, and reconnaissance
CAP	combat air patrol
CCD	camouflage, concealment, and deception
CID	combat identification
CINC	commander in chief
COCOM	combatant command (command authority)
COMAFFOR	Commander Air Force Forces
COP	common operational picture
CRC	control and reporting center
CSAR	combat search and rescue
DCA	defensive counterair
EMP	electromagnetic pulse
EW	electronic warfare

GCCS	Global Command and Control System
HVAA	high value airborne asset
ID	identification
IO	information operations
IPB	intelligence preparation of the battlespace
ISR	intelligence, surveillance, and reconnaissance
IW	information warfare
JAOC	joint air operations center
JFACC	joint force air component commander
JFC	joint force commander
JOA	joint operations area
J-SEAD	joint suppression of enemy air defenses
J-STARS	Joint Surveillance Target Attack Radar System
JTIDS	Joint Tactical Information Distribution System
JTTP	joint tactics, techniques, and procedures
MCS	modular control system
NALE	naval and amphibious liaison element
NBC	nuclear, biological, and chemical
NCA	national command authorities
OCA	offensive counterair
OPCON	operational control
POL	petroleum, oils, and lubricants
ROE	rules of engagement
SAM	surface-to-air missile
SEAD	suppression of enemy air defenses
SHORAD	short-range air defense
SIGINT	signals intelligence
SOF	special operations forces
SOLE	special operations liaison element
TACON	tactical control
TACS	Theater Air Control System
TBM	theater ballistic missile

TBMS	tactical battle management system
TM	theater missile
TST	time-sensitive target
UAV	unmanned aerial vehicle
UNAAF	Unified Action Armed Forces
US	United States
USAF	United States Air Force
WMD	weapons of mass destruction

Definitions

active air defense. Direct defensive action taken to nullify or reduce the effectiveness of hostile air and missile threats against friendly forces and vital assets. It includes such measures as the use of aircraft, air defense weapons, weapons not used primarily in an air defense role, and electronic warfare.

air defense. All defense measures designed to destroy attacking enemy aircraft and missiles or to nullify or reduce the effectiveness of such attacks.

air defense operations area. An area and the airspace above it within which procedures are established to minimize mutual interference between air defense and other operations; it may include designation of one or more of the following: air defense action area, air defense area, air defense identification zone, and/or firepower umbrella. (Joint Pub 1-02)

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

airspace control in the combat zone. A process used to increase combat effectiveness by promoting the safe, efficient, and flexible use of airspace. Airspace control is provided in order to prevent fratricide, enhance air defense operations, and permit greater flexibility of operations. Airspace control does not infringe on the authority vested in commanders to approve, disapprove, or deny combat operations. Also called **combat airspace control; airspace control**. (Joint Pub 1-02)

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

air supremacy. That degree of air superiority wherein the opposing air force is incapable of effective interference. (Joint Pub 1-02)

allocation (air). The translation of the air apportionment decision into total number of sorties by aircraft type available for each operation or task. (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 air defense commander. Within a unified command, subordinate unified command, or joint task force, the commander assigns overall responsibility for air defense to a single commander. Normally, this is 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 is provided, as appropriate, to the area air defense commander's headquarters. Also called **AADC**. (Joint Pub 1-02)

combatant command (command authority). Nontransferable command authority established by title 10 ("Armed Forces"), United States Code, section 164, exercised only by commanders of unified or specified combatant commands unless otherwise directed by the President or the Secretary of Defense. Combatant command (command authority) cannot be delegated and is the authority of a combatant commander to perform those functions of command over assigned forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction over all aspects of military operations, joint training, and logistics necessary to accomplish the missions assigned to the command. Combatant command (command authority) should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and Service and/or functional component commanders. Combatant command (command authority) provides full authority to or-

ganize and employ commands and forces as the combatant commander considers necessary to accomplish assigned missions. Operational control is inherent in combatant command (command authority). Also called **COCOM**. See also **combatant command; combatant commander; operational control; tactical control**. (Joint Pub 1-02)

control. 1. Authority which may be less than full command exercised by a commander over part of the activities of subordinate or other organizations. (Joint Pub 1-02)

counterair. A function that integrates and exploits the mutually beneficial effects of offensive and defensive operations by fixed- and rotary-winged aircraft, surface-to-air and air-to-air missiles, antiaircraft guns, artillery, and electronic warfare to destroy or neutralize enemy aircraft and missile forces and their infrastructure both before and after launch.

defensive counterair. Operations to detect, identify, intercept, and destroy enemy air and missile forces attempting to attack or penetrate the friendly air environment. Defensive counterair operations are synonymous with air defense operations. Defensive counterair encompasses both active and passive measures and is normally conducted near or over friendly territory and generally reacts to the initiative of enemy forces. Also called **DCA**.

electronic warfare. Any military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. Also called **EW**. The three major subdivisions within electronic warfare are: electronic attack, electronic protection, and electronic warfare support. **a. electronic attack**. That division of electronic warfare involving the use of electromagnetic, directed energy, or antiradiation weapons to attack personnel, facilities, or equipment with the intent of degrading, neutralizing, or destroying enemy combat capability. Also called **EA**. EA includes: 1) actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum, such as jamming and electromagnetic deception, and 2) employment of weapons that use either electromagnetic or directed energy as their primary destructive mechanism (lasers, radio frequency weapons, particle beams) or antiradiation weapons. **b. electronic protection**. That division of electronic warfare involving actions taken to protect personnel, facilities, and equipment from any effects of friendly or enemy employment of electronic warfare that degrade, neutralize, or destroy friendly combat capa-

bility. Also called **EP. c. electronic warfare support**. That division of electronic warfare involving actions tasked by, or under direct control of, an operational commander to search for, intercept, identify, and locate sources of intentional and unintentional radiated electromagnetic energy for the purpose of immediate threat recognition. Thus, electronic warfare support provides information required for immediate decisions involving electronic warfare operations and other tactical actions such as threat avoidance, targeting, and homing. Also called **ES**. Electronic warfare support data can be used to produce signals intelligence (SIGINT), which includes both communications intelligence (COMINT), and electronic intelligence (ELINT).

joint force air component commander. The joint force air component commander derives his 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 normally designates a joint force air component commander. The joint force air component commander's responsibilities are assigned by the joint force commander (normally these include, but are not 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 recommends to the joint force commander apportionment of air sorties to various missions or geographic areas. Also called **JFACC**. (Joint Pub 1-02)

offensive counterair operations. An operation mounted to destroy, disrupt or limit enemy air power as close to its source as possible. (Joint Pub 1-02)

operational control. Transferable command authority that may be exercised by commanders at any echelon at or below the level of combatant command. Operational control is inherent in combatant command (command authority). Operational control may be delegated and is the authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission. Operational control includes authoritative direc-

tion over all aspects of military operations and joint training necessary to accomplish missions assigned to the command. Operational control should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and Service and/or functional component commanders. Operational control normally provides full authority to organize commands and forces and to employ those forces as the commander in operational control considers necessary to accomplish assigned missions. Operational control does not, in and of itself, include authoritative direction for logistics or matters of administration, discipline, internal organization, or unit training. Also called **OPCON**. (Joint Pub 1-02)

passive air defense. All measures, other than active air defense, taken to minimize the effectiveness of hostile air action. These measures include deception, dispersion and the use of protective construction. (Joint Pub 1-02)

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

weapon engagement zone. In air defense, airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with a particular weapon system. (Joint Pub 1-02)

weapons free. In air defense, a weapon control order imposing a status whereby weapons systems may be fired at any target not positively recognized as friendly. (Joint Pub 1-02)

weapons hold. In air defense, a weapon control order imposing a status whereby weapons system may only be fired in self-defense or in response to a formal order. (Joint Pub 1-02)

weapons tight. In air defense, a weapon control order imposing a status whereby weapons systems may be fired only at targets recognized as hostile. (Joint Pub 1-02)

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