
FM 3-52 (FM 100-103)

**Army Airspace
Command and Control
in a Combat Zone**

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HEADQUARTERS, DEPARTMENT OF THE ARMY

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Preface

Information age developments coupled with a revolution in military technology have profoundly influenced the depth, breadth, and height of the battlespace. In today's operational environment, capabilities of friendly and enemy forces to acquire and dominate each other by fires and maneuver are maximized by effectively using the electromagnetic spectrum. Exponential improvements of targeting capabilities occur almost daily in our technological age. Although extending the battlespace has evolved throughout the history of warfare, space and airborne platforms have improved the commander's capabilities to visualize the battlespace, target the enemy, and process and distribute information beyond any twentieth century expectations. Twenty-first century technologies have placed increasing demands on using airspace. Airspace has become a crucial resource that the combat commander must manage efficiently with increasing numbers and types of airspace users.

Army airspace command and control (A2C2) is the Army's application of airspace control to coordinate airspace users for concurrent employment in the accomplishment of assigned missions. It provides the necessary command and control structure for the effective use of airspace. This field manual describes the doctrinal principles and fundamentals for organizing, planning, and using airspace. Beginning with the fundamentals of airspace management at the joint level and working through A2C2 management at each echelon of command, this manual is both a primer for airspace users and a primary reference for A2C2 staff planners. This manual provides the guidance to integrate, coordinate, synchronize, and regulate the Army's use of airspace. It focuses on how the Army uses airspace in planning and executing the commander's intent.

Coordinating and integrating the use of the airspace is a force multiplier; it ensures that all battlefield operating systems are available to positively impact the course of the battle. Additionally, effective airspace management and control enhances force protection measures, minimizes the risk of fratricide to airspace users and ground combat units, and increases overall force effectiveness.

The proponent for this publication is Headquarters, US Army Training and Doctrine Command (HQ, TRADOC). Submit changes for improvements on DA Form 2028 directly to the Commander, U.S. Army Combined Arms Center (CAC), ATTN: ATZL-SWW, Fort Leavenworth, KS 66027-6900.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

Cross-references use the new field manual numbering system. The bibliography lists field manuals by new number followed by old number.

All references to the joint air operations center (JAOC) apply to the integrated combined air operations center or the combined air operations center.

Specific terms apply to A2C2. This publication uses the joint definition of battlespace. Common tactical picture (CTP) is a term used by material developers. CTP as used in this publication refers to the common operational picture. Combat zone as used in this publication applies to the broadest interpretation of areas where combat

forces are required to conduct operations, including military operations other than war. The Army Battle Command System (ABCS) software packages are evolving. The capabilities described in this manual may not reflect actual capabilities available on the user's system.

The glossary lists most terms used in FM 3-52 that have joint or Army definitions. Terms for which FM 3-52 will become the proponent manual (the authority) when it is published are indicated with an asterisk. Definitions for which FM 3-52 will be the proponent manual are printed in boldface in the text. Other definitions are not printed in boldface. See JP 1-02 for complete joint definitions and FM 1-02 for complete Army definitions.

The glossary contains definitions for acronyms and terms not defined in JP 1-02 or FM 1-02. It does not list acronyms and abbreviations that are included only for clarity or appear only in a figure and are listed in the legend for that figure. Some common abbreviations and acronyms are not spelled out; refer to the glossary.

Chapter 1

Airspace Control and Airspace Control Systems and Organizations: An Overview

All Army commanders must have a fundamental understanding of joint airspace control in a combat zone, the Theater Air-Ground System, and the key personnel and documents pertaining to airspace control. This chapter introduces airspace control in a combat zone, discusses the considerations of joint airspace control, summarizes the command and control systems from each service that make up the Theater Air-Ground System (TAGS), discusses liaisons, identifies the key joint airspace control positions, and discusses key documents necessary for planning and executing airspace control in a combat zone.

Combat zone as used in this publication applies to the broadest interpretation of areas where combat forces are required to conduct operations, including operations other than war.

AIRSPACE CONTROL IN A COMBAT ZONE

1-1.JP 3-52 defines *airspace control in a combat zone* as 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.

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1-2. International agreements, enemy and friendly force structures, concepts of operations, and different operating environments all introduce different airspace command and control (C2) requirements. Airspace control must provide the joint force commander (JFC) with enough flexibility to effectively employ the joint force in either a joint or multinational campaign. Using current national military objectives and assigned missions as a baseline, the JFC develops specific concepts for combat zone airspace control in the joint force airspace control area. The airspace control area consists of airspace that is laterally defined by the boundaries of the area of operations. It may be divided into subareas.

CONSIDERATIONS OF JOINT AIRSPACE CONTROL

PRINCIPLES

1-3. Army airspace command and control (A2C2) planners must understand and consider the principles of joint airspace control when developing plans to support the ground commander's scheme of maneuver. The airspace control area defines a crucial battlespace dimension that all components of joint and multinational forces use to conduct their missions. Highly concentrated friendly aircraft, surface, subsurface, and air-launched weapon systems must share this airspace without one element hindering applying combat power by any other element. Joint airspace control primarily strives to enhance air, land, and maritime force effectiveness. Airspace control planners should consider these basic principles when developing any airspace control plan.

1-4. The basis of the joint airspace control system is unity of effort. C2 procedures, when integrated into the joint system, must fully support the joint force commander's objectives. Successful operations depend on a fully coordinated and integrated airspace control system.

1-5. Closely coordinated airspace C2, fire support (to include attack operations), and air defense (AD) elements reduce the risk of fratricide. However, commanders must balance that risk with the requirements for an effective airspace defense.

1-6. Liaison and close coordination among all airspace users promotes timely and accurate information flow to airspace managers. The success of operations may directly relate to the effectiveness of this liaison and coordination. Therefore, airspace information systems identification procedures and AD procedures must be compatible. Some units refer to airspace information systems identification

Principles

- **Unity of effort.**
- **Fratricide reduction and risk balance.**
- **Close liaison and coordination among all airspace users.**
- **Common airspace control procedures.**
- **Uncomplicated procedural controls.**
- **Reliable, jam-resistant, and secure C4ISR network.**
- **Durable and redundant systems.**
- **Ability to respond to evolving enemy threat conditions and evolving operation.**
- **Training for air traffic controllers that includes combat specific training.**
- **Emphasis on flexibility and simplicity.**
- **Capability to support day or night and adverse weather operations.**

procedures as “combat ID.” The procedures, equipment, and terminology for airspace control, AD, military air traffic control, and C2 systems must be compatible, mutually supporting, and interoperable.

1-7. Common airspace control procedures within the airspace control area enhance the value of air operations. These procedures should maximize flexibility by effectively mixing positive and procedural control measures. The airspace command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) structure should permit close coordination between airspace managers and air, land, maritime, and special operations forces. It should allow concentrating combat power anywhere in an area of operations in minimal time. Procedural control should be uncomplicated and understood by all aircrew members and air traffic control personnel, AD weapon system operators, and airspace managers.

1-8. Ensuring that C4ISR procedures are compatible among all airspace managers and users requires coordination and detailed planning. The airspace C4ISR structure must have a reliable, jam-resistant, and, where appropriate, secure network. However, commanders must avoid using control procedures that rely heavily on voice communications. They should emphasize simple, flexible air traffic control (ATC) procedures. They also should make provisions to decentralize airspace C2 and to preserve flexibility and responsiveness should communications become degraded. Airspace C4ISR structure must be durable and redundant because enemy information operations will likely consider such structures to be high-priority targets.

1-9. The airspace C4ISR structure must respond to changing threat conditions as well as to the evolving operation. The design, responsiveness, and procedures of such structures should promote the rapid massing of combat power through simple design and detailed care in planning.

1-10. Airspace control functions in the combat zone rely on ATC resources. These functions still remain separate and distinct from real-time control of air vehicles and the terminal air traffic control environment. Air traffic controller training must augment peacetime conditions by conducting combat-specific air traffic control training tasks. In peacetime, personnel must exercise combat zone airspace control procedures to be effective in combat.

1-11. Airspace C2 balances various demands competing for airspace use. Planners must continue to emphasize flexibility and simplicity to maximize the force effectiveness using the system. Theater airspace control procedures must prevent mutual interference among airspace users, aid aircraft identification, and safely accommodate and expedite the flow of all air traffic in the theater of operations. Combat zone airspace control must be capable of supporting day, night, and adverse weather operations.

FUNDAMENTAL CONSIDERATIONS

1-12. The commander’s operation plan (OPLAN), the airspace control plan (ACP), the airspace control order (ACO), and the air tasking order (ATO) are the keystones of airspace operations. Effective airspace use is critical to OPLAN success. Airspace control must effectively use combat operations without adding undue restrictions or adversely impacting the capabilities of any service or functional component. Other fundamental considerations include—

- Each service or functional component within a joint force operating various air platforms and weapon systems—including high- and low-speed, fixed- and rotary-wing, and manned and unmanned aircraft—within the airspace control area.
- Each service or functional component to use the airspace with maximum freedom consistent with the degree of risk operationally acceptable to the JFC.
- Forces coordinating airspace use with all other airspace users so as to integrate and synchronize offensive and defensive weapon systems and to ensure maximum effectiveness.
- The need to quickly and effectively discriminate between friendly, neutral, and enemy air operations and air platforms.
- Flexible airspace C4ISR structures that respond to the joint force’s routine requirements as well as to surge operations when required.
- Closely coordinated and integrated surface operations, joint supporting fires, air operations, AD operations, special operations, and airspace control activities.
- The need to accommodate US, host nation, and multinational airspace control activities within the area of operations.
- The need to recognize saturated levels and limited airspace control networks.
- Temporary airspace control measures that restrict certain areas of airspace to allow subordinate commanders more freedom of operations.
- Detailed incorporation of coordinated offensive operations using electronic warfare (EW) elements, strike aircraft, and cruise missiles to ensure that defensive elements or procedures of the force do not unacceptably inhibit or degrade offensive capabilities.
- The need to ensure that the airspace control network remains survivable and effective.
- Standardized communications data, format, and language requirements in multinational operations to reduce possible differences in interpreting, translating, and applying airspace control procedures.
- The capability to support day, night, and adverse operations.
- The need to expediently distribute airspace control information.
- The need to operate in a nondigitized or partially digitized environment for prolonged periods.
- The integration of intelligence, surveillance, and reconnaissance (ISR) air operations into the airspace control area.

ELEMENTS

Operational Area Considerations

1-13. Each joint operations area (JOA) has unique airspace control requirements. As early as possible, planners determine these requirements based on the JFC’s guidance and incorporate them into the overall joint force

<p>Elements</p> <ul style="list-style-type: none"> • Operational Area Considerations • Airspace Control Planning • Peacetime to Combat Considerations • Integration of Airspace Control and Air Defense • Airspace Control Methods

planning effort. Political constraints, national and military ATC systems and procedures, and the capabilities and limitations of these systems are critical considerations. Rules of engagement (ROE), disposition of AD weapons, fire support plans, and procedures for identifying US and allied aircraft are also important. When developing procedures to implement these concepts, planners must consider the likelihood of multinational operations. They should develop techniques and procedures that work with the C4ISR structure as well as with the capabilities and methods of potential multinational partners. Planners should also consider the different control and identification capabilities and procedures of multinational or host-nation forces. US forces participating in multinational operations may also be subject to command arrangements outlined in international agreements. Planners must know which agreements apply to the force and how those agreements affect airspace C2. Planners have access to this information through the appropriate host-nation or multinational liaison officers located at the joint air operations center (JAOC).

Airspace Control Planning

1-14. Six broad principles of planning are essential to effective airspace command and control in a combat zone: support the joint force, interoperability, mass and timing, unity of effort, planning cycles, and degraded operations.

1-15. **Support the Joint Force.** Planners must integrate the airspace C4ISR structure to meet and complement the commander's operations plans. Airspace C2 must ensure the best use of joint, multinational, and interagency airspace assets. Planners must directly access and get involved in the planning cycle to input and receive information from each element contributing to the operational effort. Their full involvement in planning and subsequent coordination ensures that Army aspects of the airspace C4ISR structure fully support the joint force commander's vision.

1-16. **Interoperability.** Planning for airspace control must include planning for interoperability of equipment, personnel, and terminology. Forces must understand airspace control in both joint and multinational environments to operate effectively during conflict.

1-17. **Mass and Timing.** Airspace control planners must consider the volume of all airspace users—friendly, hostile, and neutral—generated during all aspects of operations. Planners must also consider timing constraints and fully integrate these factors into the need to quickly respond with adequate force to enemy intrusion.

1-18. **Unity of Effort.** Commanders should identify and exercise proper liaison between joint force components before hostilities begin. Representatives from different components should integrate information flow through the system and provide expertise to the airspace control authority (ACA).

1-19. **Planning Cycles.** Planners should integrate the airspace planning cycle with the operations planning cycle. Planners must consolidate input from all components and devise and disseminate the final airspace control plan. This plan may be an annex to the joint force OPLAN or operation order (OPORD).

1-20. **Degraded Operations.** The design of the airspace C4ISR structure lets planners anticipate the effects of enemy offensive information operations and

communications degradation. To ensure an effective structure, commanders should plan to use all communications means available, anticipating that the system could be fully operational, totally degraded, or somewhere in-between. Planners should prepare an airspace procedural control plan in case degraded communications occur preventing effective positive airspace control. Planners also should make plans for the effects of bad weather and limited visibility.

Peacetime to Combat Considerations

1-21. Commanders should continually update the ACP throughout an operation. They can then maintain airspace control even with sudden changes in mission, ROE, or task organization. A standing ACO should exist to provide immediate airspace control if a surprise attack, other unforeseen event, or change in mission occurs. Such changes often transpire during actual conflict, and their nature differs from theater to theater. The ACP should provide simple and clear instructions to transition from such peacetime situations to combat operations and facilitate integrating civilian and commercial air traffic as appropriate.

Integration of Airspace Control and Air Defense

1-22. Airspace control and AD operations can interfere with each other if they operate independently. Therefore, planners must prioritize, integrate, and closely coordinate airspace control and AD requirements. Airspace C2 procedures help identify aircraft, facilitate engagement of enemy aircraft, and provide safe passage of friendly aircraft. AD units must be free to engage hostile targets—aircraft and missiles—within prescribed ROE. However, planners must also establish procedures to identify friendly aircraft. These procedures should not delay offensive operations, being simple enough for both aircrews and ground operations personnel to execute. They should include visual, electronic, geographic, and maneuver procedures for differentiating friendly or hostile aircraft.

Airspace Control Methods

1-23. The airspace control structure needs to respond to the evolving enemy threat conditions and changing tactical situations. Methods of airspace control range from positive control of all air assets in an airspace control area to procedural control of air assets, or a combination of both. *Positive control* relies on positive identification, tracking, and direction of aircraft within the airspace control area. It uses electronic means such as radar; sensors; identification, friend or foe (IFF) systems; selective identification feature (SIF) capabilities; digital data links; and other elements of the intelligence system and C2 network structures.

1-24. *Procedural control* relies on a combination of mutually agreed and promulgated orders and procedures. These may include comprehensive AD identification procedures and ROE, aircraft identification maneuvers, fire support coordinating measures (FSCMs), and airspace control measures (ACMs). Service, joint, and multinational capabilities and requirements determine which method, or which elements of each method, that airspace control plans and systems use. Chapter 4 discusses A2C2 procedures.

THEATER AIR-GROUND SYSTEM

1-25. To fully understand the relationship of the A2C2 systems to the Theater Air-Ground System, planners must understand each service's system and its composition and structure. The TAGS is not a complete and separate system for airspace management within a theater of operations. It combines each service's airspace management system that supports the JFC. The TAGS is not a transparent airspace management system; rather, it provides the framework that allows each service system to exist in a joint and coalition force environment and support the JFC.

1-26. The A2C2 system is the airspace management component of the Army Air-Ground System (AAGS), which is a subsystem of the TAGS. FM 3-52.2 discusses multiservice procedures for TAGS. In addition to the AAGS, the TAGS integrates the Air Force Theater Air Control System (TACS), the Navy Tactical Air Control System (NTACS), and the Marine Air Command and Control System (MACCS). Units and elements comprising the A2C2 system should develop standing operating procedures to facilitate A2C2 operations. These procedures must consistently follow joint procedures defined in JP 3-52.

1-27. The TAGS is not a formal system in itself but rather the sum of the component air-ground systems operating in the theater. It applies to all theater operations to include air, ground, maritime, and amphibious operations. Individual service systems are described in detail and illustrated. Figure 1-1 on page 1-8 is a notional arrangement used to demonstrate the TAGS. Not all of the elements must be in place for all operations.

THEATER AIR CONTROL SYSTEM

1-28. The TACS is the backbone of Air Force forces' (AFFOR's) contribution to the TAGS. In a theater where the Air Force provides most of the air assets, it consists of the AFFOR's air operations center (AOC) (the focal point of TACS), coordination and liaison organizations, and AFFOR wing operations centers (WOCs). The TACS performs centralized planning and control of air support to ground and naval forces and facilitates decentralized execution of that support. Subordinate TACS elements perform liaison, planning, coordination, monitoring, and surveillance; control the reporting; and execute air operations tasks. Ground control and airborne warning agencies that support the TACS include the control and reporting center (CRC); the air mobility element (AME); airborne battle-field command and control centers (ABCCCs); Airborne Warning and Control Systems (AWACSs); and Joint Surveillance Target Attack Radar Systems (JSTARSs). For a detailed discussion of connectivity and command relationships of these elements see FM 3-52.2.

1-29. Figure 1-2 illustrates the Air Force Theater Air Control System. The AFFOR commander works directly for the joint force commander. If the AFFOR commander is appointed as the joint force air component commander (JFACC), then he establishes a JAOC. Service components provide liaisons to include the battlefield coordination detachment (BCD), Army air and missile defense command (AAMDC) liaison team, Marine liaison officer (MARLO), naval and amphibious liaison element (NALE), special operations liaison element (SOLE), AME, and space liaison officer (SLO). Chapter 3 discusses each section in detail. In addition to these liaison elements, ground liaison officers (GLOs) working for the BCD at wing operations centers represent Army elements.

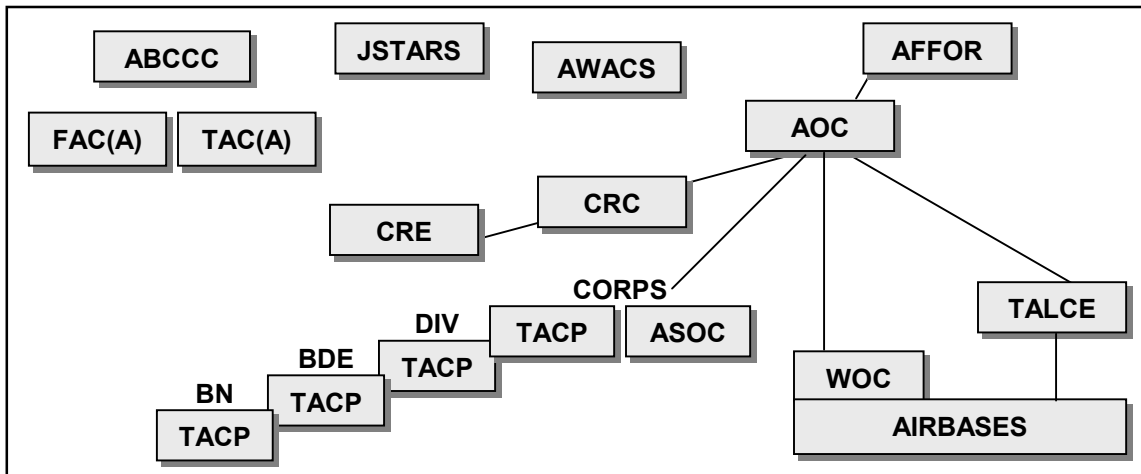


Figure 1-2. Air Force Theater Air Control System

1-30. The CRC is a facility that houses the airspace management liaison section (AMLS) staffed by all components. This section works in the senior radar control facility. In addition, the Army air defense artillery brigade provides the CRC with an air defense artillery (ADA) liaison responsible to the CRC for real-time air defense matters. Additionally, he informs the BCD of the current situation. Finally, the control reporting element (CRE)—a subordinate radar element of the CRC—extends the radar range of the CRC for early warning and aircraft control. It also provides early warning, surveillance, weapons control, and identification to the CRC. Chapter 3 details air ground support operations at the corps through battalion levels.

NAVY TACTICAL AIR CONTROL SYSTEM

1-31. The Navy employs the composite warfare commander (CWC) concept (see Figure 1-3 on page 1-10) as the doctrinal cornerstone of its operational and tactical information systems. The Navy employs the NTACS during amphibious operations. The CWC and NTACS encompass overall Navy command and control at sea.

Composite Warfare Commander Concept

1-32. The unique nature of maritime operations shapes the organization of US naval forces and affects how these forces fit into the overall unified military command structure. Vast distances, wide dispersion of forces with associated C2

challenges, and the complexities of conducting warfare in a three-dimensional battlespace characterize maritime operations. The CWC concept enables the officer in tactical command (OTC) of a naval force to aggressively wage defensive combat operations against air, surface, and subsurface threats while carrying out the primary offensive mission of the force. Depending on the mission and size of the force, the OTC may act as the CWC himself or assign more than one CWC. Subordinate warfare commanders are responsible to the CWC for the conduct of the tactical battle. The OTC or CWC may use a part or the entire concept. Key members of the CWC's organization include the air resource element coordinator, strike warfare commander, command and control warfare commander, undersea warfare commander, surface warfare commander, sea combat commander, and air defense commander.

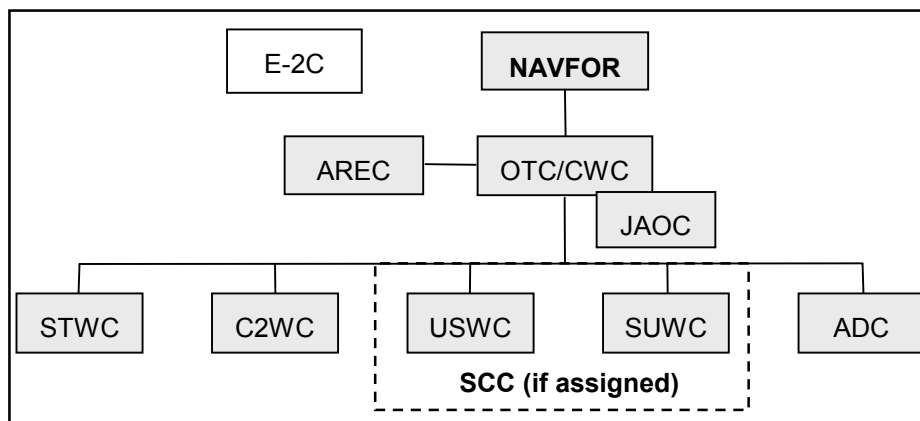


Figure 1-3. Navy Composite Warfare Commander Concept

1-33. Air Resource Element Coordinator. The air resource element coordinator (AREC), normally the carrier commanding officer, is a resource manager and an air warfare planner and coordinator. He is not a warfare commander. He acts as the air advisor to the OTC and CWC. The AREC is responsible for airspace planning and coordinates with the air defense commander in the airspace control function. The AREC produces the daily air plan that allocates aircraft to the various warfare commanders.

1-34. Strike Warfare Commander. The strike warfare commander (STWC) coordinates offensive power projection operations with respect to air and naval cruise missiles against land-based targets. He is normally the air wing commander located on an aircraft carrier. The STWC controls strike, C2, electronic combat, and support aircraft. He also integrates Tomahawk land-attack missiles (TLAMs) to support contingency operations or a theater campaign. These responsibilities give the STWC the greatest interface with other TAGS agencies and organizations during execution.

1-35. Command and Control Warfare Commander. The command and control warfare commander (C2WC) directs the management and exploitation of the electromagnetic and acoustic spectra. He develops the C2 warfare strategy for the force. This commander controls the electronic combat aircraft and shipboard systems involved in destroying or neutralizing electromagnetic targets. He also coordinates force, theater, and national surveillance assets to enhance friendly battlespace management.

1-36. **Undersea Warfare Commander.** The undersea warfare commander (USWC) must protect the battle group from undersea threats. He is usually a destroyer squadron commander co-located with the CWC onboard the aircraft carrier. The aircraft carrier provides the best tactical picture, C2 equipment, and information processing systems.

1-37. **Surface Warfare Commander.** The surface warfare commander (SUWC) must protect the battle group from surface threats. He may also be a destroyer squadron commander or the commanding officer of the aircraft carrier.

1-38. **Sea Combat Commander.** In low surface and subsurface threat environments, the responsibilities of the USWC and SUWC are often combined into a single sea combat commander. The naval component commander determines when to create the sea combat commander.

1-39. **Air Defense Commander.** The air defense commander is responsible to the CWC for air defense and airspace control around the battle group. He is normally the most senior commanding officer of a cruiser or guided missile destroyer. He controls fighter aircraft, E-2C (airborne early warning/control platform) aircraft, carrier-based tankers, and long-range surface-to-air missile capable ships.

1-40. **E-2C Hawkeye.** The E-2C Hawkeye is the Navy's carrier-based C2 platform that supports all the warfare commanders. The E-2C, an airborne early warning and control aircraft, can also serve as an airborne battlefield command and control center. The Hawkeye has a robust electronic surveillance capability and often operates with other ISR assets.

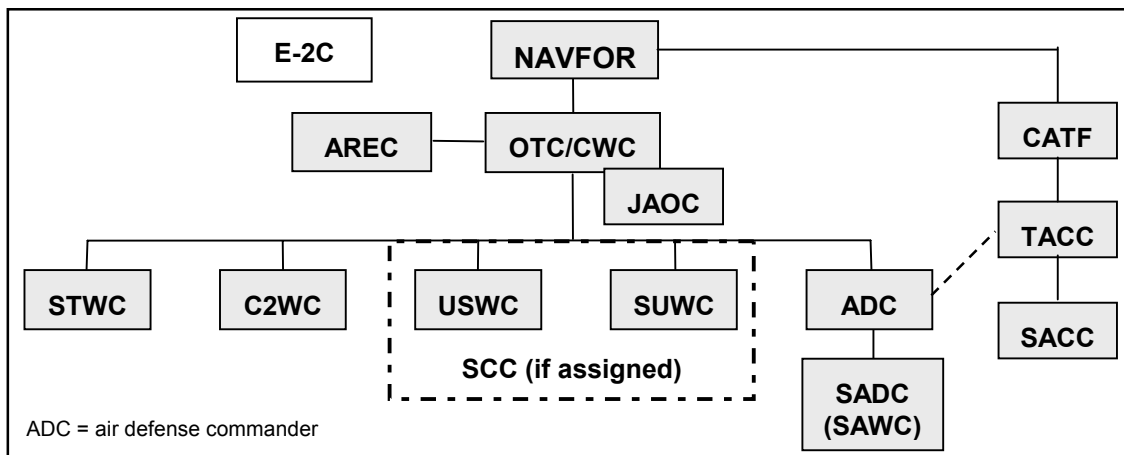


Figure 1-4. Amphibious Tactical Air Control System

Amphibious Tactical Air Control System

1-41. Amphibious Tactical Air Control System (ATACS) is the organizational structure used for command and control during amphibious operations. Figure 1-4 shows how it consists of the Navy Tactical Air Control System and the Marine Air Command and Control System. Its purpose is to plan, direct, and control air operations and supporting arms in the amphibious objective area (AOA) to accommodate the transition of the landing force once ashore. NTACS maintains positive control of all flights within the AOA from establishment by

the commander, amphibious task force (CATF) until all forces are ashore and airspace control is transferred to the MACCS.

1-42. NTACS is the organizational structure within which the CATF executes air operations in the AOA. The NTACS is found only during an amphibious operation. It is a relatively small organization compared to the MACCS. There are key components of the NTACS:

- The commander, amphibious task force is a Navy officer who controls all operations until the commander, landing force (CLF)—the senior officer in the landing force (may be Marine or Army)—is established ashore. In an amphibious operation, the CATF exercises control of all air operations in the AOA, including airspace control, until such functions are transferred to the CLF. He also establishes the ATACS to control air assets in the AOA and coordinates aviation assets with supporting forces.
- The tactical air control center is the primary air control agency from which all air operations supporting the amphibious operation are controlled. It is established aboard the CATF flagship and may be co-located with the combat direction center. Once the Marine tactical air command center sets up ashore and assumes responsibility for the command and control of aircraft, the Navy tactical air control center becomes a tactical air direction center (TADC). It becomes a backup for the Marine tactical air command center (TACC).
- The supporting arms coordination center (SACC) is located aboard an amphibious command ship close to the tactical air control center. It works closely with the tactical air control center to plan and coordinate artillery, naval gunfire, and air support. It also acts as the at-sea, functional counterpart to the Marine fire support coordination center (FSCC) or the Army fire support element (FSE).
- The sector air defense commander (SADC) performs sector air operations in the AOA and is subordinate to the air defense commander. Some doctrinal publications use the term sector air warfare coordinator (SAWC). The SADC has tactical control of surface-to-air weapons and assigned fighters within the sector.

MARINE AIR COMMAND AND CONTROL SYSTEM

1-43. Marine Air Command and Control System (see Figure 1-5) provides the aviation combat element (ACE) commander with the personnel, equipment, facilities, and procedures required to effectively command, control, and coordinate all Marine air-ground task force (MAGTF) air operations. The Marine air wing (MAW) provides the air command element with most necessary personnel and equipment to establish the MACCS. Pilots and naval flight officers (NFOs) fill critical billets within the MACCS, which requires the expertise of a Marine aviator and NFO. The tactical air command center, Marine air traffic control, tactical air operations center, low-altitude air defense, early warning/control, direct air support center, tactical air control party, and forward air controller (airborne) are the primary agencies of the MACCS.

1-44. The tactical air command center is the senior air command and control agency providing centralized command. It is the command post for the ACE commander. It consists of three sections: current operations, future operations, and future plans. Current operations monitor execution of the ATO and make

adjustments as dictated by the tactical situation. Future operations develop and disseminate the MAGTF air tasking order. Future plans develop the plan to support the next MAGTF mission.

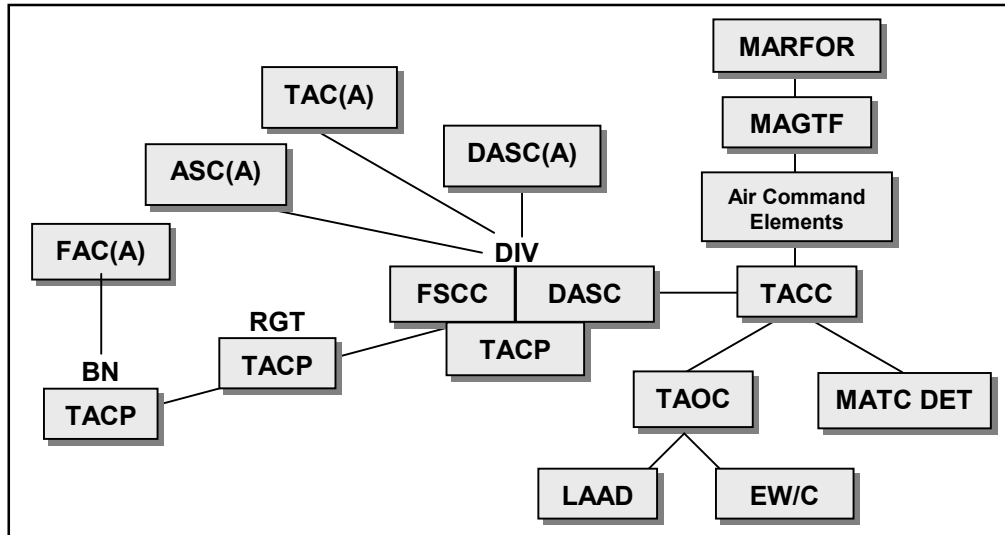


Figure 1-5. Marine Air Command and Control System

1-45. The Marine air traffic control (MATC) detachment provides continuous, all-weather air traffic control services to air bases and air facilities. It also provides expeditionary airfields and remote area landing sites as a part of the MACCS.

1-46. The tactical air operations center (TAOC) is the radar agency that conducts anti-air warfare (AAW), en route air traffic control, navigational assistance, surveillance, data link, and identification functions. It controls AAW aircraft and surface-to-air weapons in its assigned sector. The TAOC conducts theater ballistic missile defense and tactical digital information link (TADIL)-A, -B, and -J operations.

1-47. A low-altitude air defense (LAAD) unit provides close in, low altitude surface-to-air weapons fires utilizing the Stinger and Avenger missile systems. It defends either one or a combination of forward combat areas, maneuver forces, vital areas, installations, and units engaged in special or independent operations.

1-48. An early warning/control (EW/C) site is subordinate to and echeloned from a TAOC. This site is task organized to perform AAW, en route air traffic control, navigational assistance, surveillance, data link, and identification missions. While maintaining a smaller footprint than a TAOC, the EW/C site has the same functions but on a smaller scale.

1-49. The direct air support center (DASC) provides procedural control services. It is the air control agency responsible for decentralized execution of immediate close air support and assault support missions. It processes and coordinates requests for immediate air support. It is normally co-located with the senior FSCC or force fires coordination center. The DASC consists of—

- The direct air support center (airborne) (DASC[A]). It is subordinate to and performs the same functions as the DASC. It augments the DASC during periods of degraded capabilities, adverse communication conditions, and amphibious operations while control is being phased ashore. The DASC(A) operates from a specially configured KC-130, Hercules.
- The air support element. It is subordinate to, performs the same functions as, and has the same capability as the DASC. It is task organized to perform various air support control functions. Employment options can range from Marine expeditionary unit level operations characterized by limited assets and endurance to a multidivision operation. The air support element is almost identical in capabilities—but set apart in responsibilities—and subordinate to the DASC. The air support element can function as an extension of the Navy tactical air control center or helicopter direction center with the battalion tactical air control party.
- The tactical air coordinator (airborne) (TAC[A]). He performs as an airborne extension of the DASC or FSCC and deconflicts aircraft through airspace coordination. He coordinates aircraft with other supporting arms, such as artillery or naval gunfire.
- The assault support coordinator (airborne) (ASC[A]). He provides air coordination and control during helicopter operations. He also serves as an extension of the DASC or helicopter direction center to support the air mission commander. He coordinates airspace and assault support operations; movement of air assault aircraft through airspace; and close air support providing for helicopter assault operations.

1-50. The tactical air control party (TACP) is an integral part of each combat unit from division down to the battalion level. It acts as an air advisor to the maneuver unit, assists in the submission of preplanned and immediate air support requests, and provides terminal control for supporting aircraft.

1-51. The forward air controller (airborne) (FAC[A]) is the airborne extension of the ground forward air controller (FAC). He performs air reconnaissance and surveillance; has terminal control of close air support, artillery, and naval gunfire radio relay for ground FACs; and maintains landing zone preparations.

ARMY AIR-GROUND SYSTEM

1-52. The AAGS (see Figure 1-6) provides the control system for synchronizing, coordinating, and integrating air operations with the commander's scheme of maneuver. The AAGS provides the means to initiate, receive, process, and execute requests for air support and to disseminate information and intelligence produced by aerial assets. Some elements of the AAGS come as liaisons and are provided by the Air Force. These elements are the theater airlift liaison officer (TALO), TACP, and the air support operations center (ASOC). They function as a single entity in planning, coordinating, deconflicting, and integrating the air support operations with ground elements. The principal Army agencies are command posts (CPs), FSEs, air defense elements, A2C2 elements (detailed discussion in Chapter 2), and coordination and liaison elements, such as the BCD, Theater Army Air and Missile Defense Coordinator, and GLOs. Chapter 3 discusses each element of the system in detail. FM 3-52.2 discusses these agencies.

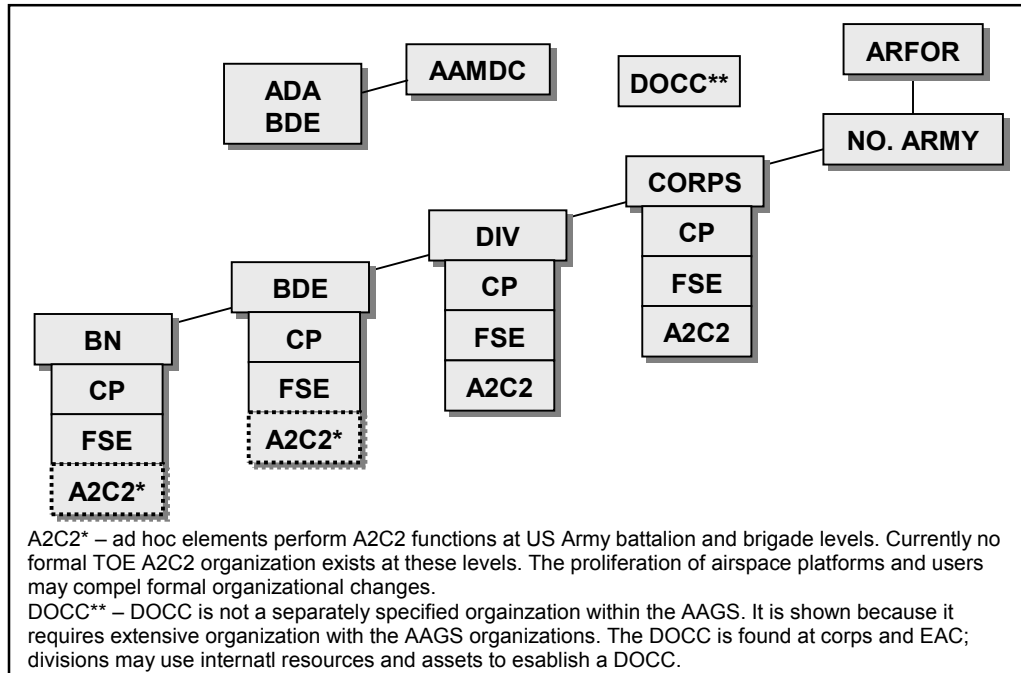


Figure 1-6. Army Air-Ground System

JOINT AIR OPERATIONS CENTER

1-53. The joint air operations center is the senior level for airspace management within a theater of operations. It provides the JFACC with the required staff to support his responsibilities. The JAOC supports component air assets by planning, coordinating, executing, controlling, monitoring, assessing, and reporting air operations. When the JFACC is a naval officer, the air component headquarters will probably be the naval component's air resource element coordinator's center. When the JFACC is a Marine officer, it will likely be a Marine tactical air command center. When the AFFOR commander is named the JFACC, the AOC becomes the JAOC. The JAOC is task-organized, directed by the JFACC, and consists of at least three divisions. These divisions are combat plans, combat operations, and combat intelligence.

- JAOC Divisions**

 - **Combat Plans Division**
 - **Combat Operations Division**
 - **Combat Intelligence Division**

1-54. The combat plans division focuses on future joint air operations. Functioning like the main command post of a maneuver force, the division looks beyond the current operation. It normally develops the joint air operations strategy, air apportionment recommendations, and the joint ATO. It consists of the air strategy branch, airspace command and control, and joint ATO development and production branch.

1-55. The combat operations division monitors and executes current joint air operations. This division functions much like a maneuver force tactical CP that monitors and directs the current fight. It consists of the current operations branch, weather support branch, operations support branch, and joint search and rescue branch.

1-56. The combat intelligence division is responsible for all intelligence activities in the JAOC. It provides intelligence support to both the combat plans and combat operations divisions by positioning cells at each division. The plans intelligence cell is located with the combat plans section. The operations intelligence cell provides support to the combat operations division. The intelligence cell develops and disseminates the relevant threat picture. Included in this picture are the effects of weather and terrain on threat and friendly forces, which is necessary for mission planning and execution. JP 3-56.1 provides details for each of these divisions.

KEY COMPONENT LIAISONS WITHIN TAGS

1-57. Effective liaison between forces is essential for coordinated TAGS operations and successful joint operations. Each component provides liaison elements to the JAOC. These liaisons consist of experienced warfare specialists who provide component planning, coordination, and tasking expertise capabilities. These liaison elements work for their respective component commanders and work with the JFACC and JAOC staff. They coordinate and deconflict component direct air support air operations with joint air operations. For this discussion, the JFACC also has the responsibilities of the ACA and area air defense commander (AADC). JP 3-56.1 and FM 3-52.2 have complete discussions of the liaison elements.

TAGS Liaisons

- Navy Liaison
- Marine Liaison
- Air Force Liaison
- Army Liaison
- Special Operations Liaison
- Airspace Management Liaison Section
- Air Mobility Element
- Air Defense Liaison Section
- Additional Liaisons

NAVY LIAISON

1-58. The naval and amphibious liaison element represents the maritime component commander. It is responsible to the JAOC on matters pertaining to Navy and Marine amphibious operations. The NALE processes requests for naval air support, monitors and interprets the naval situation for the JAOC, and exchanges maritime intelligence and operational data. Additionally, the NALE coordinates maritime requirements for air defense and monitors Navy and Marine airspace and air traffic control requirements and changes.

MARINE LIAISON

1-59. The Marine liaison officer represents the MAGTF commander in the JAOC. The MARLO processes requests for Marine air support, performs the airspace coordination functions necessary to successfully accomplish the MAGTF operations, and provides intelligence information gathered during littoral operations.

AIR FORCE LIAISON

1-60. The Air Force Liaison Element (AFLE) provides an interface between the AFFOR commander and the JFACC. It coordinates and synchronizes requests for theater and strategic Air Force assets to support joint operations. The AFLE performs various missions, to include planning for theater airlift.

ARMY LIAISON

1-61. The ARFOR commander provides the JAOC with an Army liaison element formed as a battlefield coordination detachment. This detachment processes Army requests for air support, monitors and interprets the land battle situation for the JAOC, provides the necessary interface for the exchange of current intelligence and operational data, and provides the Army liaison to the airspace management control team. See FM 3-09.13 for more information.

SPECIAL OPERATIONS LIAISON

1-62. The special operations liaison element is provided to the JFACC. The SOLE coordinates, deconflicts, and integrates special operations forces (SOF) air and surface effects with joint operations.

AIRSPACE MANAGEMENT LIAISON SECTION

1-63. The airspace management liaison section is staffed by all components. It is responsible to the ACA for planning, coordinating, and integrating activities related to airspace control in the JAOC. Additionally, these component representatives address the real-time airspace management issues that arise while executing air operations. The AMLS is located with the TACS element performing airspace management.

AIR MOBILITY ELEMENT

1-64. The air mobility element provides the planning and coordination of all strategic airlift operations in a theater. This element ensures that the strategic air mobility missions integrate with theater air and space operations planning.

AIR DEFENSE LIAISON SECTION

1-65. The air defense liaison section is staffed by all components. It is responsible to the AADC for planning, coordinating, and integrating activities related to air defense. Liaison officers assist in rapidly engaging airborne threats. The air defense liaison section is normally located with the senior radar facility.

1-66. If additional components, such as multinational forces, are present during operations, then these elements will provide liaison personnel to the JFACC, ACA, and AADC. These liaisons provide the service expertise necessary to coordinate and execute airspace control and air defense activities.

KEY POSITIONS AND RESPONSIBILITIES

1-67. There are four key positions critical to planning for and executing airspace control. These four positions—the joint force commander, joint force air component commander, airspace control authority, and area air defense commander—are responsible for various tasks.

Key Positions

- **Joint Force Commander**
- **Joint Force Air Component Commander**
- **Airspace Control Authority**
- **Area Air Defense Commander**

JOINT FORCE COMMANDER

1-68. The joint force commander has many responsibilities, to include the airspace control. For airspace control, the JFC specifically must—

- Include overall responsibility of airspace control and air defense in a joint theater of operations.
- Establish airspace control objectives and priorities for the joint force.
- Oversee the planning and force integration activities that affect the TAGS, such as apportionment and targeting guidance.
- Resolve matters on which the ACA is unable to obtain agreement.
- Possibly retain airspace control responsibilities (or he may appoint an ACA).

1-69. The JFC may designate a JFACC as a single component commander for theater- or JOA-wide counterair operations. The JFACC will have the preponderance of air power. He also has the ability to provide C2 and produce and disseminate an ATO and ACO. He is normally appointed as the ACA and AADC. The JFC normally tasks the same person as the ACA, AADC, and JFACC to maintain the flexibility to effectively meet the enemy air threat and manage airspace control. Additional information on the selection and responsibilities of the JFACC can be found in JP 3-56.1.

JOINT FORCE AIR COMPONENT COMMANDER

1-70. The JFACC may be sea or land based. The responsibilities are the same. However, the sea-based JFACC's staff will be smaller due to the limited berthing space aboard Navy combatant ships and will affect the joint air planning capacity. The JFACC responsibilities include—

- Developing a joint air operations plan to best support force objectives.
- Recommending apportionment of the joint air effort to the JFC.
- Providing centralized direction for the allocation and tasking capabilities and forces.
- Controlling execution of joint operations as specified by the JFC.
- Coordinating joint air operations with operations of other component commanders and forces assigned to or supporting the JFC.
- Evaluating the results of joint air operations.
- Functioning as the supported and supporting commander, as directed by the JFC.

AIRSPACE CONTROL AUTHORITY

1-71. The ACA is responsible for operating the airspace control system in the airspace control area. The JFC can delegate authority to authorize deviations from established policies and procedures when urgent or emergency combat situations arise. Centralized direction by the ACA does not imply assumption of operational or tactical control over any air assets.

1-72. The ACA has broad responsibilities to include—

- Coordinating, integrating, and regulating the use of the airspace in the area of operations.
- Establishing broad policies and procedures for airspace control.

- Establishing the airspace control system and integrating host-nation and multinational forces.
- Developing the airspace control plan.
- Implementing the airspace control plan through the airspace control order.

AREA AIR DEFENSE COMMANDER

1-73. The AADC is responsible for planning, coordinating, and integrating the joint area air defense plan. The AADC develops broad policies and procedures for air defense. The JFC defines the support relationship between the AADC and supporting commanders. He may apportion assets to the AADC to conduct the joint air defense operations.

1-74. The AADC has broad responsibilities to include—

- Developing and executing a plan to disseminate timely cueing of information and air and missile early warnings.
- Planning, coordinating, and integrating joint air defense operations.
- Developing and implementing identification and engagement procedures for air and missile threats.
- Appointing a deputy AADC to assist the AADC in planning and coordinating air and missile defense operations.

KEY DOCUMENTS

1-75. There are several documents critical to planning for and executing airspace control. These documents are the airspace control plan, airspace control order, air tasking order, and air defense plan. A2C2 planners should know these documents.

Key Documents

- **Airspace Control Plan**
- **Airspace Control Order**
- **Air Tasking Order**
- **Air Defense Plan**

AIRSPACE CONTROL PLAN

1-76. The ACP is developed by the ACA and approved by the JFC. It summarizes the JFC's guidance on airspace control, defines the joint force airspace control organization, and outlines the airspace control process. This plan may be published either as an annex to the basic OPLAN and OPORD or as a separate document. Because the ACP delineates the airspace control area, planners must address coordination procedures for all airspace users. See JP 3-52 for more details.

AIRSPACE CONTROL ORDER

1-77. The ACO is developed from the airspace control plan. It directs the use of joint airspace and details the approved requests for airspace control measures. The ACO is published on a cyclical basis, depending on the theater. Normally, the ACA publishes and distributes it daily. It may be part of the ATO or a stand-alone document. It may be a perpetual document with published ongoing updates. While the airspace control plan provides general guidance on airspace control, the order institutes airspace control procedures for specified periods. The ACO contains modifications to the ACP guidance and procedures, and it activates or deactivates procedural control measures. The ACO lists, but is not

limited to, ACMs and procedures used on or over the area of operations (see Chapter 4). It may include FSCMs and standing operating procedures.

1-78. Two important considerations when distributing the ACO are timing and dissemination means. The ACO and ATO cycles interrelate. Whatever publication and distribution means are used, it is critical to mission success that airspace users receive pertinent airspace information as early in the planning cycle as possible. FM 3-52.2 provides additional details on the ACO.

AIR TASKING ORDER

1-79. The ATO is a detailed order developed by the JFACC that describes and directs the overall air operation. This order provides the details for individual sorties to include targets, mission timing, weapons loads, air refueling data, call signs, and special instructions (SPINS). The SPINS are free text formats included as part of the ATO. They contain essential information that highlights, modifies, or supplements data contained in other portions of the ATO. These instructions may also contain data that modifies, changes, or replaces information contained in OPORDs. Such information includes airspace changes, IFF and SIF assignments, control agencies, and frequencies. Developing and executing the ATO is a continuous dynamic process. JP 3-56.1 and FM 3-52.2 detail this process.

AIR DEFENSE PLAN

1-80. The AADC—with the support and coordination of the service and functional commanders—develops, integrates, and distributes the JFC-approved air defense plan. Because air defense and airspace control and management are inherently related areas, the air defense plan and the ACP should be developed together to avoid conflicts. The air defense plan includes—

- Sensor employment.
- Identification procedures.
- Engagement procedures.
- Defensive airspace control procedures (developed with the ACA).
- Weapon control procedures.
- Early warning dissemination.
- Additional information that may discuss—
 - Location and type of assets to be defended.
 - Disposition and capabilities of enemy air and missile forces.
 - Disposition and location of friendly air and missile defense forces.
 - Geopolitical and other constraints that affect air defense operations.

1-81. In addition to the air defense plan, the AADC publishes a tactical operational data (TACOPDAT) message to establish air defense responsibilities or to provide supplementary air defense orders. This message may be used to report permanent changes to an OPORD or to update missile engagement zones, surveillance and defense sectors, and communication nets. The AADC also will publish an operational tasking data link message to establish relationships, configurations, coordination procedures, and other information necessary to conduct data link operations. Chapter 5 has more information on data links.

Chapter 1

Airspace Control and Airspace Control Systems and Organizations: An Overview

All Army commanders must have a fundamental understanding of joint airspace control in a combat zone, the Theater Air-Ground System, and the key personnel and documents pertaining to airspace control. This chapter introduces airspace control in a combat zone, discusses the considerations of joint airspace control, summarizes the command and control systems from each service that make up the Theater Air-Ground System (TAGS), discusses liaisons, identifies the key joint airspace control positions, and discusses key documents necessary for planning and executing airspace control in a combat zone.

Combat zone as used in this publication applies to the broadest interpretation of areas where combat forces are required to conduct operations, including operations other than war.

AIRSPACE CONTROL IN A COMBAT ZONE

1-1.JP 3-52 defines *airspace control in a combat zone* as 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.

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1-2. International agreements, enemy and friendly force structures, concepts of operations, and different operating environments all introduce different airspace command and control (C2) requirements. Airspace control must provide the joint force commander (JFC) with enough flexibility to effectively employ the joint force in either a joint or multinational campaign. Using current national military objectives and assigned missions as a baseline, the JFC develops specific concepts for combat zone airspace control in the joint force airspace control area. The airspace control area consists of airspace that is laterally defined by the boundaries of the area of operations. It may be divided into subareas.

CONSIDERATIONS OF JOINT AIRSPACE CONTROL

PRINCIPLES

1-3. Army airspace command and control (A2C2) planners must understand and consider the principles of joint airspace control when developing plans to support the ground commander's scheme of maneuver. The airspace control area defines a crucial battlespace dimension that all components of joint and multinational forces use to conduct their missions. Highly concentrated friendly aircraft, surface, subsurface, and air-launched weapon systems must share this airspace without one element hindering applying combat power by any other element. Joint airspace control primarily strives to enhance air, land, and maritime force effectiveness. Airspace control planners should consider these basic principles when developing any airspace control plan.

1-4. The basis of the joint airspace control system is unity of effort. C2 procedures, when integrated into the joint system, must fully support the joint force commander's objectives. Successful operations depend on a fully coordinated and integrated airspace control system.

1-5. Closely coordinated airspace C2, fire support (to include attack operations), and air defense (AD) elements reduce the risk of fratricide. However, commanders must balance that risk with the requirements for an effective airspace defense.

1-6. Liaison and close coordination among all airspace users promotes timely and accurate information flow to airspace managers. The success of operations may directly relate to the effectiveness of this liaison and coordination. Therefore, airspace information systems identification procedures and AD procedures must be compatible. Some units refer to airspace information systems identification

Principles

- **Unity of effort.**
- **Fratricide reduction and risk balance.**
- **Close liaison and coordination among all airspace users.**
- **Common airspace control procedures.**
- **Uncomplicated procedural controls.**
- **Reliable, jam-resistant, and secure C4ISR network.**
- **Durable and redundant systems.**
- **Ability to respond to evolving enemy threat conditions and evolving operation.**
- **Training for air traffic controllers that includes combat specific training.**
- **Emphasis on flexibility and simplicity.**
- **Capability to support day or night and adverse weather operations.**

procedures as “combat ID.” The procedures, equipment, and terminology for airspace control, AD, military air traffic control, and C2 systems must be compatible, mutually supporting, and interoperable.

1-7. Common airspace control procedures within the airspace control area enhance the value of air operations. These procedures should maximize flexibility by effectively mixing positive and procedural control measures. The airspace command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) structure should permit close coordination between airspace managers and air, land, maritime, and special operations forces. It should allow concentrating combat power anywhere in an area of operations in minimal time. Procedural control should be uncomplicated and understood by all aircrew members and air traffic control personnel, AD weapon system operators, and airspace managers.

1-8. Ensuring that C4ISR procedures are compatible among all airspace managers and users requires coordination and detailed planning. The airspace C4ISR structure must have a reliable, jam-resistant, and, where appropriate, secure network. However, commanders must avoid using control procedures that rely heavily on voice communications. They should emphasize simple, flexible air traffic control (ATC) procedures. They also should make provisions to decentralize airspace C2 and to preserve flexibility and responsiveness should communications become degraded. Airspace C4ISR structure must be durable and redundant because enemy information operations will likely consider such structures to be high-priority targets.

1-9. The airspace C4ISR structure must respond to changing threat conditions as well as to the evolving operation. The design, responsiveness, and procedures of such structures should promote the rapid massing of combat power through simple design and detailed care in planning.

1-10. Airspace control functions in the combat zone rely on ATC resources. These functions still remain separate and distinct from real-time control of air vehicles and the terminal air traffic control environment. Air traffic controller training must augment peacetime conditions by conducting combat-specific air traffic control training tasks. In peacetime, personnel must exercise combat zone airspace control procedures to be effective in combat.

1-11. Airspace C2 balances various demands competing for airspace use. Planners must continue to emphasize flexibility and simplicity to maximize the force effectiveness using the system. Theater airspace control procedures must prevent mutual interference among airspace users, aid aircraft identification, and safely accommodate and expedite the flow of all air traffic in the theater of operations. Combat zone airspace control must be capable of supporting day, night, and adverse weather operations.

FUNDAMENTAL CONSIDERATIONS

1-12. The commander’s operation plan (OPLAN), the airspace control plan (ACP), the airspace control order (ACO), and the air tasking order (ATO) are the keystones of airspace operations. Effective airspace use is critical to OPLAN success. Airspace control must effectively use combat operations without adding undue restrictions or adversely impacting the capabilities of any service or functional component. Other fundamental considerations include—

- Each service or functional component within a joint force operating various air platforms and weapon systems—including high- and low-speed, fixed- and rotary-wing, and manned and unmanned aircraft—within the airspace control area.
- Each service or functional component to use the airspace with maximum freedom consistent with the degree of risk operationally acceptable to the JFC.
- Forces coordinating airspace use with all other airspace users so as to integrate and synchronize offensive and defensive weapon systems and to ensure maximum effectiveness.
- The need to quickly and effectively discriminate between friendly, neutral, and enemy air operations and air platforms.
- Flexible airspace C4ISR structures that respond to the joint force’s routine requirements as well as to surge operations when required.
- Closely coordinated and integrated surface operations, joint supporting fires, air operations, AD operations, special operations, and airspace control activities.
- The need to accommodate US, host nation, and multinational airspace control activities within the area of operations.
- The need to recognize saturated levels and limited airspace control networks.
- Temporary airspace control measures that restrict certain areas of airspace to allow subordinate commanders more freedom of operations.
- Detailed incorporation of coordinated offensive operations using electronic warfare (EW) elements, strike aircraft, and cruise missiles to ensure that defensive elements or procedures of the force do not unacceptably inhibit or degrade offensive capabilities.
- The need to ensure that the airspace control network remains survivable and effective.
- Standardized communications data, format, and language requirements in multinational operations to reduce possible differences in interpreting, translating, and applying airspace control procedures.
- The capability to support day, night, and adverse operations.
- The need to expediently distribute airspace control information.
- The need to operate in a nondigitized or partially digitized environment for prolonged periods.
- The integration of intelligence, surveillance, and reconnaissance (ISR) air operations into the airspace control area.

ELEMENTS

Operational Area Considerations

1-13. Each joint operations area (JOA) has unique airspace control requirements. As early as possible, planners determine these requirements based on the JFC’s guidance and incorporate them into the overall joint force

<p>Elements</p> <ul style="list-style-type: none"> • Operational Area Considerations • Airspace Control Planning • Peacetime to Combat Considerations • Integration of Airspace Control and Air Defense • Airspace Control Methods

planning effort. Political constraints, national and military ATC systems and procedures, and the capabilities and limitations of these systems are critical considerations. Rules of engagement (ROE), disposition of AD weapons, fire support plans, and procedures for identifying US and allied aircraft are also important. When developing procedures to implement these concepts, planners must consider the likelihood of multinational operations. They should develop techniques and procedures that work with the C4ISR structure as well as with the capabilities and methods of potential multinational partners. Planners should also consider the different control and identification capabilities and procedures of multinational or host-nation forces. US forces participating in multinational operations may also be subject to command arrangements outlined in international agreements. Planners must know which agreements apply to the force and how those agreements affect airspace C2. Planners have access to this information through the appropriate host-nation or multinational liaison officers located at the joint air operations center (JAOC).

Airspace Control Planning

1-14. Six broad principles of planning are essential to effective airspace command and control in a combat zone: support the joint force, interoperability, mass and timing, unity of effort, planning cycles, and degraded operations.

1-15. **Support the Joint Force.** Planners must integrate the airspace C4ISR structure to meet and complement the commander's operations plans. Airspace C2 must ensure the best use of joint, multinational, and interagency airspace assets. Planners must directly access and get involved in the planning cycle to input and receive information from each element contributing to the operational effort. Their full involvement in planning and subsequent coordination ensures that Army aspects of the airspace C4ISR structure fully support the joint force commander's vision.

1-16. **Interoperability.** Planning for airspace control must include planning for interoperability of equipment, personnel, and terminology. Forces must understand airspace control in both joint and multinational environments to operate effectively during conflict.

1-17. **Mass and Timing.** Airspace control planners must consider the volume of all airspace users—friendly, hostile, and neutral—generated during all aspects of operations. Planners must also consider timing constraints and fully integrate these factors into the need to quickly respond with adequate force to enemy intrusion.

1-18. **Unity of Effort.** Commanders should identify and exercise proper liaison between joint force components before hostilities begin. Representatives from different components should integrate information flow through the system and provide expertise to the airspace control authority (ACA).

1-19. **Planning Cycles.** Planners should integrate the airspace planning cycle with the operations planning cycle. Planners must consolidate input from all components and devise and disseminate the final airspace control plan. This plan may be an annex to the joint force OPLAN or operation order (OPORD).

1-20. **Degraded Operations.** The design of the airspace C4ISR structure lets planners anticipate the effects of enemy offensive information operations and

communications degradation. To ensure an effective structure, commanders should plan to use all communications means available, anticipating that the system could be fully operational, totally degraded, or somewhere in-between. Planners should prepare an airspace procedural control plan in case degraded communications occur preventing effective positive airspace control. Planners also should make plans for the effects of bad weather and limited visibility.

Peacetime to Combat Considerations

1-21. Commanders should continually update the ACP throughout an operation. They can then maintain airspace control even with sudden changes in mission, ROE, or task organization. A standing ACO should exist to provide immediate airspace control if a surprise attack, other unforeseen event, or change in mission occurs. Such changes often transpire during actual conflict, and their nature differs from theater to theater. The ACP should provide simple and clear instructions to transition from such peacetime situations to combat operations and facilitate integrating civilian and commercial air traffic as appropriate.

Integration of Airspace Control and Air Defense

1-22. Airspace control and AD operations can interfere with each other if they operate independently. Therefore, planners must prioritize, integrate, and closely coordinate airspace control and AD requirements. Airspace C2 procedures help identify aircraft, facilitate engagement of enemy aircraft, and provide safe passage of friendly aircraft. AD units must be free to engage hostile targets—aircraft and missiles—within prescribed ROE. However, planners must also establish procedures to identify friendly aircraft. These procedures should not delay offensive operations, being simple enough for both aircrews and ground operations personnel to execute. They should include visual, electronic, geographic, and maneuver procedures for differentiating friendly or hostile aircraft.

Airspace Control Methods

1-23. The airspace control structure needs to respond to the evolving enemy threat conditions and changing tactical situations. Methods of airspace control range from positive control of all air assets in an airspace control area to procedural control of air assets, or a combination of both. *Positive control* relies on positive identification, tracking, and direction of aircraft within the airspace control area. It uses electronic means such as radar; sensors; identification, friend or foe (IFF) systems; selective identification feature (SIF) capabilities; digital data links; and other elements of the intelligence system and C2 network structures.

1-24. *Procedural control* relies on a combination of mutually agreed and promulgated orders and procedures. These may include comprehensive AD identification procedures and ROE, aircraft identification maneuvers, fire support coordinating measures (FSCMs), and airspace control measures (ACMs). Service, joint, and multinational capabilities and requirements determine which method, or which elements of each method, that airspace control plans and systems use. Chapter 4 discusses A2C2 procedures.

THEATER AIR-GROUND SYSTEM

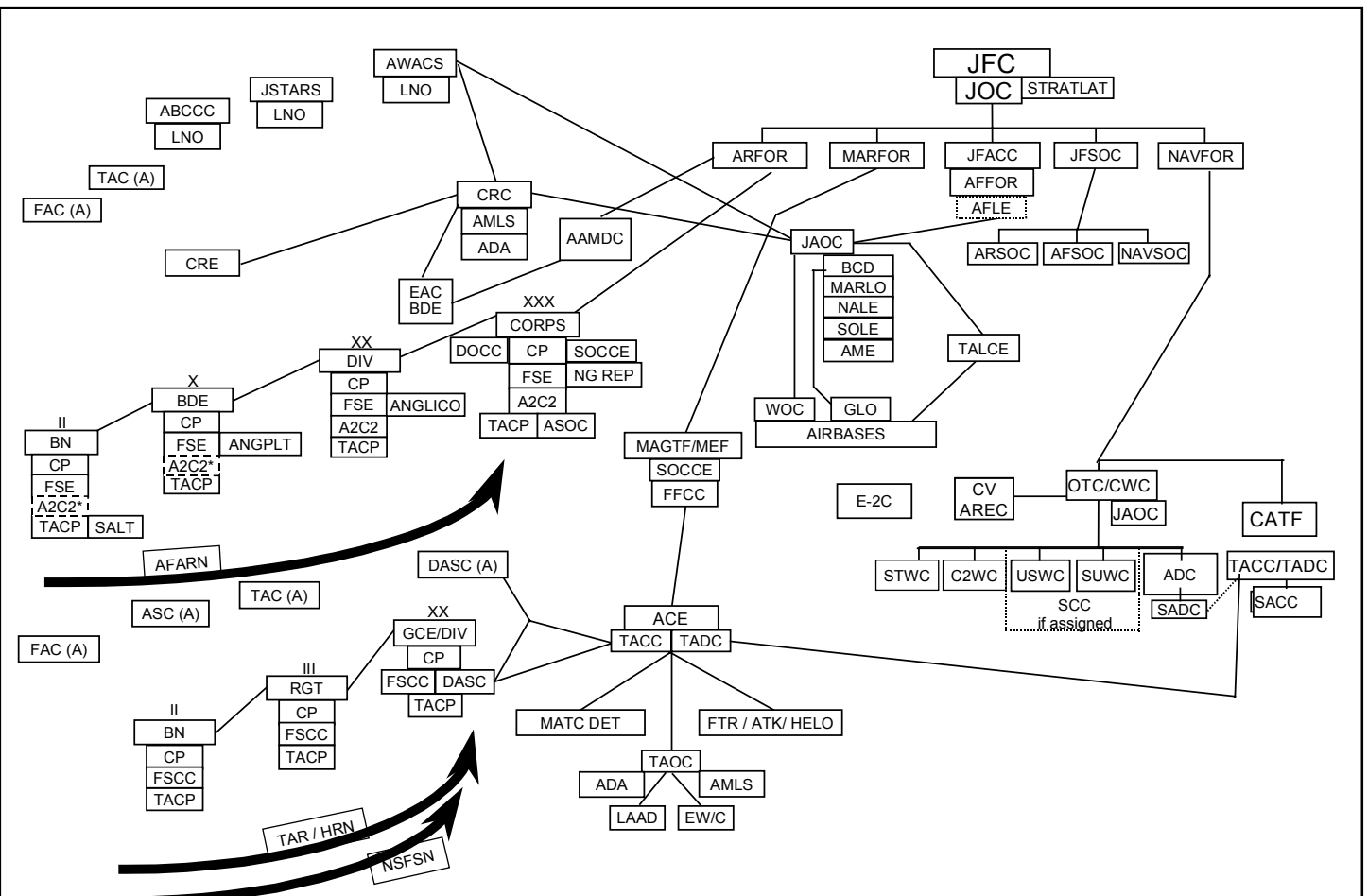
1-25. To fully understand the relationship of the A2C2 systems to the Theater Air-Ground System, planners must understand each service's system and its composition and structure. The TAGS is not a complete and separate system for airspace management within a theater of operations. It combines each service's airspace management system that supports the JFC. The TAGS is not a transparent airspace management system; rather, it provides the framework that allows each service system to exist in a joint and coalition force environment and support the JFC.

1-26. The A2C2 system is the airspace management component of the Army Air-Ground System (AAGS), which is a subsystem of the TAGS. FM 3-52.2 discusses multiservice procedures for TAGS. In addition to the AAGS, the TAGS integrates the Air Force Theater Air Control System (TACS), the Navy Tactical Air Control System (NTACS), and the Marine Air Command and Control System (MACCS). Units and elements comprising the A2C2 system should develop standing operating procedures to facilitate A2C2 operations. These procedures must consistently follow joint procedures defined in JP 3-52.

1-27. The TAGS is not a formal system in itself but rather the sum of the component air-ground systems operating in the theater. It applies to all theater operations to include air, ground, maritime, and amphibious operations. Individual service systems are described in detail and illustrated. Figure 1-1 on page 1-8 is a notional arrangement used to demonstrate the TAGS. Not all of the elements must be in place for all operations.

THEATER AIR CONTROL SYSTEM

1-28. The TACS is the backbone of Air Force forces' (AFFOR's) contribution to the TAGS. In a theater where the Air Force provides most of the air assets, it consists of the AFFOR's air operations center (AOC) (the focal point of TACS), coordination and liaison organizations, and AFFOR wing operations centers (WOCs). The TACS performs centralized planning and control of air support to ground and naval forces and facilitates decentralized execution of that support. Subordinate TACS elements perform liaison, planning, coordination, monitoring, and surveillance; control the reporting; and execute air operations tasks. Ground control and airborne warning agencies that support the TACS include the control and reporting center (CRC); the air mobility element (AME); airborne battle-field command and control centers (ABCCCs); Airborne Warning and Control Systems (AWACSs); and Joint Surveillance Target Attack Radar Systems (JSTARSs). For a detailed discussion of connectivity and command relationships of these elements see FM 3-52.2.



1. This figure shows a notional arrangement. Not all organizations and functions are needed in every case.
2. All possible connections are not shown.
3. Tactical Airspace Integration System (TAIS), when fielded, or air defense artillery elements will provide connectivity with AWACS and other reporting elements of the TAGS.
4. A2C2* - ad hoc elements perform A2C2 functions at US Army battalion and brigade levels. Currently no formal TOE A2C2 organization exists at these levels. The numerous airspace platforms and users may compel formal organizational changes.

Figure 1-1. Theater Air-Ground System (Notional)

1-29. Figure 1-2 illustrates the Air Force Theater Air Control System. The AFFOR commander works directly for the joint force commander. If the AFFOR commander is appointed as the joint force air component commander (JFACC), then he establishes a JAOC. Service components provide liaisons to include the battlefield coordination detachment (BCD), Army air and missile defense command (AAMDC) liaison team, Marine liaison officer (MARLO), naval and amphibious liaison element (NALE), special operations liaison element (SOLE), AME, and space liaison officer (SLO). Chapter 3 discusses each section in detail. In addition to these liaison elements, ground liaison officers (GLOs) working for the BCD at wing operations centers represent Army elements.

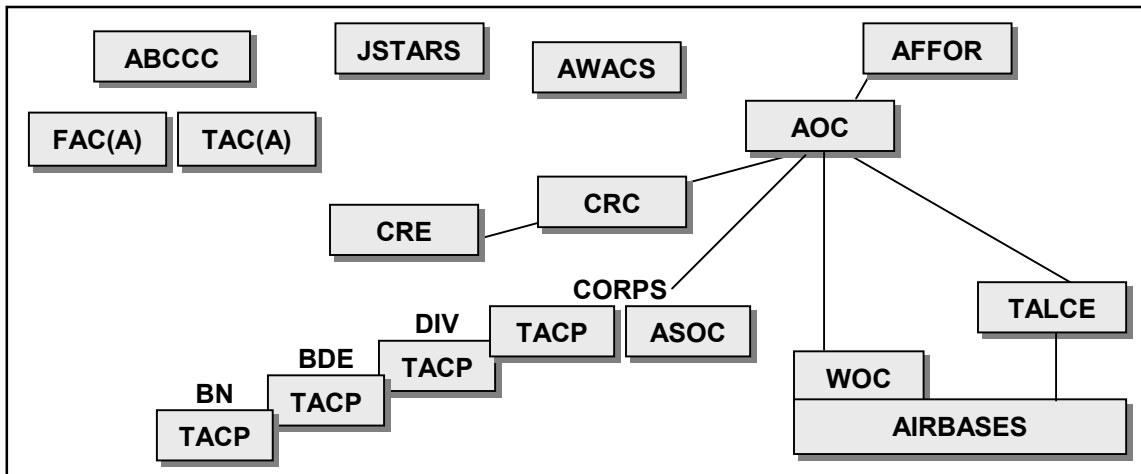


Figure 1-2. Air Force Theater Air Control System

1-30. The CRC is a facility that houses the airspace management liaison section (AMLS) staffed by all components. This section works in the senior radar control facility. In addition, the Army air defense artillery brigade provides the CRC with an air defense artillery (ADA) liaison responsible to the CRC for real-time air defense matters. Additionally, he informs the BCD of the current situation. Finally, the control reporting element (CRE)—a subordinate radar element of the CRC—extends the radar range of the CRC for early warning and aircraft control. It also provides early warning, surveillance, weapons control, and identification to the CRC. Chapter 3 details air ground support operations at the corps through battalion levels.

NAVY TACTICAL AIR CONTROL SYSTEM

1-31. The Navy employs the composite warfare commander (CWC) concept (see Figure 1-3 on page 1-10) as the doctrinal cornerstone of its operational and tactical information systems. The Navy employs the NTACS during amphibious operations. The CWC and NTACS encompass overall Navy command and control at sea.

Composite Warfare Commander Concept

1-32. The unique nature of maritime operations shapes the organization of US naval forces and affects how these forces fit into the overall unified military command structure. Vast distances, wide dispersion of forces with associated C2

challenges, and the complexities of conducting warfare in a three-dimensional battlespace characterize maritime operations. The CWC concept enables the officer in tactical command (OTC) of a naval force to aggressively wage defensive combat operations against air, surface, and subsurface threats while carrying out the primary offensive mission of the force. Depending on the mission and size of the force, the OTC may act as the CWC himself or assign more than one CWC. Subordinate warfare commanders are responsible to the CWC for the conduct of the tactical battle. The OTC or CWC may use a part or the entire concept. Key members of the CWC's organization include the air resource element coordinator, strike warfare commander, command and control warfare commander, undersea warfare commander, surface warfare commander, sea combat commander, and air defense commander.

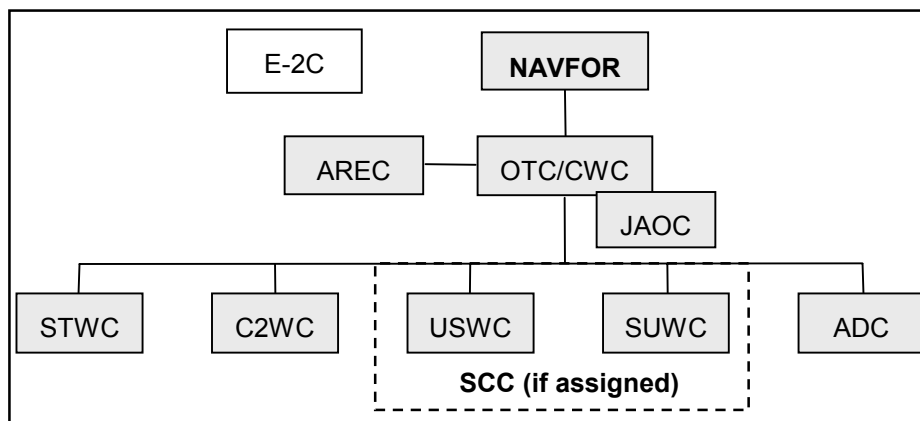


Figure 1-3. Navy Composite Warfare Commander Concept

1-33. Air Resource Element Coordinator. The air resource element coordinator (AREC), normally the carrier commanding officer, is a resource manager and an air warfare planner and coordinator. He is not a warfare commander. He acts as the air advisor to the OTC and CWC. The AREC is responsible for airspace planning and coordinates with the air defense commander in the airspace control function. The AREC produces the daily air plan that allocates aircraft to the various warfare commanders.

1-34. Strike Warfare Commander. The strike warfare commander (STWC) coordinates offensive power projection operations with respect to air and naval cruise missiles against land-based targets. He is normally the air wing commander located on an aircraft carrier. The STWC controls strike, C2, electronic combat, and support aircraft. He also integrates Tomahawk land-attack missiles (TLAMs) to support contingency operations or a theater campaign. These responsibilities give the STWC the greatest interface with other TAGS agencies and organizations during execution.

1-35. Command and Control Warfare Commander. The command and control warfare commander (C2WC) directs the management and exploitation of the electromagnetic and acoustic spectra. He develops the C2 warfare strategy for the force. This commander controls the electronic combat aircraft and shipboard systems involved in destroying or neutralizing electromagnetic targets. He also coordinates force, theater, and national surveillance assets to enhance friendly battlespace management.

1-36. **Undersea Warfare Commander.** The undersea warfare commander (USWC) must protect the battle group from undersea threats. He is usually a destroyer squadron commander co-located with the CWC onboard the aircraft carrier. The aircraft carrier provides the best tactical picture, C2 equipment, and information processing systems.

1-37. **Surface Warfare Commander.** The surface warfare commander (SUWC) must protect the battle group from surface threats. He may also be a destroyer squadron commander or the commanding officer of the aircraft carrier.

1-38. **Sea Combat Commander.** In low surface and subsurface threat environments, the responsibilities of the USWC and SUWC are often combined into a single sea combat commander. The naval component commander determines when to create the sea combat commander.

1-39. **Air Defense Commander.** The air defense commander is responsible to the CWC for air defense and airspace control around the battle group. He is normally the most senior commanding officer of a cruiser or guided missile destroyer. He controls fighter aircraft, E-2C (airborne early warning/control platform) aircraft, carrier-based tankers, and long-range surface-to-air missile capable ships.

1-40. **E-2C Hawkeye.** The E-2C Hawkeye is the Navy's carrier-based C2 platform that supports all the warfare commanders. The E-2C, an airborne early warning and control aircraft, can also serve as an airborne battlefield command and control center. The Hawkeye has a robust electronic surveillance capability and often operates with other ISR assets.

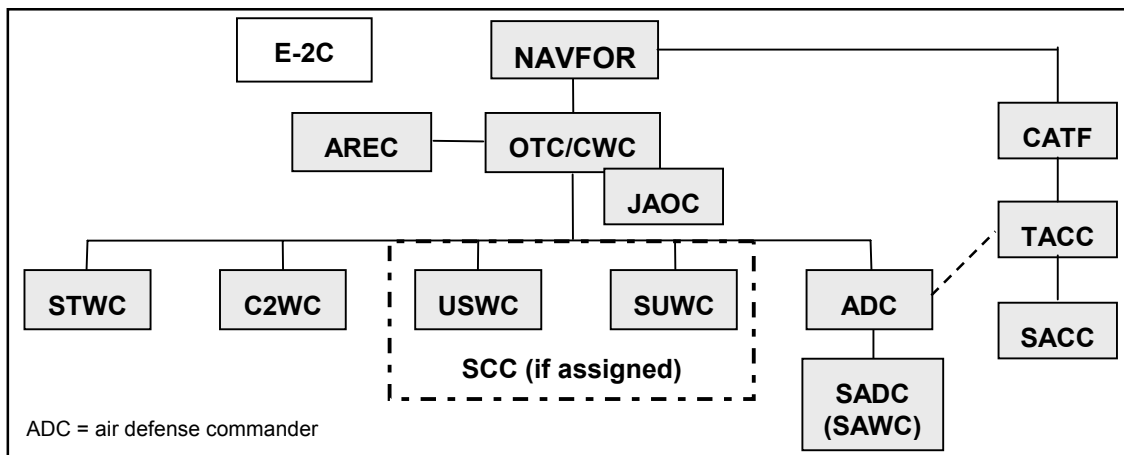


Figure 1-4. Amphibious Tactical Air Control System

Amphibious Tactical Air Control System

1-41. Amphibious Tactical Air Control System (ATACS) is the organizational structure used for command and control during amphibious operations. Figure 1-4 shows how it consists of the Navy Tactical Air Control System and the Marine Air Command and Control System. Its purpose is to plan, direct, and control air operations and supporting arms in the amphibious objective area (AOA) to accommodate the transition of the landing force once ashore. NTACS maintains positive control of all flights within the AOA from establishment by

the commander, amphibious task force (CATF) until all forces are ashore and airspace control is transferred to the MACCS.

1-42. NTACS is the organizational structure within which the CATF executes air operations in the AOA. The NTACS is found only during an amphibious operation. It is a relatively small organization compared to the MACCS. There are key components of the NTACS:

- The commander, amphibious task force is a Navy officer who controls all operations until the commander, landing force (CLF)—the senior officer in the landing force (may be Marine or Army)—is established ashore. In an amphibious operation, the CATF exercises control of all air operations in the AOA, including airspace control, until such functions are transferred to the CLF. He also establishes the ATACS to control air assets in the AOA and coordinates aviation assets with supporting forces.
- The tactical air control center is the primary air control agency from which all air operations supporting the amphibious operation are controlled. It is established aboard the CATF flagship and may be co-located with the combat direction center. Once the Marine tactical air command center sets up ashore and assumes responsibility for the command and control of aircraft, the Navy tactical air control center becomes a tactical air direction center (TADC). It becomes a backup for the Marine tactical air command center (TACC).
- The supporting arms coordination center (SACC) is located aboard an amphibious command ship close to the tactical air control center. It works closely with the tactical air control center to plan and coordinate artillery, naval gunfire, and air support. It also acts as the at-sea, functional counterpart to the Marine fire support coordination center (FSCC) or the Army fire support element (FSE).
- The sector air defense commander (SADC) performs sector air operations in the AOA and is subordinate to the air defense commander. Some doctrinal publications use the term sector air warfare coordinator (SAWC). The SADC has tactical control of surface-to-air weapons and assigned fighters within the sector.

MARINE AIR COMMAND AND CONTROL SYSTEM

1-43. Marine Air Command and Control System (see Figure 1-5) provides the aviation combat element (ACE) commander with the personnel, equipment, facilities, and procedures required to effectively command, control, and coordinate all Marine air-ground task force (MAGTF) air operations. The Marine air wing (MAW) provides the air command element with most necessary personnel and equipment to establish the MACCS. Pilots and naval flight officers (NFOs) fill critical billets within the MACCS, which requires the expertise of a Marine aviator and NFO. The tactical air command center, Marine air traffic control, tactical air operations center, low-altitude air defense, early warning/control, direct air support center, tactical air control party, and forward air controller (airborne) are the primary agencies of the MACCS.

1-44. The tactical air command center is the senior air command and control agency providing centralized command. It is the command post for the ACE commander. It consists of three sections: current operations, future operations, and future plans. Current operations monitor execution of the ATO and make

adjustments as dictated by the tactical situation. Future operations develop and disseminate the MAGTF air tasking order. Future plans develop the plan to support the next MAGTF mission.

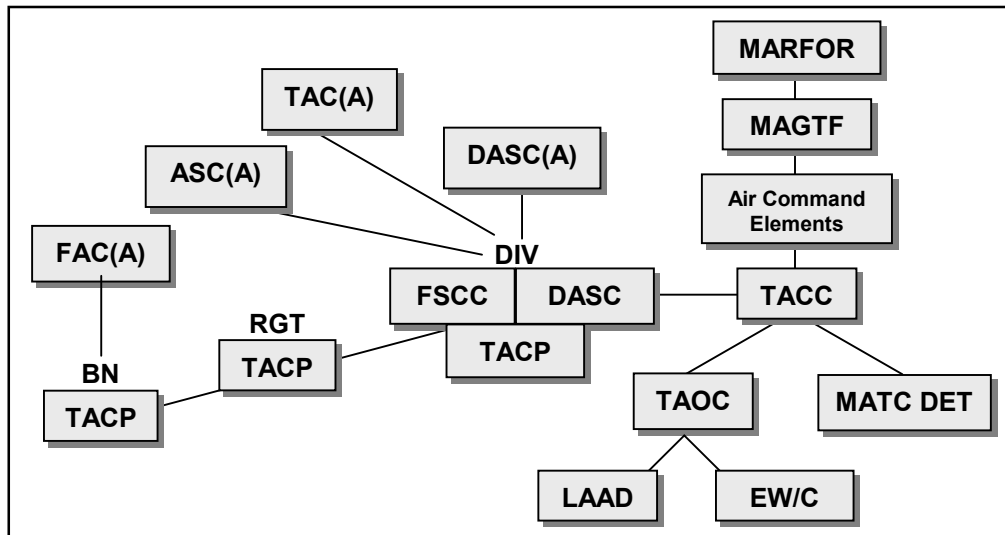


Figure 1-5. Marine Air Command and Control System

1-45. The Marine air traffic control (MATC) detachment provides continuous, all-weather air traffic control services to air bases and air facilities. It also provides expeditionary airfields and remote area landing sites as a part of the MACCS.

1-46. The tactical air operations center (TAOC) is the radar agency that conducts anti-air warfare (AAW), en route air traffic control, navigational assistance, surveillance, data link, and identification functions. It controls AAW aircraft and surface-to-air weapons in its assigned sector. The TAOC conducts theater ballistic missile defense and tactical digital information link (TADIL)-A, -B, and -J operations.

1-47. A low-altitude air defense (LAAD) unit provides close in, low altitude surface-to-air weapons fires utilizing the Stinger and Avenger missile systems. It defends either one or a combination of forward combat areas, maneuver forces, vital areas, installations, and units engaged in special or independent operations.

1-48. An early warning/control (EW/C) site is subordinate to and echeloned from a TAOC. This site is task organized to perform AAW, en route air traffic control, navigational assistance, surveillance, data link, and identification missions. While maintaining a smaller footprint than a TAOC, the EW/C site has the same functions but on a smaller scale.

1-49. The direct air support center (DASC) provides procedural control services. It is the air control agency responsible for decentralized execution of immediate close air support and assault support missions. It processes and coordinates requests for immediate air support. It is normally co-located with the senior FSCC or force fires coordination center. The DASC consists of—

- The direct air support center (airborne) (DASC[A]). It is subordinate to and performs the same functions as the DASC. It augments the DASC during periods of degraded capabilities, adverse communication conditions, and amphibious operations while control is being phased ashore. The DASC(A) operates from a specially configured KC-130, Hercules.
- The air support element. It is subordinate to, performs the same functions as, and has the same capability as the DASC. It is task organized to perform various air support control functions. Employment options can range from Marine expeditionary unit level operations characterized by limited assets and endurance to a multidivision operation. The air support element is almost identical in capabilities—but set apart in responsibilities—and subordinate to the DASC. The air support element can function as an extension of the Navy tactical air control center or helicopter direction center with the battalion tactical air control party.
- The tactical air coordinator (airborne) (TAC[A]). He performs as an airborne extension of the DASC or FSCC and deconflicts aircraft through airspace coordination. He coordinates aircraft with other supporting arms, such as artillery or naval gunfire.
- The assault support coordinator (airborne) (ASC[A]). He provides air coordination and control during helicopter operations. He also serves as an extension of the DASC or helicopter direction center to support the air mission commander. He coordinates airspace and assault support operations; movement of air assault aircraft through airspace; and close air support providing for helicopter assault operations.

1-50. The tactical air control party (TACP) is an integral part of each combat unit from division down to the battalion level. It acts as an air advisor to the maneuver unit, assists in the submission of preplanned and immediate air support requests, and provides terminal control for supporting aircraft.

1-51. The forward air controller (airborne) (FAC[A]) is the airborne extension of the ground forward air controller (FAC). He performs air reconnaissance and surveillance; has terminal control of close air support, artillery, and naval gunfire radio relay for ground FACs; and maintains landing zone preparations.

ARMY AIR-GROUND SYSTEM

1-52. The AAGS (see Figure 1-6) provides the control system for synchronizing, coordinating, and integrating air operations with the commander's scheme of maneuver. The AAGS provides the means to initiate, receive, process, and execute requests for air support and to disseminate information and intelligence produced by aerial assets. Some elements of the AAGS come as liaisons and are provided by the Air Force. These elements are the theater airlift liaison officer (TALO), TACP, and the air support operations center (ASOC). They function as a single entity in planning, coordinating, deconflicting, and integrating the air support operations with ground elements. The principal Army agencies are command posts (CPs), FSEs, air defense elements, A2C2 elements (detailed discussion in Chapter 2), and coordination and liaison elements, such as the BCD, Theater Army Air and Missile Defense Coordinator, and GLOs. Chapter 3 discusses each element of the system in detail. FM 3-52.2 discusses these agencies.

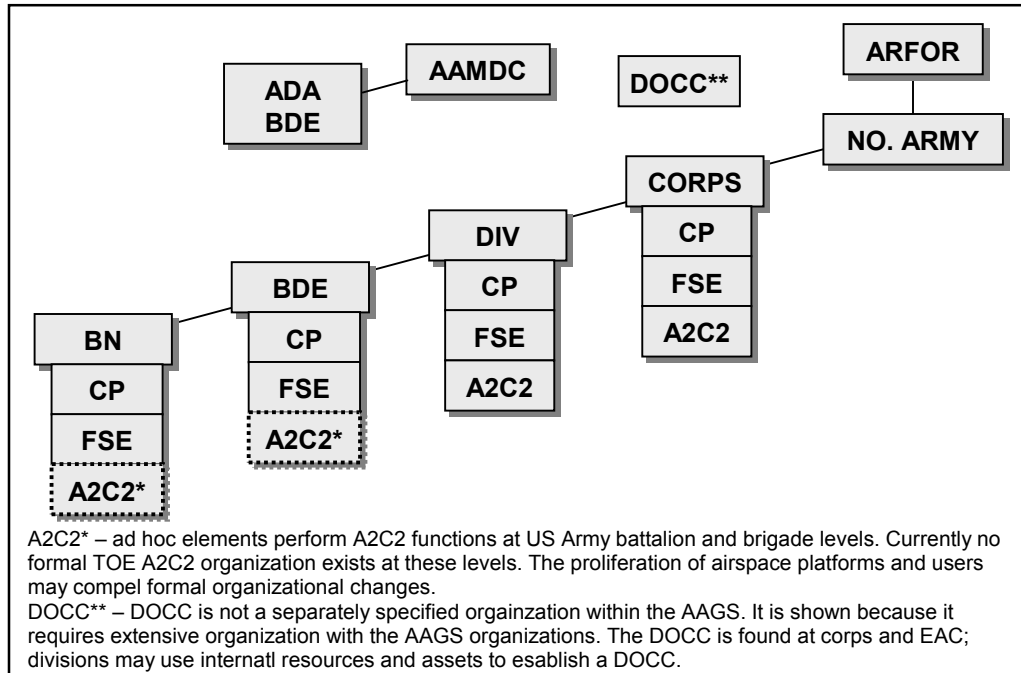


Figure 1-6. Army Air-Ground System

JOINT AIR OPERATIONS CENTER

1-53. The joint air operations center is the senior level for airspace management within a theater of operations. It provides the JFACC with the required staff to support his responsibilities. The JAOC supports component air assets by planning, coordinating, executing, controlling, monitoring, assessing, and reporting air operations. When the JFACC is a naval officer, the air component headquarters will probably be the naval component's air resource element coordinator's center. When the JFACC is a Marine officer, it will likely be a Marine tactical air command center. When the AFFOR commander is named the JFACC, the AOC becomes the JAOC. The JAOC is task-organized, directed by the JFACC, and consists of at least three divisions. These divisions are combat plans, combat operations, and combat intelligence.

- JAOC Divisions**

 - **Combat Plans Division**
 - **Combat Operations Division**
 - **Combat Intelligence Division**

1-54. The combat plans division focuses on future joint air operations. Functioning like the main command post of a maneuver force, the division looks beyond the current operation. It normally develops the joint air operations strategy, air apportionment recommendations, and the joint ATO. It consists of the air strategy branch, airspace command and control, and joint ATO development and production branch.

1-55. The combat operations division monitors and executes current joint air operations. This division functions much like a maneuver force tactical CP that monitors and directs the current fight. It consists of the current operations branch, weather support branch, operations support branch, and joint search and rescue branch.

1-56. The combat intelligence division is responsible for all intelligence activities in the JAOC. It provides intelligence support to both the combat plans and combat operations divisions by positioning cells at each division. The plans intelligence cell is located with the combat plans section. The operations intelligence cell provides support to the combat operations division. The intelligence cell develops and disseminates the relevant threat picture. Included in this picture are the effects of weather and terrain on threat and friendly forces, which is necessary for mission planning and execution. JP 3-56.1 provides details for each of these divisions.

KEY COMPONENT LIAISONS WITHIN TAGS

1-57. Effective liaison between forces is essential for coordinated TAGS operations and successful joint operations. Each component provides liaison elements to the JAOC. These liaisons consist of experienced warfare specialists who provide component planning, coordination, and tasking expertise capabilities. These liaison elements work for their respective component commanders and work with the JFACC and JAOC staff. They coordinate and deconflict component direct air support air operations with joint air operations. For this discussion, the JFACC also has the responsibilities of the ACA and area air defense commander (AADC). JP 3-56.1 and FM 3-52.2 have complete discussions of the liaison elements.

TAGS Liaisons
<ul style="list-style-type: none"> • Navy Liaison • Marine Liaison • Air Force Liaison • Army Liaison • Special Operations Liaison • Airspace Management Liaison Section • Air Mobility Element • Air Defense Liaison Section • Additional Liaisons

NAVY LIAISON

1-58. The naval and amphibious liaison element represents the maritime component commander. It is responsible to the JAOC on matters pertaining to Navy and Marine amphibious operations. The NALE processes requests for naval air support, monitors and interprets the naval situation for the JAOC, and exchanges maritime intelligence and operational data. Additionally, the NALE coordinates maritime requirements for air defense and monitors Navy and Marine airspace and air traffic control requirements and changes.

MARINE LIAISON

1-59. The Marine liaison officer represents the MAGTF commander in the JAOC. The MARLO processes requests for Marine air support, performs the airspace coordination functions necessary to successfully accomplish the MAGTF operations, and provides intelligence information gathered during littoral operations.

AIR FORCE LIAISON

1-60. The Air Force Liaison Element (AFLE) provides an interface between the AFFOR commander and the JFACC. It coordinates and synchronizes requests for theater and strategic Air Force assets to support joint operations. The AFLE performs various missions, to include planning for theater airlift.

ARMY LIAISON

1-61. The ARFOR commander provides the JAOC with an Army liaison element formed as a battlefield coordination detachment. This detachment processes Army requests for air support, monitors and interprets the land battle situation for the JAOC, provides the necessary interface for the exchange of current intelligence and operational data, and provides the Army liaison to the airspace management control team. See FM 3-09.13 for more information.

SPECIAL OPERATIONS LIAISON

1-62. The special operations liaison element is provided to the JFACC. The SOLE coordinates, deconflicts, and integrates special operations forces (SOF) air and surface effects with joint operations.

AIRSPACE MANAGEMENT LIAISON SECTION

1-63. The airspace management liaison section is staffed by all components. It is responsible to the ACA for planning, coordinating, and integrating activities related to airspace control in the JAOC. Additionally, these component representatives address the real-time airspace management issues that arise while executing air operations. The AMLS is located with the TACS element performing airspace management.

AIR MOBILITY ELEMENT

1-64. The air mobility element provides the planning and coordination of all strategic airlift operations in a theater. This element ensures that the strategic air mobility missions integrate with theater air and space operations planning.

AIR DEFENSE LIAISON SECTION

1-65. The air defense liaison section is staffed by all components. It is responsible to the AADC for planning, coordinating, and integrating activities related to air defense. Liaison officers assist in rapidly engaging airborne threats. The air defense liaison section is normally located with the senior radar facility.

1-66. If additional components, such as multinational forces, are present during operations, then these elements will provide liaison personnel to the JFACC, ACA, and AADC. These liaisons provide the service expertise necessary to coordinate and execute airspace control and air defense activities.

KEY POSITIONS AND RESPONSIBILITIES

1-67. There are four key positions critical to planning for and executing airspace control. These four positions—the joint force commander, joint force air component commander, airspace control authority, and area air defense commander—are responsible for various tasks.

Key Positions

- **Joint Force Commander**
- **Joint Force Air Component Commander**
- **Airspace Control Authority**
- **Area Air Defense Commander**

JOINT FORCE COMMANDER

1-68. The joint force commander has many responsibilities, to include the airspace control. For airspace control, the JFC specifically must—

- Include overall responsibility of airspace control and air defense in a joint theater of operations.
- Establish airspace control objectives and priorities for the joint force.
- Oversee the planning and force integration activities that affect the TAGS, such as apportionment and targeting guidance.
- Resolve matters on which the ACA is unable to obtain agreement.
- Possibly retain airspace control responsibilities (or he may appoint an ACA).

1-69. The JFC may designate a JFACC as a single component commander for theater- or JOA-wide counterair operations. The JFACC will have the preponderance of air power. He also has the ability to provide C2 and produce and disseminate an ATO and ACO. He is normally appointed as the ACA and AADC. The JFC normally tasks the same person as the ACA, AADC, and JFACC to maintain the flexibility to effectively meet the enemy air threat and manage airspace control. Additional information on the selection and responsibilities of the JFACC can be found in JP 3-56.1.

JOINT FORCE AIR COMPONENT COMMANDER

1-70. The JFACC may be sea or land based. The responsibilities are the same. However, the sea-based JFACC's staff will be smaller due to the limited berthing space aboard Navy combatant ships and will affect the joint air planning capacity. The JFACC responsibilities include—

- Developing a joint air operations plan to best support force objectives.
- Recommending apportionment of the joint air effort to the JFC.
- Providing centralized direction for the allocation and tasking capabilities and forces.
- Controlling execution of joint operations as specified by the JFC.
- Coordinating joint air operations with operations of other component commanders and forces assigned to or supporting the JFC.
- Evaluating the results of joint air operations.
- Functioning as the supported and supporting commander, as directed by the JFC.

AIRSPACE CONTROL AUTHORITY

1-71. The ACA is responsible for operating the airspace control system in the airspace control area. The JFC can delegate authority to authorize deviations from established policies and procedures when urgent or emergency combat situations arise. Centralized direction by the ACA does not imply assumption of operational or tactical control over any air assets.

1-72. The ACA has broad responsibilities to include—

- Coordinating, integrating, and regulating the use of the airspace in the area of operations.
- Establishing broad policies and procedures for airspace control.

- Establishing the airspace control system and integrating host-nation and multinational forces.
- Developing the airspace control plan.
- Implementing the airspace control plan through the airspace control order.

AREA AIR DEFENSE COMMANDER

1-73. The AADC is responsible for planning, coordinating, and integrating the joint area air defense plan. The AADC develops broad policies and procedures for air defense. The JFC defines the support relationship between the AADC and supporting commanders. He may apportion assets to the AADC to conduct the joint air defense operations.

1-74. The AADC has broad responsibilities to include—

- Developing and executing a plan to disseminate timely cueing of information and air and missile early warnings.
- Planning, coordinating, and integrating joint air defense operations.
- Developing and implementing identification and engagement procedures for air and missile threats.
- Appointing a deputy AADC to assist the AADC in planning and coordinating air and missile defense operations.

KEY DOCUMENTS

1-75. There are several documents critical to planning for and executing airspace control. These documents are the airspace control plan, airspace control order, air tasking order, and air defense plan. A2C2 planners should know these documents.

Key Documents

- **Airspace Control Plan**
- **Airspace Control Order**
- **Air Tasking Order**
- **Air Defense Plan**

AIRSPACE CONTROL PLAN

1-76. The ACP is developed by the ACA and approved by the JFC. It summarizes the JFC's guidance on airspace control, defines the joint force airspace control organization, and outlines the airspace control process. This plan may be published either as an annex to the basic OPLAN and OPORD or as a separate document. Because the ACP delineates the airspace control area, planners must address coordination procedures for all airspace users. See JP 3-52 for more details.

AIRSPACE CONTROL ORDER

1-77. The ACO is developed from the airspace control plan. It directs the use of joint airspace and details the approved requests for airspace control measures. The ACO is published on a cyclical basis, depending on the theater. Normally, the ACA publishes and distributes it daily. It may be part of the ATO or a stand-alone document. It may be a perpetual document with published ongoing updates. While the airspace control plan provides general guidance on airspace control, the order institutes airspace control procedures for specified periods. The ACO contains modifications to the ACP guidance and procedures, and it activates or deactivates procedural control measures. The ACO lists, but is not

limited to, ACMs and procedures used on or over the area of operations (see Chapter 4). It may include FSCMs and standing operating procedures.

1-78. Two important considerations when distributing the ACO are timing and dissemination means. The ACO and ATO cycles interrelate. Whatever publication and distribution means are used, it is critical to mission success that airspace users receive pertinent airspace information as early in the planning cycle as possible. FM 3-52.2 provides additional details on the ACO.

AIR TASKING ORDER

1-79. The ATO is a detailed order developed by the JFACC that describes and directs the overall air operation. This order provides the details for individual sorties to include targets, mission timing, weapons loads, air refueling data, call signs, and special instructions (SPINS). The SPINS are free text formats included as part of the ATO. They contain essential information that highlights, modifies, or supplements data contained in other portions of the ATO. These instructions may also contain data that modifies, changes, or replaces information contained in OPORDs. Such information includes airspace changes, IFF and SIF assignments, control agencies, and frequencies. Developing and executing the ATO is a continuous dynamic process. JP 3-56.1 and FM 3-52.2 detail this process.

AIR DEFENSE PLAN

1-80. The AADC—with the support and coordination of the service and functional commanders—develops, integrates, and distributes the JFC-approved air defense plan. Because air defense and airspace control and management are inherently related areas, the air defense plan and the ACP should be developed together to avoid conflicts. The air defense plan includes—

- Sensor employment.
- Identification procedures.
- Engagement procedures.
- Defensive airspace control procedures (developed with the ACA).
- Weapon control procedures.
- Early warning dissemination.
- Additional information that may discuss—
 - Location and type of assets to be defended.
 - Disposition and capabilities of enemy air and missile forces.
 - Disposition and location of friendly air and missile defense forces.
 - Geopolitical and other constraints that affect air defense operations.

1-81. In addition to the air defense plan, the AADC publishes a tactical operational data (TACOPDAT) message to establish air defense responsibilities or to provide supplementary air defense orders. This message may be used to report permanent changes to an OPORD or to update missile engagement zones, surveillance and defense sectors, and communication nets. The AADC also will publish an operational tasking data link message to establish relationships, configurations, coordination procedures, and other information necessary to conduct data link operations. Chapter 5 has more information on data links.

Chapter 2

Army Airspace Command and Control Fundamentals

Army airspace command and control ensures that forces coordinate their use of airspace. It also improves the force commander's ability to command and control those forces using airspace. An effective Army airspace command and control (A2C2) system enables all the battlefield operating systems (BOS) to function efficiently while synchronizing air operations to support the commander's intent. In addition, A2C2 supports

command and control (C2) requirements during force projection operations and is fully integrated into the theater. This chapter discusses the basics of the A2C2 system: functions, activities, operations, and organizations.

The term A2C2 does not denote that any airspace contiguous to the battlefield or any other geographical dimension of airspace is designated "Army" airspace but refers to the Army users of the airspace. Neither does it imply command of any asset that is not assigned or under operational control to any Army commander.

A2C2 SYSTEM OVERVIEW

2-1. Joint forces use airspace to conduct air operations, deliver fires, employ air defense artillery assets, and conduct intelligence operations. To effectively use airspace, commanders must prudently command and control the Army airspace users. A2C2 is the Army's operational approach to accomplishing the functional activity of airspace control. A2C2 enhances command and control of forces using airspace and synchronizes their use of the airspace. The A2C2 system includes functions, activities, functional operations, and command and control

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organizations. A2C2 aims to maximize the combat effectiveness of all airspace users without adding undue restrictions and with minimal adverse impact on their capabilities. This system arranges staff elements in each command echelon from maneuver battalion through numbered army. It includes organic echelon C2 staff personnel, air defense artillery (ADA) command and control elements, fire support coordination elements, intelligence staff elements, Army air traffic service (ATS) command and control elements, and liaison personnel with key facilities of the airspace control authority (ACA). These elements work to support Army commanders and with the ACA to link elements of the Army Air-Ground System (AAGS) to other elements of the Theater Air-Ground System (TAGS). Commanders and staff must see the entire common operational picture (COP). They can then command and control operations in Army airspace. For commanders to achieve situational understanding, they must ensure that assets, systems, and personnel provide timely, relevant, and accurate information and intelligence.

A2C2 FUNCTIONS

2-2. All airspace users must perform four functions: identification, coordination, integration, and regulation. As discussed, these functions are airspace specific.

IDENTIFICATION

2-3. Identification is the ability to identify all the airspace users and how they will use the airspace. It uses positive or procedural means to determine friendly or hostile manned or unmanned aircraft, missiles, and other airspace users. Identification allows for the timely engagement of enemy aircraft and missiles while minimizing potential fratricide.

COORDINATION

2-4. Coordination is the exchange of information to inform, synchronize, and de-conflict operations. In the A2C2 context, coordination synchronizes the activities of all airspace users to achieve effective, efficient, and flexible airspace use. Effective coordination enables integration.

INTEGRATION

2-5. Integration is the consolidation of airspace requirements and assets beginning at the lowest echelon possible and with the correct organization. Planners must ensure that every element works together to apply each asset to every operation. Integration embraces every echelon up to the theater level and beyond. It unites the many systems from Army, joint, and multinational sources and from every battlefield operating system. Under the supervision of the G3/S3 air, ATS personnel integrate the A2C2 element for all airspace users.

REGULATION

2-6. Regulation is the application of promulgated rules and procedures on all airspace users. To achieve the greatest combat effectiveness, regulation must be flexible and not interfere with friendly forces' ability to accomplish their mission. Regulation assists in the command and control of airspace activities to prevent conflicts among the various uses and users of airspace. Regulation is accomplished through various control measures.

A2C2 ACTIVITIES

2-7. When the four functions are in place, they allow for successfully accomplishing the five basic and indivisible activities of A2C2. These activities are command and control, air defense (AD), fire support coordination, air traffic control, and airspace management.

COMMAND AND CONTROL

2-8. An effective command and control system at all echelons is critical to accomplishing missions. Commanders must thoroughly plan, continuously review, and clearly define A2C2 procedures and directives to maximize combat power while minimizing potential hazards. The C2 system must be jam resistant, secure, and reliable enough to expediently disseminate airspace C2 information.

AIR DEFENSE

2-9. A2C2 planners recommend C2 procedures and rules of engagement that reduce the potential firing of AD weapons on friendly aircraft while allowing quick engagement of hostile aircraft and missiles. Timely procedures for identifying aircraft are essential. Pilots and weapon systems operators must easily understand and execute these procedures.

FIRE SUPPORT COORDINATION

2-10. Responsive fire support weapon systems are critical to the maneuver commander's scheme of maneuver. Such responsiveness requires detailed planning, integration of all fire support systems, C2 systems, and effective fire control measures. These control measures include fire support coordinating measures (FSCMs) that the land or amphibious commander uses to rapidly engage targets and simultaneously provide safeguards for friendly forces. FM 3-09 discusses FSCM. Some fire support weapons can significantly impact air operations and must be included in A2C2 planning and execution.

AIR TRAFFIC CONTROL

2-11. Air traffic control is the use of active and passive measures to identify, locate, and regulate aircraft operating in the airspace control area. Regulating air traffic promotes air safety, facilitates identification of aerial platforms, and contributes to optimizing air defense assets. Air traffic control includes terminal procedures that focus on controlling aerial platforms at a specific landing or takeoff site, as well as, en route procedures.

AIRSPACE MANAGEMENT

2-12. A2C2 elements must integrate, coordinate, deconflict, and disseminate critical airspace information. This includes horizontal information flow to adjacent units and vertical information flow to higher and lower units or organizations. Overarching policies, guidance, and the commanders' intent help determine how commanders manage the airspace.

A2C2 FUNCTIONAL OPERATIONS

2-13. Although only five functional activities of A2C2 exist, various organizations at each echelon conduct many functional operations. Each operation can significantly impact A2C2. These functional operations are fire support operations, air defense artillery operations, Army aviation operations, intelligence operations, intratheater airlift operations, amphibious operations, and joint and multinational operations.

Functional Operations

- Fire Support
- Air Defense Artillery
- Army Aviation
- Intelligence
- Intratheater Airlift
- Amphibious
- Joint and Multinational

FIRE SUPPORT OPERATIONS

2-14. Fire support facilitates rapidly engaging targets and, at the same time, provides safeguards for friendly forces by using fire support coordinating measures and a network of fire support teams, liaison parties, and the fire support elements (FSEs). Fire support coordinating measures enhance the expeditious attack of targets; protect forces, populations, critical infrastructure, and sites of religious or cultural significance; and set the stage for future operations. Interface between FSEs and A2C2 element representatives ensures that requirements are coordinated rapidly and information is exchanged quickly.

2-15. The close interface of fire support as a function of A2C2 ensures that planned artillery fires are routinely coordinated with air operations and that planned air activities are coordinated with ground operations. To reduce potential conflicts between surface-to-surface indirect fires and aircraft, the FSE must provide the A2C2 element with firing battery locations and fire support plans and activities. The A2C2 element disseminates this information to all aviation, ATS, and tactical air elements. The A2C2 element also must coordinate with the ACA, deconflicting all friendly and neutral aircraft per guidance of the joint force commander (JFC). The Multiple Launch Rocket System, Army Tactical Missile System, and other indirect fires—cannon and mortar—will affect the airspace. Such coordination deconflicts fires, air operations, and ground operations.

AIR DEFENSE ARTILLERY OPERATIONS

2-16. Air rules and procedures established by the area air defense commander (AADC) control air defense fires. He manages the integrated air defense through a combination of positive and procedural controls.

2-17. Air defense rules of engagement specify the circumstances and limitations under which air defense artillery forces initiate or continue combat engagements. The seven components of air defense rules of engagement are—

- Right of self-defense.
- Hostile criteria.
- Level of control.
- Weapons control status.
- Modes of control.
- Autonomous operations.
- Fire control orders.

2-18. Supplemental fire control measures for air defense artillery include—

- Air defense operations area.
- Weapon engagement zone.
- High-density airspace control zone.
- Temporary airspace restrictions.
- Low-level transit routes and other air corridors.

2-19. Army ADA operations are controlled from tactical operations centers, fire direction centers (FDCs), and command posts established at the Army Air and Missile Defense Command (AAMDC) through battery levels. The FDCs that coordinate the high-to-medium-altitude air defense fires of ADA units are located at the ADA brigade and battalion levels. Local radar and automated C2 systems—linked with the joint data network and controlling authority—support the FDCs. Short-range air defense fires are controlled procedurally by using primary target lines and sectors of fire. The design of the defense and weapon capabilities determines these lines.

ARMY AVIATION OPERATIONS

2-20. Army aviation depends on commanders effectively using airspace to accomplish missions. Through airspace command and control, commanders fully synchronize combat activities and employ aviation assets and air maneuver to contribute decisively to the battle's outcome. Army aviation operations are generally conducted in the terrain flight dimension of the battlefield, which is fundamentally linked to ground maneuver at all echelons. The terrain flight environment consists of the airspace below the coordinating altitude and its buffer in which the Army rotary-winged aviation generally operates.

2-21. Aviation units are organized to conduct attack, air assault, reconnaissance, intelligence, and logistic operations. Airspace requirements for Army aviation cover a broad category of units and special requirements. Aircraft assigned to the aerial exploitation battalion and operating out of the corps rear area have unique airspace requirements. Aviation units operating primarily in the communications zone (COMMZ) and corps rear areas have different requirements than those operating in the division area and forward.

2-22. Attack helicopters, air cavalry, and aviation companies and battalions involved in air assault operations conduct combat operations as a tactical formation and respond to the tactical directions of an aviation command and control system. As such, ACA policy and procedures concerning air traffic management, identification of airspace users, and flight following are implemented differently than for aircraft operating in the COMMZ and rear area.

2-23. In the ground maneuver brigade area of operations, air traffic generally operates in the terrain flight environment. Aircraft provide rapid, flexible responses to the requirements of the commander. This requires flexibility in airspace control procedures. Aviation units in this area employ procedural control measures. Attack helicopter battalions and air cavalry units exercise procedural control over forces through the command and control system. They use control measures, such as objectives, areas of operations, axis of advance, phase lines, boundaries, battle positions, assembly areas, and forward arming and refueling

points. Chapter 4 discusses control measures, such as air corridors and air axis as well as other tactics, techniques, and procedures.

2-24. In the rear area, air traffic usually moves among support areas, key support command facilities (major base clusters), airfields, and command and control sites. Movement is usually predictable, follows routes that afford ease of navigation, provides for masking from the threat, avoids restricted areas and other hazards, and is at greater flight altitudes. Aircraft operations are managed primarily by adhering to standard airspace control measures and more positive means of control. Adherence to identification, friend or foe procedures; flight following requirements; and monitored ATS facilities has greater emphasis in this area. FM 3-04.100 has detailed information on aviation operations.

INTELLIGENCE OPERATIONS

2-25. The intelligence staff develops an integrated intelligence, surveillance, and reconnaissance (ISR) plan. ISR assets include both air and ground assets, which collect to answer the commander's requirements. Airborne assets consist of rotary-wing, fixed-wing, and unmanned aerial vehicles (UAVs). A2C2 planners should anticipate greater UAV usage at increasingly lower levels. Missions are planned for inclusion in the air tasking order (ATO) and airspace control order (ACO). However, because of their flexible, highly responsive nature, assets are often tasked for immediate missions not in the ATO or ACO. The A2C2 system at each echelon must resolve conflicts between airborne intelligence assets and those of other airspace users. The G2 or S2 provides the information required for coordinating intelligence collection missions with the A2C2 element to synchronize these missions with other airspace operational requirements, especially air defense forces.

INTRATHEATER AIRLIFT OPERATIONS

2-26. Intratheater airlift refers to air transport of supplies, personnel, and equipment by Army rotary-wing and fixed-wing aircraft and Air Force intratheater fixed-wing aircraft. Airlift operations include all missions except those involving the movement of combat forces to contact in an objective area.

2-27. The rear area normally contains small austere airfields to handle intratheater Air Force aircraft as well as Army aviation forces supporting airlift requirements. Intratheater fixed-wing aircraft fly airlift missions to support tactical Army operations using air-land or airdrop delivery methods. Employing airlift forward is a command decision based on the factors of mission, enemy, terrain and weather, troops and support available, time available, civil considerations (METT-TC); available assets; and mission priority. Army rotary-wing aircraft conduct airlift operations throughout the rear area and to support shaping operations.

2-28. Airspace requirements for airlift missions require coordination between members of the A2C2 element and airlift managers and planners. These individuals are the movement control officer, the transportation officer, the Air Force tactical airlift liaison officer, members of the appropriate A2C2 elements, and the liaison officer provided by the aviation unit.

AMPHIBIOUS OPERATIONS

2-29. Army forces participating in amphibious operations exercise airspace control techniques and procedures under the guidance and direction of the commander, amphibious task force (CATF). The joint force commander assigns to the CATF the amphibious objective area, which includes airspace.

2-30. The Naval Tactical Air Control System (NTACS) contains those naval command, control, and communications facilities responsible for airspace control functions during amphibious operations. The major element of the NTACS is the tactical air control center which includes—

- Air traffic control section.
- Supporting arms coordination center (similar to the Army's fire support element).
- Air support control section (similar to the Air Force's air support operations center).
- Antiair warfare section (similar to the control and reporting center).
- Sector air defense coordination center.

2-31. Army forces operating in the amphibious objective area that require airspace interface with the CATF's Tactical Air Control System through the elements of the A2C2 system. Liaison and the co-location of functional elements provide timely coordination and integration of airspace users.

2-32. As the tactical situation develops and command and control agencies of the amphibious task force are established ashore, the control of fire support, air operations, and air defense transfer from the CATF to the landing force commander.

JOINT AND MULTINATIONAL OPERATIONS

2-33. Coordinating and integrating Army airspace operational requirements with those of the other services and multinational forces occur at all echelons of command. This coordination and integration effort is accomplished by interfacing the A2C2 system with the Tactical Air Control Systems of the other services and multinational forces.

COMMAND AND CONTROL ORGANIZATIONS

2-34. Command and control organizations synchronize and coordinate combat power on the battlefield and provide the direction to the fight. JP 1-02 defines *command and control* as the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Commanders employ forces using a command and control system. A *command and control system* is the arrangement of personnel, information management, procedures, and equipment and facilities essential to the commander to plan, prepare for, execute, and assess operations (FM 6-0). For properly managing A2C2, a myriad of organizations must closely coordinate

C2 Organizations

- **Command Post**
- **Fire Support Element**
- **A2C2 Element**
- **Army Air and Missile Defense Command**
- **ADA Brigade**
- **Special Operations Component**

their efforts. These C2 elements are positioned throughout the theater structure from theater Army level to division level in formal organizations and below division as ad hoc elements. Chapter 3 discusses in detail each element's role and task. However, a brief overview is presented here of each element's role in Army A2C2.

COMMAND POST

2-35. Command posts (CPs) function at every level of command. The commander employs this facility to control combat operations. During A2C2 operations, staff of each CP ensures that A2C2 synchronizes with the scheme of maneuver and tracks the airspace picture relevant to their command's current and future operations.

FIRE SUPPORT ELEMENT

2-36. The fire support element of a command post manages centralized targeting, coordination, and integration of fires delivered on surface targets by fire support means under the control, or in support, of their assigned forces. In A2C2, the FSE coordinates friendly fires against surface targets with other staff elements ensuring that these fires do not impact on simultaneously conducted air operations.

ARMY AIRSPACE COMMAND AND CONTROL ELEMENT

2-37. The A2C2 element is the Army's principal organization responsible for airspace control. The A2C2 element is located within the CPs established by each echelon. These elements dedicated to accomplish A2C2 tasks are located at division level and above. A2C2 elements below division level are formed on an ad hoc basis and must determine how to meet the commander's A2C2 needs. The A2C2 elements at division and above fall under the staff responsibility of the Army chief of staff or G3 and are supervised by the G3 air. These elements consist of representatives from, but not limited to, the elements listed in the text box. For A2C2 elements supported by the Air and Missile Defense Planning and Control System and Tactical Airspace Integration System, unique data link capabilities permit a rapid transfer of A2C2 information and near-real time update of the air picture.

A2C2 Element Representatives

- **ADA Element**
- **Aviation Element**
- **Air Liaison Officer**
- **Fire Support Element**
- **ATS Company—supporting the unit at division and higher level**
- **Military Intelligence Unit**
- **G2 Section and UAV Chief**
- **G4 Section**
- **Marine Corps Air or Naval Gunfire Liaison Company, when required**

ARMY AIR AND MISSILE DEFENSE COMMAND

2-38. The AAMDC commander must plan, coordinate, and integrate air and missile defense operations for the ARFOR commander or, if designated, the joint force land component commander (JFLCC). The AAMDC commander ensures that these operations are properly executed. He accomplishes these functions through several activities:

- Commands echelons above corps ADA forces and oversees operational level planning to support brigade operations; ensures that the brigades are postured to protect theater forces and assets. He also facilitates the force projection of the brigades and resolves brigade support issues.
- Serves as the theater Army air and missile defense coordinator (TAAMDCOORD) and acts as a special staff officer to the ARFOR or JFLCC commander. The TAAMDCOORD ensures that Army operations are integrated with counterair operations at the theater level.
- Supports the joint force air component commander (JFACC), area air defense commander, and airspace control authority by serving as a deputy AADC; ensures that the Army's contribution to the joint fight is planned, coordinated, and synchronized with the JFACC, AADC, and ACA concepts of operations.
- Shares, through his G2 and attack operations elements, intelligence preparation of the battlefield information with the deep operations coordination cell (DOCC) and the G2.
- Provides target nominations to the DOCC and the G3 for immediate targeting, time-sensitive targets, and the ATO process.
- Exercises either operational or tactical control (or as determined by the JFC) of assigned multinational forces.
- Coordinates with the corps ADA brigades to ensure that their operations integrate and synchronize with the theater air defense plan.
- Disseminates through his passive defense element an early warning to affected ARFOR units and, when requested, to joint and multinational units or the populace in the ARFOR area of operations.
- Deploys liaison officers to critical theater and ARFOR command and control nodes. These officers provide the essential coordination to prosecute the fight efficiently. They keep commanders and staffs apprised of the status of operations and recommend appropriate courses of action relative to air and missile events. They also serve as subject matter experts on the capabilities of the AAMDC and its subordinate ADA forces.

AIR DEFENSE ARTILLERY BRIGADE

2-39. The AAMDC commands echelons above corps (EAC) air defense artillery brigades. The EAC air defense artillery brigade provides command and control for subordinate ADA assets. This brigade provides air and missile defense of prioritized theater assets. Corps ADA brigades are under the command of their respective corps commanders. The corps ADA brigade provides C2 for subordinate ADA assets and provides air and missile defense of prioritized corps defended assets. For airspace control relative to identification and engagement operations, the AADC designates an authority to control the fires of both EAC and corps ADA brigades. Both EAC and corps ADA brigades possess data link capabilities. These capabilities help brigades to integrate at all levels of the tactical digital information link (TADIL) architectures and participate in the joint data network. This allows brigades to rapidly transfer and update information relative to the integrated air picture.

SPECIAL OPERATIONS COMPONENT

2-40. The special operations command (SOC) provides powerful operational leverage across strategic, operational, and tactical levels. The theater SOC normally exercises operational control of all assigned special operations forces (SOF) in theater. The SOC may be designated as the joint force special operations component commander (JFSOCC). The JFSOCC will control assigned SOF as well as any conventional assets provided by the JFC to support specific missions. Tactical control of SOF air assets is normally exercised by the Air Force special operations component, the Army special operations aviation commander, or the joint special operations air component commander. The SOC command and control structure will be situationally dependent.

Chapter 3

Army Airspace Command and Control Functional Elements

Army doctrine calls for synchronized use of all elements of combat power as well as available joint and multinational assets within a commander's area of operations (AO). Flexibly applying combat power is key to the Army's ability to maneuver. Army airspace command and control (A2C2) enhances this maneuver by coordinating the efforts of elements that use airspace. The A2C2 airspace deconfliction function helps enable decisive operations. This function allows rapidly and simultaneously applying combat power to several axes. Success requires detailed coordination of airspace users. Integrated A2C2 is the key to providing close and continuous coordination among all users of airspace. This chapter describes the various airspace command and control organizations, sister service liaison officers, and staff tasks that appear at each level of command.

TYPES AND LEVELS

3-1. Organizations managing A2C2 tasks exist with formal and informal structures. At division level and above, A2C2 organizations are organized as part of the table of organization and equipment (TOE). At organizations below division, informal or ad hoc cells manage A2C2 tasks. These cells are designed to meet the commander's requirements for airspace control, airspace management, and properly allocating air assets.

A2C2 NODES AND ORGANIZATIONS

3-2. In Army operations, A2C2 staff functions are performed at each command echelon from maneuver battalion through the ARFOR. Division-level is the lowest level which has authorized staff positions to integrate A2C2, but many A2C2 functions are performed ad hoc at brigade- and battalion-level. These A2C2 elements are located within the command posts (tactical and main) and may co-locate with the fire support cell. These elements form a vertical and horizontal channel for commanders. Staffs coordinate and disseminate airspace control requirements and information through this channel.

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Army Forces

3-3. The ARFOR staff coordinates airspace control issues with the Army forces in the joint operations area for requirements that overlap the rear combat zone and communications zone (COMMZ). The G3, the A2C2 staff proponent, coordinates and integrates airspace users for the ARFOR. The G3 relies on an A2C2 element at each command post to interface with the airspace planners of all components.

3-4. At this command echelon, airspace coordination and integration focus on assisting the joint air operations center (JAOC) airspace planners. The planners must develop a joint force airspace control plan and define the broad policies and procedures for operating the integrated airspace control system.

3-5. As the staff plans major operations and implements written orders, planners achieve coordination and integration. Annexes to the operation plan (OPLAN) and operation order (OPORD) provide implementing directions to subordinate forces. The annexes coordinate and integrate Army forces that use airspace in the area of operations.

Battlefield Coordination Detachment

3-6. The battlefield coordination detachment (BCD) is the ARFOR coordination detachment located at the JAOC. This detachment monitors and interprets the land battle for the JAOC. It provides the necessary interface for exchanging current intelligence and advises the JAOC staff on operational data. The BCD exchanges intelligence and operation information with—

- Army ground liaison officers at wing operations centers.
- Army sections at control and reporting centers (CRCs).
- Army corps' operations, intelligence, and fire support liaisons.
- A2C2 elements at echelons above corps (EAC), corps, and division.

3-7. The BCD relays and interprets Army needs for air support to the JAOC. Therefore, the ARFOR staff sections must continuously advise the BCD on matters pertaining to their current and planned operations and needs for air support. Operations officers (G3s) at the ARFOR headquarters and at corps provide key information and decisions to the BCD. This information includes—

- Land force concept of operations.
- Priority of effort for close air support (CAS) and air interdiction.
- Processed requests for air support.
- Target nominations for joint theater missile defense (JTMD) attack operations.
- Army imposed fire support coordinating measures updates, forward line of own troops (FLOT), phase lines, Army air defense unit status, and airspace control means requests and graphics.
- Planned Army special weapons employment.
- Planned air assaults.
- Attacks with surface-to-surface fires beyond the fire support coordination line (FSCL).
- Shaping attacks with Army helicopters.
- Intelligence.

- Joint suppression of enemy air defense operations.
- Offensive information operations (IO) plans.
- Battle damage assessments.
- Planned long range surveillance and reconnaissance detachment insertions.
- Locations of special operations forces.

3-8. Key information and decisions provided to the BCD by the JAOC include—

- Air Force capability to provide air support requested by the Army.
- Intelligence on enemy forces.
- Plans for Air Force nuclear strikes.
- Battle damage assessments.
- Electronic warfare (EW) operations.
- Weapons control status for air defense.
- Joint suppression of enemy air defense operations.
- Offensive IO plans.
- Apportioning and allocating decisions.
- Air tasking orders (ATOs) and airspace control orders (ACOs).

3-9. The BCD works closely and continuously in the JAOC for the ARFOR commander. It plays a vital role in coordinating air and land aspects of the battle. It improves the timely exchange of operational information through face-to-face coordination during the ATO development cycle. The BCD's ability to rapidly follow up and interpret land force needs for air support increases the Army commanders' ability to use firepower. The BCD has numerous responsibilities in the A2C2 process. Appendix B lists these responsibilities. FM 3-09.13 expands on these responsibilities.

Deep Operations Coordination Cell

3-10. In addition to the BCD, the ARFOR commander may use a deep operations coordination cell (DOCC). The DOCC is an ad hoc organization that plans and coordinates deep operations, but it does not control the forces once they are deep. Once commanders decide to attack a deep target, they may create a direct sensor-to-shooter link. For example, if the DOCC decides to attack a detected target with attack helicopters, it will plan and coordinate the attack. Once commanders decide to launch the attack, the attack helicopter battalion, not the DOCC, provides the command and control (C2) node. The DOCC must coordinate with the A2C2 element to ensure that all airspace requirements are planned, requested, and approved for mission execution. This may be accomplished by the A2C2 element sending a liaison officer to the DOCC to assist in developing deep attack plans. The A2C2 element forwards the requirements to the BCD for incorporation into the airspace control order and air tasking order. The DOCC develops the plans based on high-payoff targets. It selects attack assets based on several factors:

- Location of attack assets with respect to targets.
- Operational status of attack assets.
- Range to a target.
- Number and type of missions in progress.

- Munitions available.
- Enemy air defense threat.
- Accuracy of target acquisition data.

3-11. Subordinate elements to the JAOC nominate targets that joint or other component assets can better engage. The DOCC may recommend directly disseminating targeting information from sensor to shooter to meet critical time lines associated with surface targets.

LEVELS

Echelons Above Corps-Level A2C2

3-12. At levels of command below the ARFOR, various organizations manage airspace issues. Each organization coordinates with higher and adjacent elements to maximize the efficiency of airspace management and the lethality of supporting weapon systems.

3-13. Under direction of the G3, A2C2 elements at this level interface either at the numbered army level or at joint or multinational operational levels. The numbered army A2C2 element performs many of the same functions as corps-level elements. These functions include, but are not limited to, the deconflicting airspace requests or airspace usage between subordinate corps-level units and the interface between multinational forces assigned to that numbered army.

3-14. Most airspace command and control coordination among the joint force land component commander (JFLCC), the joint force air component commander (JFACC), and the joint force maritime component commander occurs at the BCD. At this level of command, the BCD provides an A2C2 interface between the theater airspace information systems (INFOSYS) and subordinate Army elements executing A2C2 functions. Its critical mission allows for allocating and prioritizing Army air support requirements for inclusion into the theater air operation plan.

Corps-Level A2C2

3-15. The corps A2C2 element has a dedicated element at the corps main and tactical command posts (CPs). No A2C2 cell exists at the rear CP; the main CP A2C2 element manages rear area requirements. Corps airspace issues are controlled by the corps G3 and managed by the G3 air. The corps air traffic service (ATS) battalion commander and the corps air defense artillery (ADA) brigade commander serve as the corps commander's airspace advisors. Figure 3-1 provides a graphic summary of a notional corps A2C2 element.

3-16. The A2C2 cell at the main CP is the focal point for conducting A2C2 activities. The corps A2C2 cell focuses on the deep battles, rear battles, and future (72+ hours) operations. It also coordinates A2C2 issues for deep operations through the DOCC (when established). In the absence of a DOCC, the A2C2 cell (with the targeting cell) at the main CP must accomplish these functions. In addition to the A2C2 element, the main CP A2C2 cell may also include other liaisons based on the requirements of METT-TC—mission, enemy, terrain and weather, troops and support available, time available, civil considerations. These liaisons must accomplish two separate tasks. First, they perform their primary staff functions. Second, they contribute to the A2C2 process by synchronizing

their organizations' airspace requirements with those of other airspace users. The corps ATS battalion—group at echelons above corps—provides A2C2 liaison teams equipped with the Tactical Airspace Integration System (TAIS). The A2C2 element from the supporting ATS unit will provide equipment, manning, and subject matter experts to the corps main CP A2C2 cell. The primary TAIS task will be to serve as the A2C2 system to capture, deconflict, and coordinate corps airspace requirements. Such tasks include processing them through the BCD.

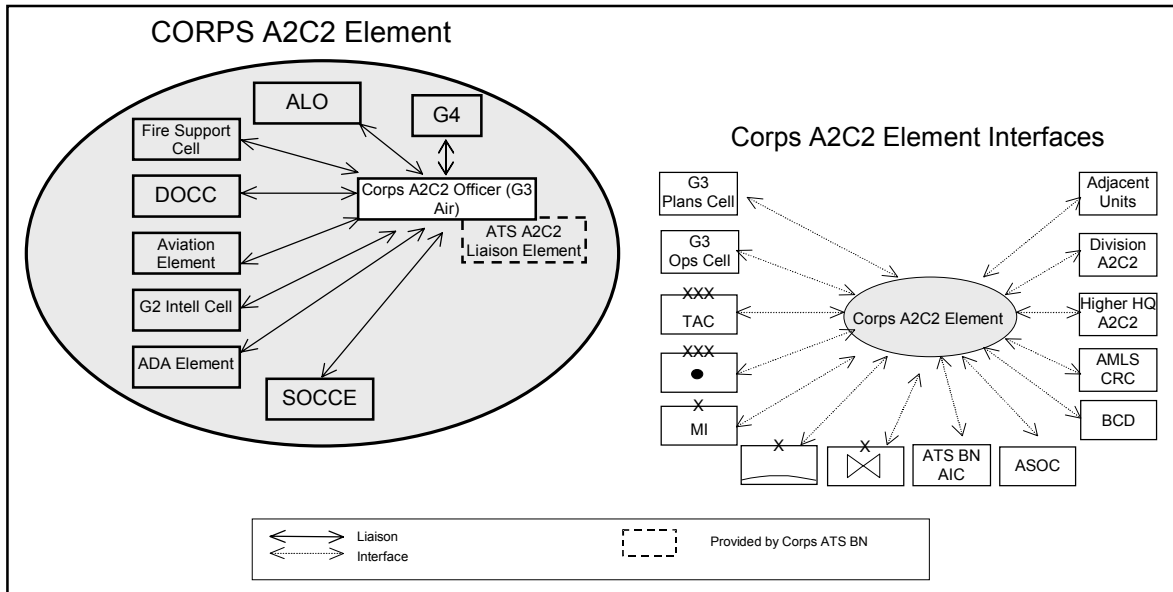


Figure 3-1. Corps A2C2 Element

3-17. The corps G3 must coordinate Army aircraft missions—including flights—that must be placed on the ATO for information purposes to obtain discreet transponder codes through the BCD. This is essential for missions that will routinely be flown above the coordination altitude, outside Army controlled airspace, and in areas where joint airspace requires deconfliction to avoid fratricide such as deep attacks by Army aviation assets.

3-18. The A2C2 element at the tactical CP is responsible for airspace control activities supporting close combat; the A2C2 element at the main CP assists as required. The two A2C2 elements coordinate closely to ensure that they meet airspace requirement changes quickly and effectively. The corps A2C2 element at the tactical CP should include, as a minimum, liaisons from Army aviation, ADA, and field artillery (FA), and the Air Force. The fire support officer (FSO) or aviation officer serves as the A2C2 element chief. The corps A2C2 element at the tactical CP must link to the A2C2 element at the main CP to submit airspace requirements and promulgate requests.

3-19. The main CP A2C2 element must plan and execute with the DOCC. The element may send a liaison officer to the DOCC to assist in developing deep attack plans. However, the DOCC sends all its airspace requirements to the main CP A2C2 element. This element processes and forwards the requirements to the ARFOR A2C2 element or BCD for incorporation into the airspace control order and air tasking order.

3-20. At corps level, the Air Force deploys an air support operations center (ASOC). An ASOC must direct and control on-call close air support and air reconnaissance assets that support ground forces. This center usually locates with the supported corps main CP and functions under the Air Force forces' operational control through the JAOC. The ASOC operates the Air Force air request net (AFARN) and uses this net to coordinate and direct CAS sorties that have been allocated to the corps. An ASOC must react quickly to immediate requests for air support from ground forces. It advises the JAOC of the air effort needed to meet ground tactical air support requirements. An ASOC may request additional air resources when requirements exceed the corps' sortie allocation or distribution.

3-21. The tactical air control party (TACP) is also located with Army maneuver unit headquarters from corps to battalion. It provides Air Force operational expertise to support Army planning and operations. The TACP assists planners in preparing and synchronizing air support with surface fires and the Army's air support plan. It coordinates preplanned and immediate air requests; assists in coordinating air support missions with appropriate A2C2 elements; and operates, uses, and monitors the AFARN. Finally, the TACP provides terminal attack control for air missions in the corps and division area.

Division-Level A2C2

3-22. The division A2C2 element is located in the division main CP. The division G3 air manages the A2C2 element. This element includes representatives from the corps ATS battalion's direct support company and other elements supporting the division maneuver elements, to include ADA, FA, and intelligence. Figure 3-2 provides a graphic summary of a notional division A2C2 element.

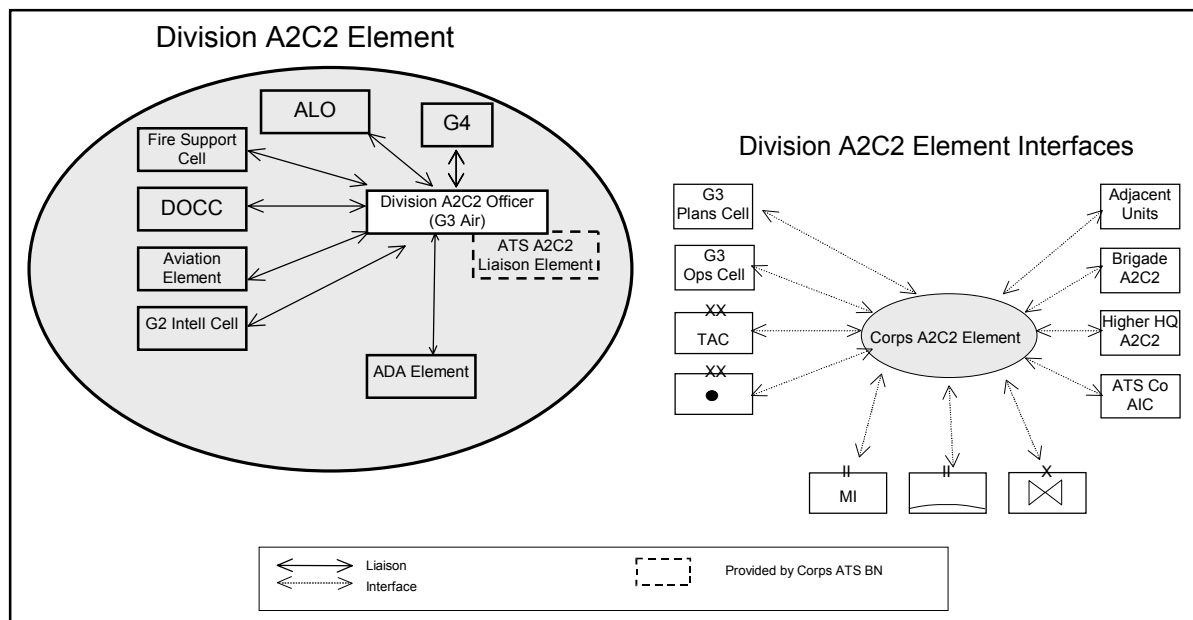


Figure 3-2. Division A2C2 Element

3-23. The organization of the A2C2 element at the division main CP resembles that of the corps level. However, the division focuses on conducting the battles and engagements in the forward portion of the combat zone. Therefore, airspace control tasks are primarily those required to support the close battle. The difference in geographical orientation (forward versus rear) results in minor differences in airspace control procedures and the degree of coordination required.

3-24. The division A2C2 element plans airspace management for the division area of operations. It must move airspace planning data to and from the corps A2C2 element and disseminate A2C2 information—such as the ATO or ACO—to division units. The G3 air centralizes airspace requests and requirements.

Brigade-Level A2C2

3-25. The brigade level does not have a dedicated A2C2 element. Brigade A2C2 elements are ad hoc but resemble those at higher echelons. The brigade S3 has overall responsibility for coordinating and managing all airspace management within the brigade AO. The A2C2 element implements and disseminates the airspace control order and air tasking order to the lowest levels. It also submits airspace control means requests to the division A2C2 element for processing. Minimum staffing can include the S3 air (as the chief of the cell) and air defense (AD), FA, aviation, and other representatives.

3-26. While brigade-level A2C2 functions primarily involve executing current operations, the brigade—when deployed as a separate task force—requires many of the same planning and execution functions as do divisions and corps. The brigade, as a separate task force headquarters, may receive TACPs and theater airlift liaison officers (TALOs) from the Air Force to assist in air mission planning and execution. They function in the same manner as TACPs and TALOs stationed with division and corps elements.

Battalion-Level and Below A2C2

3-27. As at brigade level, no formalized A2C2 element exists in a battalion. Therefore, members of the battalion staff and liaison officers (LNOs) from supporting organizations perform A2C2 functions by extracting information from various sources. These sources can include the Maneuver Control System (MCS), All Source Analysis System, Advanced Field Artillery Tactical Data System (AFATDS), and Army Battle Command System (ABCS). This ad hoc A2C2 element includes the S3 air as chief and may include the S2, FSO, air liaison officer, aviation officer, and ADA liaison officer. The battalion S3 air or ad hoc A2C2 element submits airspace control means requests to the brigade A2C2 element for processing and forwarding to the division. Additionally, select battalions—such as ADA, FA, military intelligence, and aviation—must receive and implement ACOs and ATOs.

LIAISONS

3-28. When a component commander becomes the JFACC, area air defense commander (AADC), and airspace control authority (ACA), then each component may provide liaisons to coordinate joint operations. All service components provide liaison officers to support the JFACC, AADC, and ACA. While liaison requirements may vary, the following missions illustrate those functions necessary

for mutual understanding among the Air Force, Navy, and Marine forces and to achieve unity and purpose of action in air operations.

NAVY

Naval and Amphibious Liaison Element

3-29. The naval and amphibious element (NALE) responds to the JAOC. It provides the necessary interface for exchanging current operational and intelligence data between components and the JAOC.

Naval Gunfire Officer

3-30. The naval gunfire officer (NGFO) coordinates the training of shore fire control parties in garrison. He also assists the division naval gunfire section with operational planning and may be assigned as the NGFO at the division alternate CP during field operations. He can also perform his duties as the regimental NGFO in the fire support coordination center of the designated regiment. During the planning phase, he reviews, coordinates, and consolidates the naval gunfire plans of the battalions with the regiment's additional requirements. The regimental commander must approve the plans.

Shore Fire Control Party

3-31. The shore fire control party (SFCP) is the basic unit for containing both a planning and operational element. It is organized to support a battalion.

MARINE

Marine Liaison Officers

3-32. The Marine liaison officer (MARLO) assists in the coordinating and integrating Marine operations into the JFACC's air employment plan. Normally the MARLO will locate in the JAOC.

Air and Naval Gunfire Liaison Company

3-33. The air and naval gunfire liaison company (ANGLICO) is a Marine Corps company usually commanded by a Marine lieutenant colonel. Its primary mission is to provide ground control and liaison agencies for the planning and use of naval gunfire and naval aviation support for allied or US Army forces of division size or smaller. The ANGLICO will deploy the air naval gunfire platoon (ANGPLT) and the supporting arms liaison team (SALT) to assist in support at lower echelons.

Air Naval Gunfire Platoon

3-34. The ANGPLT provides planning and coordination functions at the brigade level. This platoon locates at the brigade command post.

Supporting Arms Liaison Team

3-35. The SALT works within the battalion combat operations center. It performs the planning, coordination, and terminal control of CAS, naval gunfire, or artillery.

AIR FORCE

Air Force Liaison Element

3-36. The Air Force Liaison Element (AFLE) provides an interface between the commander of the Air Force forces and the JFACC for coordinating and synchronizing Air Force units in support of joint air operations. Normally located at the JAOC, the AFLE comprises personnel and equipment from a general purpose numbered Air Force's staff and component organizations. The AFLE can be tailored to perform various missions and management functions to match the contingency or operation.

Air Liaison Officers

3-37. Air liaison officers (ALOs) are provided to the Army maneuver units from corps to battalion. They assist in planning, integration, coordination, and terminal control of air support missions. They are assigned to the ASOC, TACPs, and other component agencies or elements to facilitate air operations. Additionally, theater airlift liaison officers are provided to the same Army maneuver units. They assist in planning, integrating, and coordinating theater airlift missions. TALOs advise the Army commander and senior ALO on airlift assets and use. They also operate the TALO advance notification and coordination net. This net provides "heads-up" notification of immediate airlift requests to the air operations center (AOC) airlift coordination cell. TALOs may control and direct airlift missions as well as complete tactical drop zone surveys. They liaise with other airlift agencies and provide airlift training programs to the Army.

ARMY

Battlefield Coordination Detachment

3-38. The BCD is an Army liaison provided by the ARFOR commander to the AOC or to the component designated by the joint force commander to plan, coordinate, and deconflict air operations. The BCD processes Army requests for tactical air support and airspace control means. It also monitors and interprets the land battle situation for the JAOC and provides the necessary interface for exchange of current intelligence and operational data.

Ground Liaison Officers

3-39. Ground liaison officers (GLOs) are provided to each air attack wing operations center (WOC) supporting ground operations. They are not at the reconnaissance or airlift WOCs. ARFOR commanders must be prepared to provide liaison officers to these operations when a mission demands higher visibility of reconnaissance or airlift missions. GLOs provide Army expertise, brief pilots on the ground situation, and debrief pilots upon return from missions. GLOs receive and report operational and intelligence data to the BCD.

Air Defense Liaison Officer

3-40. The Army air and missile defense command (AAMDC) deploys liaison teams to all major theater C2 headquarters. These headquarters include the JFLCC, JFACC, AADC, joint forces maritime component commander, joint forces special operations component commander, ARFOR, and BCDs. Corps ADA

brigades deploy liaison personnel—in some cases air defense artillery fire control officers—to airborne command and control systems, CRCs, tactical air operations centers (TAOCs), and other C2 facilities, as required, to facilitate the ground-to-air battle. Divisional short-range air defense battalions provide liaison teams to divisional elements and supported maneuver battalions to facilitate the ground-to-air battle.

Theater Air and Missile Defense Coordinator

3-41. The theater Army air and missile defense coordinator (TAAMDCOORD) serves as the focal point for Army organizations at corps level and above. He coordinates and integrates all theater air and missile defense assets. Working with the other services, he ensures that Army air and missile defense concerns are addressed in joint planning.

SPECIAL OPERATIONS

Special Operations Liaison Element

3-42. The special operations component provides a special operations liaison element (SOLE) to the JFACC staff (if designated) or appropriate service component air C2 facility—JAOC, AOC, tactical air command center (TACC), and tactical air control center. This element coordinates and synchronizes special operations forces (SOF) air and surface efforts with joint air operations. The SOLE also assists with planning and executing the air tasking order and airspace control order and deconflicting special operations forces with conventional forces.

Special Operations Command and Control Elements

3-43. Special operations command and control elements (SOCCEs) are the focal points for synchronizing special operations activities with land operations. They are normally employed when special operations forces conduct operations to support a conventional joint or service force. The SOCCE co-locates with the command post of the supported force—corps for ARFOR and Marine air-ground task force for Marine forces—to coordinate and deconflict special operations with the operations of the supported force. It then ensures communications interoperability with that force.

JOINT

Airspace Management Liaison Section

3-44. Representatives from all involved components staff the airspace management liaison section (AMLS). This section is responsible to the ACA for planning, coordinating, and integrating activities related to airspace control. It is located with the senior radar facility, such as the TAOC and CRC.

Air Defense Liaison Section

3-45. The air defense liaison section (ADLS) is staffed with representatives from all components involved. This section is responsible to the AADC for planning, coordinating, and integrating air defense activities. It is also located with the senior radar facility, such as the TAOC and CRC.

STAFF TASKS

3-46. A2C2 actions require diligent and coordinated staff effort at each level of command. All staffs must strive to fully interact with their counterpart staffs involved in the A2C2 process. Staff tasks are divided into those actions taken during the planning and execution phases of the operation.

A2C2 IN ACTION

3-47. Procedures and organizations designed to specify airspace control—responsibility, unity, and standardization—guide how the system functions during combat operations. As complex as the system appears, A2C2 is little more than the action that staff officers at each echelon take to optimally use airspace. Such action eliminates and resolves conflicts among users vying for priority airspace use. This staff action occurs at distinct times during the operation: during battle planning, during conduct of the battle, and through ongoing conflict resolution.

Planning the Battle

3-48. A2C2 planning is accomplished as part of the normal decision making process. This chapter and FM 5-0 discuss in detail the staff functions and tasks in support of the planning process. The planning process is continuous, forward looking in its approach. It uses the commander's intent as a guide in decision making.

3-49. Upon receipt of planning guidance, staff planners follow certain considerations in developing A2C2 plans. These considerations include—

- Listing the commander's stated priorities for airspace usage.
- Limiting to the minimum restrictive airspace control procedures and associated control measures used to conform to the tactical plan.
- Striking the appropriate balance of airspace control methods (positive or procedural) to enable integrated and coordinated airspace operations. Command and control systems and voice communications provide the means to react to changes.
- Ensuring that the scheme of maneuver and commander's intent determine and govern the design of the supporting plan.
- Using airspace with maximum freedom consistent with the degree of risk acceptable to the commander.
- Structuring airspace control measures to facilitate recognition by either aircrews or ground-based weapons crews.
- Where possible, ensuring that the boundaries of the level of command requesting the measure encompass temporary airspace control measures, such as restricted operations zones (ROZs) and high-density airspace control zones (HIDACZs).
- Using coordinating altitudes.
- Enhancing mission-oriented C2 for subordinate commanders and structuring A2C2 plans on the concept of management by exception.
- Providing air traffic services according to the airspace control plan.
- Devising and implementing airspace control procedures for the entire battlespace.

- Providing capability to request, coordinate, and control immediate combat air power to support ground operations.
- Using threat ADA assessment to include order of battle, range of threat ADA systems, and threat radar.
- Using threat air assessment to include unmanned aerial vehicle (UAV), fixed-wing and rotary-wing aircraft, and ordinance and delivery techniques.
- Using the Integrated Meteorological System (IMETS) to identify the effects of weather on friendly and threat forces. These weather effects will include visibility, winds, precipitation, cloud cover, temperature, and humidity and their effects on assets and sensors. The weather effects will help determine the feasibility of using an asset for a particular mission.

3-50. A2C2 planners must first identify the users and uses of the airspace. Then the planners should identify potential conflicts among airspace users and establish the tactics, techniques, and procedures required to resolve or to minimize the potential for these conflicts. The A2C2 plan reflects these techniques and procedures. This plan may be an A2C2 annex to an OPLAN or OPORD. It may also be an A2C2 overlay with a fragmentary order (FRAGO). Automated systems such as TAIS provide a further means of deconflicting—and disseminating deconfliction decisions—throughout the command. Other systems—such as the Air and Missile Defense Planning and Control System, AFATDS, and MCS—provide additional means to integrate and disseminate A2C2 information for deconflicting decisions and operations.

3-51. Planning will be as detailed as the situation and time allow. A supporting A2C2 annex should be an integral part of every OPORD. (See FM 5-0.) The A2C2 annex should be thorough yet concise, easily understood by all subordinate elements, and flexible enough to sustain modifications as the situation requires. In some situations, the fast-paced and dynamic tempo of combat operations causes the A2C2 staff to use an overlay (or a unit airspace plan for automated systems) and issue verbal directives to subordinate forces.

3-52. Using field SOPs, automated systems, ACOs, airspace control plans, and unit airspace plans reduces the coordination and provides implementing instructions. Automated equipment allows faster dissemination as well as accurate planning, preparation, and execution depending on the degree of complexity, repetition, and detail involved to perform the functions. The time saved will improve as systems mature, integration is refined, and users gain proficiency. These systems provide more accurate and timely information. This increased available planning time enables commanders and staff to assess the tactical situation, complete the decision making process, and support near real-time operations. Digitized sensing systems expedite the sensor-to-commander flow of information, providing a near real-time surveillance capability for the airspace management mission. Digitization further supports airspace management by improving ground-to-air connectivity and information throughput.

Conducting the Battle

3-53. The dynamic nature of battle means it will rarely proceed as planned. As the situation alters, commanders must quickly form new decisions, then coordinate and disseminate these decisions to synchronize subordinate and supporting

actions. Once the battle is in progress, the A2C2 elements at the main and tactical CPs continue to monitor the situations of subordinate and parent units and modify plans as required. Effective coordination, rapid deconfliction and exchange of information, timely decision making, and rapid issue of orders promote agility and initiative.

3-54. Although now more time sensitive, A2C2 actions required during the battle mirror those performed during the planning phase. During the conduct of the battle, A2C2 elements react to changes in the tactical situation; anticipate future requirements based on the progress of the battle; and facilitate the commander's ability to influence the battle by allocating air assets. They should identify and take immediate action to resolve potential airspace conflicts.

3-55. After planners determine how to conduct the battle, they must consider automation, planning considerations, and SOPs. Only after completely understanding each of these elements and integrating them into the plan can A2C2 staff management succeed. Airspace use and information displays maintained by the A2C2 element within the CP consist of an airspace situation map, status boards, and charts. Information displayed is keyed to the commander's critical information requirements.

3-56. **Automation.** The A2C2 elements must have their own dedicated workstations. Exchanging information and organizing the A2C2 system facilitates the response to changing airspace requirements by A2C2 elements at the tactical and main CPs. Electronic communications disseminate information, airspace control orders, and requests for special restrictive measures. Voice, facsimile, and data systems can move information quickly between staff cells and command posts.

3-57. Fielding the new automated systems for each battlefield operating system greatly enhances near real-time airspace coordination and integration. Automated A2C2 systems such as TAIS provide this same information digitally and can share this information with other Army Battle Command Systems or produce hard copy data. (See Chapter 5 and Appendix C for detailed discussions on ABCS.)

3-58. **Planning Considerations.** Although many planning considerations discussed will pertain to every level of command, some apply only to specific levels of command. For this reason, the key planning considerations are listed by echelon: corps and echelons above corps, divisions, and brigades and battalions.

3-59. At corps and EAC, the A2C2 elements and the current operations cell must promptly attend to matters pertaining to the use of airspace or the requirements of forces to use airspace. At these echelons, particularly the corps, the ability of the commander to influence the conduct of the battle stems from using air assets. Because commanders can use air assets in a relatively short lead time, they must coordinate and integrate their airspace requirements with the ongoing ground battle requirements. Current operations actions at the corps (and EAC) are also required when—

- Conflicts that require resolution develop in the corps rear area and COMMZ.
- Changes to the corps OPORD affecting the use of, or users of, the airspace are directed in response to the tactical situation.

- Corps is directing a specific operation such as a deep operation.
- Conflicts cannot be resolved at a lower echelon.

3-60. Any discussion of the division A2C2 element also applies to most functions of the corps A2C2 element. The division element—located at the tactical and main CP—is responsible for the A2C2 function within the division’s assigned area of operations. Like the corps element, it operates under the staff supervision of the G3 and conducts both future planning and current execution.

3-61. By coordinating with other staff cells in the main CP, the division A2C2 element determines which combat, combat support, and combat service support activities, requirements, and mission impact on effective A2C2. This element conducts planning activities and develops the appropriate plans.

3-62. The division A2C2 element maintains data on the ATS facilities, current and planned restrictive measures, and special joint use requirements. Staff sends conflicts that the element cannot resolve (per command guidance, orders, and SOPs) to the G3 for resolution. The division A2C2 element also maintains data on the AD situation, including ADA coverage, for other tactical operations center (TOC) elements to use. Hostile air activity data obtained through the G2 and AD channels is provided to the division A2C2 element and other elements of the division main CP. When a unit requires specific details, it requests information from the appropriate ADA unit headquarters. The division A2C2 element assists the division commander by identifying the impact that ADA weapons control status will have on air operations.

3-63. Supported by an ATS A2C2 element and airspace information center (AIC) team, the division A2C2 element develops plans to provide ATS assistance to aircraft operating in the division area of operations and to those units conducting tactical operations. ATS units supporting the division operate under the G3 and may be attached to the aviation brigade for logistic support.

3-64. The ATS unit supporting the corps or division is linked with the A2C2 system, the host nation ATS, and the Theater Air Control System (TACS). The unit supports aircraft from the Army, other component forces operating in the division area of operations, and division aviation brigade units conducting tactical operations. It coordinates aircraft in flight with the A2C2 element at the command post. ATS support includes a broad scope of services such as navigational assistance, flight following assistance, weather information, notice to airmen, air threat warnings, artillery advisories, airfield and landing site terminal control, and other assistance to ensure near real-time coordination and integration of air traffic.

3-65. Within the division and corps A2C2 element, the TACP is the principal air advisor to the ground commander. The TACPs request, coordinate, and control close air support missions to support the ground operation.

3-66. The division A2C2 element obtains information on nuclear, biological, and chemical (NBC); field artillery; weather; air threat; and other air operations that affect the control of airspace. It disseminates this information directly to the appropriate airspace users and ATS facilities.

3-67. Aircrews monitor ATS frequencies and may request flight assistance, including flight following and current information on weather, NBC, airspace

restrictions, and air operations. When necessary, division commanders may direct mandatory flight following for all aircraft flights in the division rear. Flight following may be accomplished with a unit's flight operations section or with an ATS facility. Each division A2C2 element coordinates with adjacent division A2C2 elements.

3-68. Brigades and battalions focus primarily on executing the operation plan or order. The maneuver brigade commander provides C2 of his users of the airspace over his area of responsibility through his staff and liaison officers from the Air Force, Army ADA, and Army aviation. The brigade commander can form a brigade A2C2 element from the ADA LNO, Army aviation liaison officer, brigade fire support officer, air liaison officer, and brigade S3 air.

3-69. The liaison officers function as the brigade special staff officers for their specific functional area. They advise the brigade commander and staff on their areas and on related A2C2 matters. The liaison officers receive information from their parent battalion TOC or from the liaison officers at the division A2C2 element.

3-70. The brigade may retain responsibility for control of battalion airspace. If not, the maneuver battalion commander controls airspace in the battalion area and coordinates with airspace users directly supporting battalion operations. At battalion, no special staff element is dedicated to A2C2. The commander routinely coordinates with the staff, primarily the S3 (assisted by the S3 air), ALO, fire support coordinator, subordinate unit commanders, and representatives from any supporting units—such as an ADA platoon placed in support of the battalion. To assign responsibility, the S3 air becomes the principal staff executor for battalion A2C2 matters.

3-71. **Standing Operating Procedures.** Commanders, staff, and airspace users have many standardized control means to assign responsibility, ensure conformity with the tactical plan, describe and illustrate the concept, maintain separation of forces, concentrate effort, coordinate fires with maneuver, and assist in the command and control of forces. When incorporating airspace procedural control measures with these SOPs, Army forces can graphically depict the integration, coordination, regulation, and identification of Army airspace users in a given area of operations. FM 5-0, combined arms manuals such as FM 3-91, and functional manuals provide further guidance for applying these operational procedures in various tactical operations.

3-72. The Army relies on procedural controls to synchronize airspace users. The Army's methodology for airspace control in this area is based on using standing operating procedures, graphics, coordinating altitude, fire support coordinating measures, air defense rules of engagement, and airspace control measures.

3-73. Standing operating procedures and operational graphics fix responsibility to the unit commanders responsible for controlling maneuver in the area of operations. For the vertical dimension of the area of operations, Army aircraft—except for special electronic mission aircraft (SEMA) and UAV—operate largely in the terrain flight environment below the coordinating altitude. Accordingly, as with other maneuver elements, SOPs provide the most effective control techniques for this environment. Fire support coordinating measures help the fire support coordinators ensure that fire support systems interface and that fires do not jeopardize troop safety or disrupt adjacent unit operations. Air defense

rules of engagement—chiefly hostile criteria, weapons control status, and weapon engagement zones—ensure identification and control of airspace users. Airspace users follow joint airspace procedural control measures only as required to supplement Army control measures and facilitate employing joint forces. Commanders use such measures on a case-by-case evaluation; use the factors of METT-TC; and consider the requirements of other service components.

3-74. Army command and control systems—specifically those in the battlefield operating systems, functional areas of maneuver (including A2C2), fire support, and air defense—provide an important adjunct to the use of procedural control.

Conflict Resolution

3-75. Determining the exact combination and type of operational procedure, fire support coordinating measure, air defense procedural control technique, airspace procedural control measure, or positive control means is a key part of the A2C2 process. Representatives of the A2C2 element at each command echelon, with expertise in their respective branches and functional areas, perform this activity.

3-76. **During Planning.** During the planning process, the A2C2 staff identifies potential airspace conflicts and the degree of acceptable risk among the various airspace users. They then establish appropriate procedures to resolve the conflict or reduce the risk. While analyzing the situation and concept of operations, the focus is directed to the scheme of maneuver, plan for fires, and counterair operations. Early in the planning phase, the A2C2 staff reviews supporting plans, overlays, and sketches. This graphically depicts maneuver, fires, air defense, reconnaissance and surveillance, EW, and sustaining operations. This geographical review identifies where the intended actions of two or more airspace users (or other combatants) come into contact or close proximity. These are the areas of potential airspace conflict. When automated, actual airspace conflicts can be automatically identified three-dimensionally and by time.

3-77. A2C2 planners further evaluate each potential conflict by studying the altitude and time. If the airspace users involved have an altitude separation that can provide adequate safety, then a conflict does not exist. If the airspace users operate at the same altitude, the evaluation process must continue. If time separates the airspace users, then a conflict does not exist. However, if the airspace users conduct operations at the same time, then a potential for conflict exists.

3-78. To resolve each identified airspace conflict, the A2C2 element will advise the commander of one or more options:

- Change the time sequence or relocate the airspace user or another element.
- Eliminate an airspace user or restrict the operation of an airspace user.
- Recommend the decision to accept the risk.

3-79. The A2C2 element first selects the appropriate means of ensuring conformity with the tactical plan, preventing interference among units, and synchronizing the effective use of airspace. It then ensures these means are established with, communicated to, and coordinated with the commander and staff of the combined arms team. Map overlays, operation overlays and sketches,

coordinating instructions, and annexes to OPORDs are rechecked to verify that they include the required operational graphics and control measures.

3-80. Sometimes conflicts between airspace users or requirements for using airspace arise between interechelons. The conflict is then resolved at the next higher headquarters. The element refers major unresolved airspace control conflicts at the land component commander and air component commander levels to the joint operations center at the joint force headquarters. Examples of conflict and potential resolutions include—

- A low-level transit route (LLTR) or minimum-risk route positioned over fire support units. If involving a single fire support unit, move the unit or accept the risk. If involving multiple fire support units, move the LLTR.
- A standard use Army aircraft flight route crossing a LLTR. Develop procedures to cross the LLTR or accept the risk.
- A forward arming and refueling point (FARP) or aviation unit locates in front of a fire support unit or ADA unit that is in a weapons free control status or locates so that aircraft overfly the fire support or ADA unit. Move the FARP or move the unit. If an AD unit, ensure that its weapon control status is tight.
- An air control point and an AD unit in a weapons free weapons control status are located in the same area. Move either the air control point or the AD unit or put the AD system on weapons tight (if appropriate).
- An air assault or movement operation overflying AD or fire support weapon systems that is in a weapons free control status (both going and returning). If moving all systems is impractical, place all AD systems in or near the route on weapons tight during the outbound and inbound flight times. Establish formal airspace coordination areas where air corridors exist to ensure that no weapons will fire through the corridors. Any combination of the above options may be used.
- An airdrop operation conducted without restricting other air traffic from the area. Establish a ROZ over the drop zone.
- A major ground battle projected for a specific area. The commander expects the battle to be his decisive fight. He must use all his assets in the area without interference. Create a HIDACZ over the battle area.

3-81. **During the Battle.** A2C2 actions taken during the planning cycle is one aspect of the A2C2 process. Reacting to changes in the tactical situation during the conduct of the battle requires similar A2C2 actions. While executing tactical missions, the A2C2 element receives changes in missions, evaluates the situation, and identifies requirements for airspace and potential conflicts between airspace users. The element then selects, coordinates, and implements options to resolve the conflicts and synchronize forces.

3-82. For example, during the conduct of a successful defensive mission, the division has issued a FRAGO to the aviation brigade directing the brigade to conduct a hasty attack against an enemy uncommitted reserve force. The A2C2 staff element within the brigade, in concert with the division A2C2 element, begins to monitor development of the proposed scheme of maneuver and supporting plan for fires. The staff compares operational measures to support the scheme of maneuver with those of supporting air force elements. They plot the routing of CAS aircraft. They establish and coordinate contact points, initial

points, pop-up points, and other airspace control measures. The staff reviews and coordinates fire support plans, priorities, targets, fire support coordinating measures, and artillery unit locations with all appropriate forces. They also review and coordinate air defense artillery unit locations, sectors of fire, weapons control status, and identification procedures and direct changes. The staff reviews sustaining plans, such as aerial movement of Class III and V products to FARPs; they coordinate routing of aircraft conducting logistic support missions with other operation plans.

3-83. The A2C2 element identifies and coordinates special ATS support requirements. One such requirement includes designating the communications net and element that will serve as the control authority for any established airspace control measures.

3-84. The differences between A2C2 actions taken during the planning cycle and those performed during the conduct of operations is in the time available to establish selected control measures through the ACA and to coordinate and disseminate information. Using standard operational graphics and other control means allows a more rapid response to changes, regardless of the situation. To synchronize all elements of combat power, the forward air controller (FAC), CAS flight leader, attack helicopter commander, and field artillery air observer must directly communicate and see the target area and friendly forces. The very nature of CAS requires a high degree of terminal control techniques and procedures because of the proximity of friendly forces and the target.

3-85. The Army Air-Ground System interfaces with the Tactical Air Control System. This joint system provides positive control of CAS missions.

SPECIAL AIRSPACE USERS

3-86. Unmanned aerial vehicles, SEMA flights, heliborne electronic warfare flights, Army Tactical Missile System (ATACMS), Multiple Launch Rocket System (MLRS), and others that operate above the coordinating altitude require airspace control measures for proper coordination. This can result in a mixture of positive and procedural controls. ATACMS is discussed in Chapter 4.

UAV Flights

3-87. UAV flights require airspace conflict resolution, established control measures, and coordinated missions with the other users. The UAV avoids airspace conflict resolution by separating in time, in altitude, and by sector (zone) from other aerial platforms and missions. Establishing airspace control measures provides procedural control that ensures reduced conflicts.

3-88. Units employ airspace procedural control measures such as ROZs and special corridors. ROZs support UAV launch and recovery sites and large mission areas; special corridors are useful for UAV flights in a narrow corridor (route). A ROZ in the vicinity of the FLOT and extending forward to the FSCL can restrict tactical air operations. This situation may cause other airspace users to weigh the risk and request clearance from the controlling authority to transit through the UAV ROZ. The airspace control authority requires the UAV unit to identify needed airspace control measures for the ACO for all known planned or preplanned UAV missions and to identify any areas anticipated for immediate UAV missions requirements. The ACA normally requires that commanders

report all planned or preplanned UAV missions for the ATO. ATS personnel can then alert other air traffic to the UAV unit's intention to activate the pertinent airspace control measures as listed in the ATO with respect to UAV mission.

3-89. UAV users establish positive control of those UAVs under direct control of a forward ground control station. Communications among the controlling ground control station, A2C2 element, fire support personnel, and FAC permit the UAV mission to integrate with other missions.

3-90. Timely dissemination of information concerning UAV operations is accomplished through the A2C2 system. UAV operational information coordinated with other airspace users includes—

- Location of central launch and recovery section (CLRS) elements and the altitude and radius around the launch site that must be avoided.
- Flight times.
- Operational altitudes (flight profile).
- Ingress and egress routes from the CLRS to the forward control station hand-off point.
- Area (route) of the intended flight.

SEMA Flights

3-91. Special electronic mission aircraft flights require airspace conflict resolution and interface with the appropriate elements of the integrated airspace control system. Airspace required to accommodate typical flight profiles is significant. Normally a ROZ provides the airspace control measure to support the operational requirements of a SEMA mission.

3-92. To establish a restricted operations zone, the supporting unit submits an airspace request to the airspace control authority. This request is submitted through the airspace coordination channels of the A2C2 system to the A2C2 section of the BCD.

3-93. In addition to obtaining the required airspace to support SEMA flights, a sequence of coordination actions must occur. When the corps tasks a supporting unit to conduct intelligence, surveillance, and reconnaissance missions, the flight operations element and crew of the unit conduct the necessary flight planning and submit the request for airspace. Other information related to the scheduled mission is disseminated and coordinated through the corps A2C2 system. The ATO reflects all preplanned SEMA missions. Occasionally mission requirements call for an immediate and dynamically retasked SEMA mission, but mission requirements cannot be incorporated into the published ATO because of time lines. In these cases, planners coordinate the SEMA mission requirements—profile, altitude, mission area, and flight routes—through the appropriate A2C2 element to the ACA via other means such as radio. Disseminating the ATO ensures that all users have information relevant to the SEMA mission.

3-94. Having the SEMA mission listed in the ATO is the normal procedure used to achieve advanced airspace coordination. Units will normally pursue another course of action (immediate radio or electronic coordination with A2C2 units) when they lack the time to get the mission into the ATO and ACO planning cycle (immediate and dynamically retasked missions). For example, in response to an immediate SEMA tasking mission, the unit flight operations section and aircrew

file a flight plan with the appropriate A2C2 element for the supported organization.

Heliborne Electronic Warfare Flights

3-95. The ACA approves restricted operations zones to support heliborne EW missions. The required request procedures and coordination are similar to the actions described for SEMA airspace. In addition to the airspace control measures required by the heliborne EW system, EW operations must synchronize with operation plans.

Identification of Airspace Users

3-96. To effectively integrate friendly air assets and air operations with air defense operations, the airspace control function must conform to other air defense operations. For effective performance of the active air defense, correct identification of aircraft must be commensurate with the capability of the air defense system and weapons employment.

3-97. Airspace control measures and the A2C2 system must complement and support the air defense identification requirement. This ensures timely engagement of enemy aircraft, conserves air defense assets, and reduces potential fratricide. Through airspace control methods and air defense weapon systems, units can identify aircraft as friendly or hostile without unduly restricting friendly air maneuver or their ability to engage hostile aircraft. With the INFOSYS, the A2C2 system informs all airspace users and air defense units to facilitate identification, friend or foe (IFF).

3-98. Identifying air assets in the combat zone and terrain flight environment is difficult. Identification largely depends on a mix of procedural and positive control measures. Minimum risk procedures and practices afforded by selected airspace control measures are procedural and complement the primary positive means of identification—visual identification, IFF, and selective identification feature (SIF) procedures.

3-99. Army forces employ standing operating procedures, ADA rules of engagement and control measures, indirect information (such as flight plans, OPORDs, and other intelligence data), selected airspace control measures, and IFF and SIF procedures to assist in the identification process. INFOSYS coordinate, process, disseminate, and facilitate identification requirements.

Chapter 4

Airspace Control Measures

Army operations require the commander to employ a combination of positive and procedural methods of control. Common joint standing operating procedures, Army standing operating procedures, and theater specific control measures afford the necessary methods for the procedural control of airspace. The Army's airspace control methodology emphasizes the procedural control of airspace.

METHODS OF AIRSPACE CONTROL

4-1. Airspace control uses positive control, procedural control, or a combination of both. Positive control is conducted by elements designated by the airspace control authority (ACA). It relies on positive identification, tracking, and direction of aircraft in the airspace control area. It uses electronic means such as radar; sensors; identification, friend or foe (IFF) systems; selective identification feature capabilities; digital data links; voice; and other identification methods. Procedural control is used when positive control is not possible and relies on a combination of mutually agreed and promulgated orders and procedures. These may include comprehensive air defense (AD) identification procedures, rules of engagement, aircraft identification maneuvers, fire support coordinating measures (FSCMs), and airspace control measures (ACMs). Service, joint, and multinational capabilities and requirements determine which methods or elements of each that the airspace control plans and systems use.

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PROCEDURAL AIRSPACE CONTROL MEASURES

4-2. As discussed in Chapter 1, the joint force commander (JFC) designates an ACA to develop, coordinate, and publish airspace control procedures for operating the airspace control system in the joint operations area. He establishes an airspace control plan, which includes procedural ACMs—such as, restricted operations areas (ROAs), high-density airspace control zones (HIDACZs), and minimum-risk routes (MRRs)—defensive ACMs, and FSCMs. The airspace control plan provides specific planning guidance and procedures to support various operation plans of a joint or multinational force. The airspace control order implements the airspace control plan and provides the details of the approved requests for ACMs.

4-3. Airspace control measures are rules, mechanisms, and directions governed by joint doctrine and defined in the airspace control plan. These measures control how to use airspace of specified dimensions. Airspace elements establish ACMs to accomplish one or more functions:

- Establish reserved airspace for specific airspace users.
- Restrict the actions of some airspace users.
- Create airspace in which units can use weapons with minimal risk of fratricide.
- Control actions of specific airspace users.
- Require airspace users to accomplish specific actions.

COMMON JOINT AIRSPACE CONTROL MEASURES

4-4. The joint commands agreed on several ACMs used by Army airspace command and control (A2C2) elements. JP 3-52 provides additional information on each listed airspace control measure as well as information on other ACMs used by A2C2 elements.

Common Joint ACMs

- **Coordinating Altitude**
- **Low-Level Transit Route**
- **Minimum-Risk Route**
- **Restricted Operations Area**
- **Special-Use Airspace**
- **High-Density Airspace Control Zone**
- **Standard Use Army Aviation Flight Routes**

Coordinating Altitude

4-5. *Coordinating altitude* is a procedural airspace control method used to separate fixed- and rotary-wing aircraft. This method determines an altitude below which fixed-wing aircraft will normally not fly and above which rotary-wing aircraft normally will not fly. The coordinating altitude is normally specified in the airspace control order and may include a buffer zone for small altitude deviations (JP 3-52). Figure 4-1 illustrates this method. The coordinating altitude can vary from theater to theater and even within a theater. It does not prohibit using fixed- or rotary-wing aircraft in airspace above or below the coordinating altitude; however, aircraft that need to cross the coordinating altitude should coordinate with the appropriate controlling agency before they penetrate it. When aircraft pass into the airspace above or below a coordinating altitude, control—either positive or procedural—always reverts to the controlling authority for that airspace. Coordinating altitudes do not apply to air defense artillery (ADA) or field artillery fires.

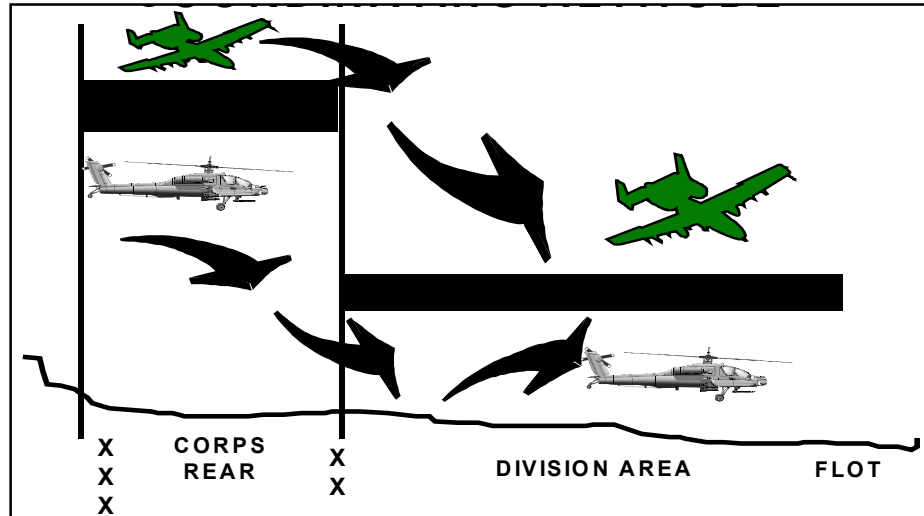


Figure 4-1. Coordinating Altitude

Low-Level Transit Route

4-6. A *low-level transit route* (LLTR) is a temporary corridor established in the forward area to minimize risk to friendly aircraft from friendly AD or surface forces (JP 3-52). These routes are used only within NATO. The ACA specifies how many LLTRs to establish to accommodate air operations. Division and corps commanders nominate LLTR ground traces. The A2C2 element plans the actual LLTRs with Air Force coordination and assistance. A well-planned LLTR accommodates transiting aircraft by being oriented on terrain features that allow easy visual navigation. Aircraft should also avoid critical areas and assets defended by ADA and areas of anticipated intense combat operations, such as the objective of the decisive operation. Additionally, airspace elements establish the corridor to avoid—

- Field artillery positions.
- Targets planned for engagement with ground-based systems.
- Landing zones, pickup zones, forward arming and refueling points, landing sites, and airfields.
- Known enemy ADA locations.
- Other planned or active special-use airspace (for example, ROAs, HIDACZs, or special corridors).

Minimum-Risk Route

4-7. A *minimum-risk route* is a temporary corridor of defined dimensions recommended for use by high-speed, fixed-wing aircraft that presents the minimum known hazards to low-flying aircraft transiting the combat zone (JP 3-52). See Figure 4-2 on page 4-4 for a graphic illustration. The dimensions of a MRR vary; the route may change frequently and may extend below the coordinating altitude. MRRs are established considering the threat, friendly operations, terrain, known restrictions, and fire support locations. Ground commanders nominate MRRs through the A2C2 system to the ACA. Friendly fixed-wing aircraft on cross-forward line of own troops missions primarily use these routes.

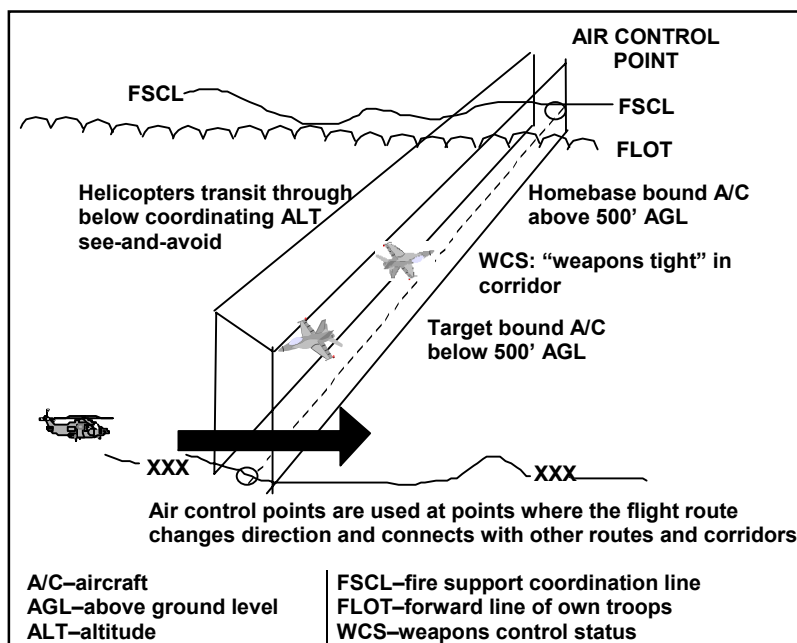


Figure 4-2. Minimum-Risk Route

Restricted Operations Area

4-8. As seen in Figure 4-3, a *restricted operations area* is that airspace of defined dimensions created in response to specific operational situations or requirements within which the operation of one or more airspace users is restricted. It is also known as a restricted operations zone (ROZ) (JP 3-52). The ROA or ROZ significantly helps to deconflict surface attacks, prevent duplicated effort, and prevent fratricide by closely restricting airspace access over a designated surface area.

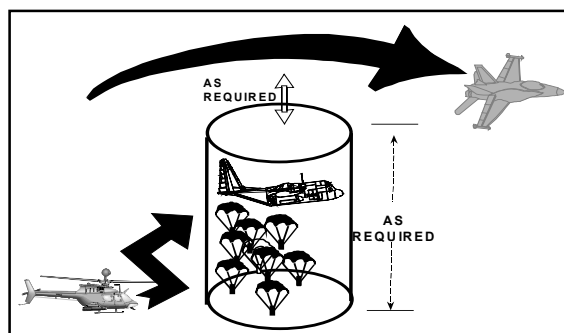


Figure 4-3. Restricted Operations Area

4-9. Maneuver commanders request ROAs or ROZs; the ACA approves them. Commanders use ROAs or ROZs to support many types of operations. Some typical uses are to restrict air operations over Army Tactical Missile System (ATACMS) launch and target areas as well as unmanned aerial vehicle (UAV) launch and recovery areas.

Special-Use Airspace

4-10. Special-use airspace is an area of airspace reserved for a specific purpose and is established by the ACA. It may also designate airspace in which no flight activity is authorized. Special-use airspace typically applies to base defense zones, combat air patrol (CAP) and orbit areas. See JP 3-52 for more details. Location, orientation, altitude, and time define CAP and orbit areas.

They allow the joint force air component commander (JFACC) and other component commanders to pre-position air assets for surveillance, reconnaissance, air defense, battle management, and anticipated air strikes.

High-Density Airspace Control Zone

4-11. A *high-density airspace control zone* is an area in which there is a concentrated employment of numerous and varied weapons or airspace users (JP 3-52). This zone restricts airspace use because of the large volume and density of fires supporting ground operations within the described geographical area. See Figure 4-4. A HIDACZ has defined dimensions, which usually coincide with geographical features or navigational aids. A ground commander requests a HIDACZ and the ACA approves it.

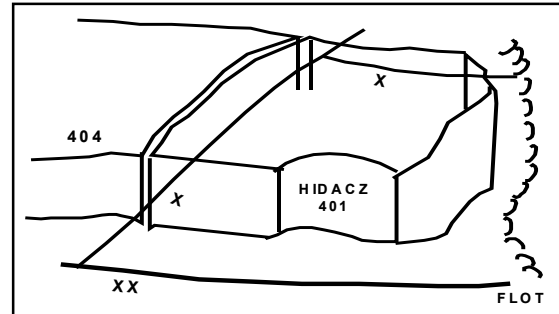


Figure 4-4. High-Density Airspace Control Zone

A ground commander requests a HIDACZ and the ACA approves it.

4-12. By establishing a HIDACZ, the ground commander forces other airspace users either to operate elsewhere or under the conditions and restrictions that he has established. The A2C2 element of the requesting headquarters for a HIDACZ must be prepared to provide the following guidance and directions for all airspace users:

- Low-level transit routes and minimum-risk routes into and out of the HIDACZ.
- Fire support coordination.
- Air traffic advisory.
- ADA weapons control status coordination.
- Enemy unit locations.
- Procedures for expeditious movement of aircraft into and out of the HIDACZ.

Standard Use Army Aircraft Flight Routes

4-13. Ground commanders establish standard use Army aircraft flight routes (SAAFRs) below the coordinating altitude to provide safe routes for aviation assets performing combat support and combat service support missions. Figure 4-5 on page 4-6 shows a SAAFR. These routes do not need ACA approval if they remain below the coordinating altitude. If a coordinating altitude has not been established, then the requesting ground commander must get approval from the ACA. The A2C2 element must report SAAFRs to the ACA, and SAAFRs must appear on all A2C2 overlays. The A2C2 element at each echelon must develop the SAAFR structure in each respective area of operation.

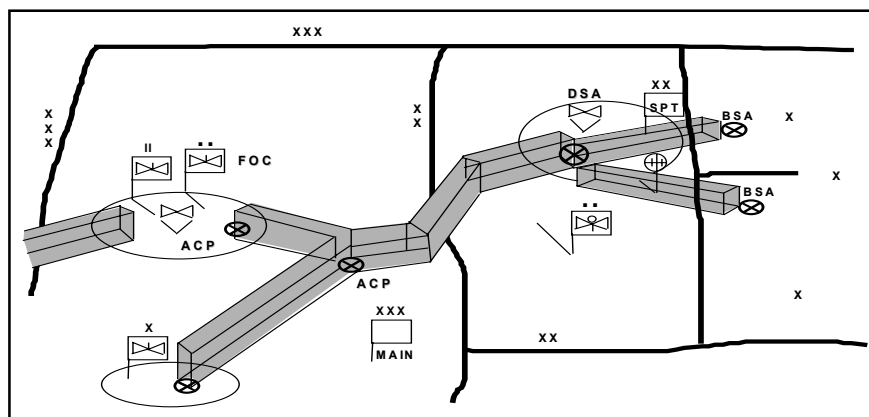


Figure 4-5. Standard Use Army Aircraft Flight Routes

ARMY AIRSPACE CONTROL MEASURES STANDING OPERATING PROCEDURES

4-14. The Army, in addition to the common joint ACMs, has developed standardized control measures. These measures assign responsibility; ensure conformity with the tactical plan; describe and illustrate the concept of operations; maintain separation of forces; concentrate effort; coordinate fires with maneuver; and assist in the command and control of forces. When Army forces incorporate airspace control measures with these standard control measures, they can graphically depict the integration, coordination, regulation, and identification of Army airspace users in a given area of operation. These measures are air corridor, axis of advance, air control point, battle position, engagement area, communications checkpoint, attack by fire position, and observation post.

Standing Operating Procedures

- Air Corridor
- Axis of Advance
- Air Control Point
- Battle Position
- Engagement Area
- Communications Checkpoint
- Attack by Fire Position
- Observation Post

Air Corridor

4-15. An *air corridor* is a restricted air route of travel specified for use by friendly aircraft and established for the purpose of preventing friendly aircraft from being firing on by friendly forces (JP 3-52). See Figure 4-6. Air corridors are used to route combat aviation elements between such areas as forward arming and refueling points, holding areas, and battle positions. These corridors also deconflict artillery firing positions with aviation traffic, including UAVs. Altitudes of an air corridor do not exceed the coordinating altitude. If a coordinating altitude has been established, the ground force commander implements an air corridor. If a coordinating altitude has not been established, the ACA, at the request of the ground commander, establishes an air corridor.

Axis of Advance

4-16. An axis of advance is a general route of advance, assigned for the purposes of control, which extends toward the enemy. The axis of advance symbol graphically portrays a commander's intention, such as avoiding built-up areas or known enemy air defense sites. When used for attack aviation operations, it provides the general direction of movement and may be subdivided into routes. See FM 3-90.

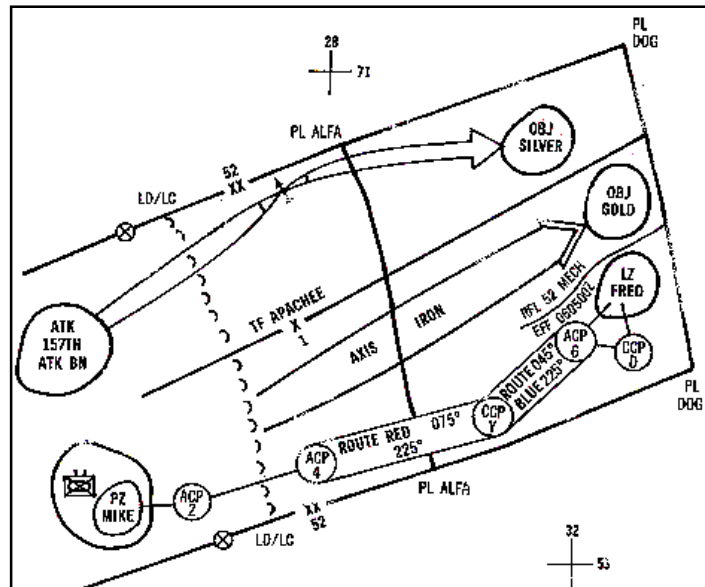


Figure 4-6. Air Corridor and Axis of Advance

Air Control Point

4-17. An *air control point* is an easily identifiable point on the terrain or an electronic navigational aid used to provide necessary control during air movement. Air control points are generally designated at each point where the flight route or air corridor makes a definite change in any direction and at any other point deemed necessary for timing or control of the operation. It is used to develop the routes for SAAFRs, LLTRs, and MRRs. Preplanned air control points facilitate the rapid restructuring of routes.

Battle Position

4-18. A battle position is a designated area in which attack helicopters can maneuver and fire into a designated engagement area or can engage targets of opportunity. Elements assigned a battle position will locate within the general area (as outlined by the battle position) and may move within the outline of the battle position. See FM 3-90.

Engagement Area

4-19. An engagement area lies along an enemy avenue of approach where the commander intends to contain and destroy an enemy force with massed fires of all available weapons. When multiple airspace users operate simultaneously, A2C2 elements will provide detailed planning and coordination to deconflict the airspace. See FM 3-90.

Communications Checkpoint

4-20. The communications checkpoint is a type of air control point. It requires serial leaders to report to either the aviation mission commander or to the terminal control facility.

Attack by Fire Position

4-21. An attack by fire position designates the general position from which a unit conducts the tactical task of attack by fire. The purpose of these positions is to increase the supported force's freedom of maneuver; it does not indicate a specific site. See FM 3-90.

Observation Post

4-22. An observation post is a position from which soldiers make observations or direct and adjust fires. This post possesses appropriate communications. It may be airborne. See FM 3-90.

AIR DEFENSE AIRSPACE CONTROL MEASURES

4-23. Airspace control and air defense operations are linked inextricably in enemy engagement operations. Because of this link, airspace control measures used for air defense must be part of the A2C2 plan. The A2C2 elements must plan and coordinate, in detail, these control measures.

- ACMs for Air Defense**

 - **Base Defense Zone**
 - **Weapon Engagement Zone**
 - **Weapons Free Zone**
 - **Air Defense Identification Zone**

The ACMs may be requested by the A2C2 elements and submitted to the area air defense commander (AADC) for approval and inclusion on the airspace control order (ACO). Some common procedural ACMs used in air defense operations are listed. FM 3-52.1 and JP 3-52 provide additional information.

Base Defense Zone

4-24. A *base defense zone* is an air defense zone established around an air base and limited to the engagement envelope of short-range air defense weapon systems defending that base (JP 3-52). Base defense zones as shown in Figure 4-7 have specific established entry, exit, and IFF procedures. The base defense zone may be thought of as a specific type of ROA or special-use airspace.

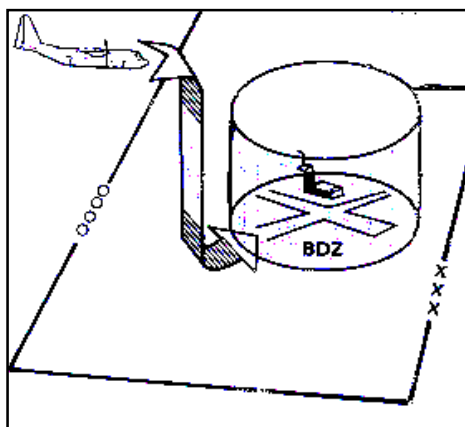


Figure 4-7. Base Defense Zone

Weapon Engagement Zone

4-25. *Weapon engagement zones* (WEZs) are airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with a particular weapon system (JP 3-52). Examples of weapon engagement zones include the high-altitude missile engagement zone,

low-altitude missile engagement zone, fighter engagement zone, joint engagement zone, and short-range air defense engagement zone. The area defined by the WEZ depends on specific weapon system capabilities.

Weapons Free Zone

4-26. The *weapons free zone* is an air defense zone established for the protection of key assets or facilities, other than air bases, where weapon systems may be fired at any target not positively recognized as friendly (JP 3-52). See Figure 4-8. It is used for high-value asset defense and in areas with limited command and control authority. The AADC declares the zone weapons free and the ACA approves the requested zone.

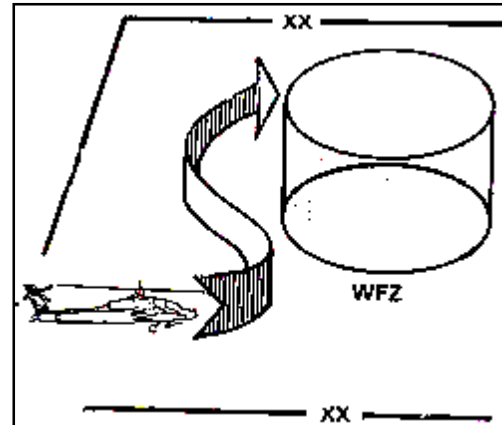


Figure 4-8. Weapons Free Zone

Air Defense Identification Zone

4-27. An *air defense identification zone* (ADIZ) is airspace of defined dimensions within which the ready identification, location, and control of airborne vehicles are required (JP 3-52). The ADIZ is associated with nations or areas of operations and is normally the transition between procedural and positive control areas. This zone is used for sovereign national boundaries or, in the case of military operations, for identification into the rear areas. ADIZs are theater specific and established by the AADC.

FIRE SUPPORT COORDINATING MEASURES

4-28. Fire support coordinating measures are important elements in any A2C2 plan. Integrating the FSCMs and ACMs can be extremely difficult. The measures are not complementary and may cause conflicts between airspace users and fire delivery systems. All indirect fires pose a potential hazard to other friendly airspace users. The highest probability of conflict occurs at relatively low altitudes in the immediate vicinity of the firing unit and target location. Commanders incorporate FSCMs to facilitate rapidly engaging targets while simultaneously providing safeguards for friendly forces. Fire support coordination associated with A2C2 occurs at all levels, from the fire support officer at the maneuver battalion command post to the fire support elements at each higher echelon. The G3/S3 ensures integration of the fire support mission through A2C2. A2C2 elements must work with fire support elements and tactical air control parties to ensure that appropriate FSCMs and ACMs are planned, requested, and approved to support the ground commander's scheme of maneuver. Properly planned and coordinated FSCMs and ACMs do

FSCMs	
•	Permissive FSCMs
▪	Free-Fire Area
▪	Coordinated Fire Line
▪	Fire Support Coordination Line
•	Restrictive FSCMs
▪	Airspace Coordination Area
▪	Restricted Fire Line
▪	No-Fire Area
▪	Restricted Fire Area

not restrict the ground commander's ability to effectively employ fires in support of maneuver. FSCMs are divided into permissive and restrictive measures. See JP 3-09 and FM 3-09 for discussions on FSCMs.

PERMISSIVE FIRE SUPPORT COORDINATING MEASURES

Free-Fire Area

4-29. A *free-fire area* (FFA) is a specific designated area into which any weapons system may fire without additional coordination with the establishing headquarters (JP 3-09). Only the commander with jurisdiction over the area—usually a division or higher commander—may establish a FFA. The FFA should be located on identifiable terrain; however, grid coordinates may designate it.

Coordinated Fire Line

4-30. The coordinated fire line (CFL) is a line beyond which conventional—direct and indirect—surface fire support means may fire at any time in the boundaries of the establishing headquarters without additional coordination. Its purpose is to expedite the surface-to-surface attack of targets beyond the CFL without coordination with the ground commander in whose area of operation the targets are located. A brigade or division commander usually establishes the CFL.

Fire Support Coordination Line

4-31. The fire support coordination line (FSCL) facilitates the expeditious attack of targets of opportunity beyond the coordinating measure. It does not divide an area of operations (AO). It applies to all fires of all weapon systems using any munitions against surface targets. The appropriate land commanders—in consultation with superior, subordinate, supporting, and affected commanders—establish and adjust the FSCL in their boundaries. Changing the FSCL requires notifying all the affected forces in the AO and must allow sufficient time for these forces to incorporate the change. FM 3-09 discusses fire support coordination lines.

RESTRICTIVE FIRE SUPPORT COORDINATING MEASURES

Airspace Coordination Area

4-32. The *airspace coordination area* is a three-dimensional block of airspace in a target area, established by the appropriate ground commander, in which friendly aircraft are reasonably safe from friendly surface fires. The airspace coordination area may be formal or informal (JP 1-02). This area facilitates the simultaneous attack of a target or target near each other by multiple assets, usually air and surface-to-surface fires. The Army defines an *airspace coordination area* as a block or corridor of airspace in which friendly aircraft are reasonably safe from friendly surface fires. The airspace coordination area may be formal or informal.

4-33. **Formal Airspace Coordination Area.** Formal airspace coordination areas require detailed planning. The vertical and lateral limits of such areas allow freedom of action for air and surface fire support against the greatest

number of targets. The airspace control authority establishes formal airspace coordination areas at the request of the appropriate ground commander (normally brigade and higher level). Information defining a formal airspace coordination area includes minimum and maximum altitudes, a baseline designated by grid coordinates at each end, the width (on either side of the baseline), and the effective times. See Figure 4-9.

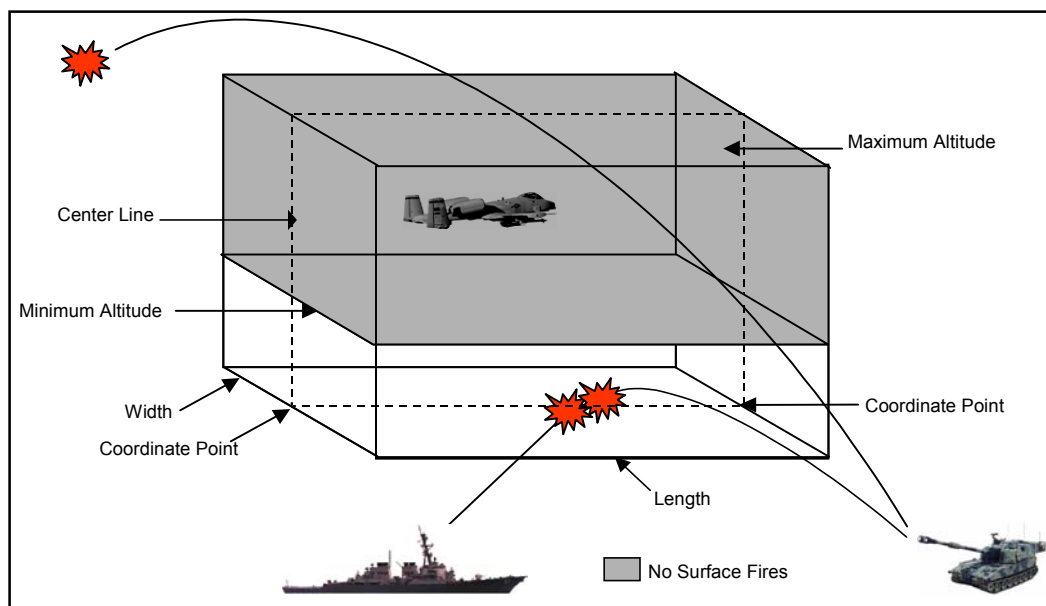


Figure 4-9. Formal Airspace Coordination Area

4-34. **Informal Airspace Coordination Area.** At the request of subordinate A2C2 elements, the ground commander can ask the ACA to establish informal airspace coordination areas. An informal airspace coordination area can be established at battalion task force level or higher. Aircraft and surface fires may be separated by time or distance (laterally, by altitude, or by a combination of lateral or altitude). Distance separation requires less-detailed coordination between aircraft and firing units, but it can be the most restrictive for aircraft routing. Fire support personnel should select the separation technique that requires the least coordination without adversely affecting the aircrew's ability to safely complete the mission.

Restrictive Fire Line

4-35. A *restrictive fire line* (RFL) is a line established between converging friendly surface forces that prohibits fires or their effects from crossing that line. The purpose of the RFL is to prevent fratricide and duplication of attacks by converging friendly forces. The commander common to both friendly forces establishes the RFL (JP 3-09).

No-Fire Area

4-36. A *no-fire area* (NFA) is a land area designated by the appropriate commander in which fires or their effects are prohibited. There are two exceptions. The first exception is when the establishing headquarters approves

fires in the NFA on a mission-by-mission basis. The second is when an enemy force within the NFA engages a friendly force, the commander may engage the enemy to defend his force. It is established on identifiable terrain (if possible), by grid coordinates, or by a radius from a center point (FM 3-09).

Restrictive Fire Area

4-37. A restrictive fire area (RFA) is an area in which specific restrictions are imposed and into which fires that exceed those restrictions will not be delivered without coordination with the establishing headquarters. A maneuver battalion or higher commander normally establishes RFAs. The RFA is established on identifiable terrain, by grid, or by a radius from a center point.

DECONFLICTION METHODS

4-38. Despite detailed planning and coordination, airspace conflicts will arise. All echelons of A2C2 elements must be prepared to deconflict airspace, facilitate using weapons platforms, and prevent fratricide. All A2C2 plans should include some deconfliction methods. Two examples of deconfliction methodologies are time separation and common reference system.

TIME SEPARATION

4-39. Time separation requires detailed coordination. It may be required when aircraft, manned and unmanned, must fly near indirect-fire trajectories or ordnance effects. This procedure requires extensive coordination between the fire support coordinator and the A2C2 element. The timing of surface fires must be coordinated with aircraft routing. This ensures that even though aircraft and surface fires may occupy the same space, they do not do so at the same time. All timing for surface fires is based on the specific aircraft event time—time on target and time to target. Time separation works appropriately when aircrews and firing units engage the same or nearby targets.

COMMON REFERENCE SYSTEMS

4-40. Common reference systems provide a universal perspective with which to define specific areas of the battlespace, enabling commanders to efficiently coordinate, deconflict, and synchronize surface attacks. These systems result in rapid, deconflicted surface attacks; enhanced probability of mission success; and reduced potential for duplicated effort and fratricide. They also allow for rapidly coordinating joint engagement and employing combined arms. Such systems are flexible enough to use for other purposes, such as labeling search and surveillance areas, identifying restricted zones, and designating high-threat areas—such as enemy surface-to-air missile battery locations. These systems primarily provide the force with a common frame of reference. One such system is the Bullseye Reference System found in FM 3-52.1. JP 3-60 discusses the details of common reference systems.

SPECIAL AIRSPACE USERS

SPECIAL OPERATIONS

4-41. Special operations present a distinct challenge for Army airspace command and control. A2C2 elements must coordinate and deconflict special operations with conventional operations (to the battalion level) primarily via liaison with established conventional command and control agencies. The special operations liaison element (SOLE) coordinates and synchronizes special operations forces (SOF) air and surface operations with joint air operations for the joint force special operations component commander.

4-42. Restrictive fire areas, no-fire areas, or possibly ROAs can protect most areas of special operations. The A2C2 element coordinates these areas with the SOLE, special operations coordination element (SOCOORD), and special operations command and control element (SOCCE), which know the locations and activities of SOF in and outside of the area of responsibility.

4-43. Clandestine special operations, which do not permit published control measures, require direct coordination and deconfliction by the SOLE, SOCOORD, or SOCCE. Should proposed conventional operations put special operations at risk (by the ATACMS or deep attack by Army aviation or UAV operations), then the SOLE, SOCOORD, or SOCCE must deconflict or recommend disapproval because of the potential for fratricide or compromise.

UNMANNED AERIAL VEHICLE OPERATIONS

4-44. UAVs provide a significant challenge due to their small size, agility, and increasing density as well as their limited ability to detect, see, and avoid other aircraft. UAVs pose an operational hazard to manned aircraft operating nearby. UAV flights, like manned aircraft flights, must be coordinated to ensure deconfliction with other airspace users. UAV missions should be coordinated with the ACA, AADC, and the JFACC to safely separate UAVs from manned aircraft and to prevent engagement by friendly air defense systems.

4-45. The ACA may establish specific UAV flight routes and altitudes and publish them in the airspace control plan. The established principles of airspace management used in manned flight operations normally apply to UAV operations but may be waived by the JFC. UAV missions may be both preplanned and immediate in nature. Preplanned UAV flights should be included in the air tasking order, special instructions, or ACO. Immediate UAV missions will be coordinated with the appropriate airspace control agencies to safely separate UAVs from manned aircraft and to prevent inadvertent engagement by friendly air defense elements. Specific tactics, techniques, and procedures (TTP) for using UAV are in JP 3-55.1 and FM 3-52.1.

ARMY TACTICAL MISSILE SYSTEM

4-46. Corps or echelon above elements usually plan or request ATACMS operations. The key elements involved in ATACMS deconfliction are the corps fire support element, corps A2C2 element, battlefield coordination detachment, air support operations center, and the joint air operations center. ATACMS missions may be preplanned or immediate. TTP for the airspace deconfliction of the ATACMS missions may be found in FM 3-52.1.

Chapter 5

Army Airspace Command and Control Connectivity

This chapter identifies and describes the Army airspace command and control (A2C2) system; messages and reports; various interconnectivity links; and the subsystems used to accomplish A2C2 tasks. These descriptions provide the A2C2 element with the tools to perform the A2C2 functions regardless of the command structure of the operating environment.

For the near to mid term, A2C2 elements rely on procedural controls to deconflict airspace users and to minimize associated fratricide risks. Further reduction of fratricide risk requires advancements in integrating the Army Battle Command System software and hardware technology. Substantial progress is being made in the A2C2 arena with developed and integrated advanced hardware and software for Army Battle Command Systems.

A2C2 SYSTEM

5-1. The Army Battle Command System (ABCS), a US Army program, consists of systems that are related, connected, or both. It provides A2C2 and airspace management capabilities. The A2C2 system includes standardized common message and report formats, common data links, and battlefield automated systems that support the battlefield operating systems of fire support, maneuver, intelligence and electronic warfare, air defense, and combat service support. The ABCS software packages are evolving. A2C2 elements must coordinate with the battlefield automation system support specialists to determine the capabilities available on their specific Army Battle Command System. The Army requires a digitized, integrated, and automated system to provide total Army airspace command and control. This A2C2 system must, at a minimum, be capable of—

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- Interfacing with the Airborne Warning and Control System (AWACS), the International Civil Aviation Organization, and the Federal Aviation Administration Air Traffic Control System for real-time airspace management.
- Interoperating with all allied and joint systems.
- Interfacing with all Army information systems (INFOSYS).
- Directly interfacing with the Theater Battle Management Core System (TBMCS).
- Interfacing in near real-time with artillery, military intelligence, aviation, and air defense artillery systems and being able to transmit, receive, and graphically display data from these systems.
- Directly interconnecting with higher, lower, and lateral A2C2 systems to ensure rapid and accurate data transfer.

5-2. The primary provider of these capabilities is the Tactical Airspace Integration System (TAIS). It is the Army's enabling system for digitization, integration, and automation of A2C2 planning and operations as well as air traffic services. The TAIS is a component of the Army Battle Command System and supports the maneuver battlefield operating systems (BOS) (see Appendix C).

DIGITAL MESSAGE FORMATS

5-3. There are two basic types of digital messages based on format and message size: United States message text format (USMTF) and joint variable message format (VMF). The USMTF messages are used predominantly on the Army Tactical Command and Control System (ATCCS), the Global Command and Control System (GCCS), and joint command and control (C2) automation systems. VMF messages are used at the platform level to support Force XXI Battle Command Brigade and Below (FBCB2) and the tactical Internet.

5-4. *United States Message Text Format.* This format is an established set of standards, rules, and conventions governing message text formats. These standards provide common voice and automation templates that allow interoperability for all military operations. A2C2 elements use two types of USMTF messages and reports. They are ABCS templates and voice templates. Appendix A discusses these messages and reports. Additional information on USMTF may be found in the Joint User Handbook-Message Text Formats (JUH-MTF) and FM 6-99.2.

5-5. *Joint Variable Message Format.* This format consists of only essential information, allowing shorter messages than USMTF for reduced transmission time and network clutter. The messages support the information transmission and processing of FBCB2 from the platform up to embedded battle command software on the ATCCS. The ABCS can parse selected messages.

TACTICAL DIGITAL INFORMATION LINKS

5-6. Tactical digital information links (TADILs) are standardized communication links. They are suitable for transmission of digital and, in some cases, voice information. All Army INFOSYS use TADILs to transmit and receive

data. TADILs are characterized by their standard message and transmission formats. Several TADILs are used:

- TADIL-A/Link 11 is a secure, half-duplex that receives or transmits—but not both simultaneously—a sequential data exchange digital link. It exchanges digital information among airborne, land-based, and ship-board tactical data systems. It is the primary means to exchange data beyond line of sight. TADIL-A can be used on either high frequency (HF) or ultrahigh frequency (UHF). However, the Army uses only HF.
- TADIL-B/Link 11B is a full duplex, point-to-point, secure link used to simultaneously exchange tactical data between land-based units. TADIL-B uses super high frequency, very high frequency (VHF), UHF, and landlines for exchange. An adaptable surface interface terminal is required to translate interim Joint Tactical Information Distribution System (JTIDS) message specification into TADIL-B for exchanges between AWACS and TADIL-B users.
- TADIL-C/Link 4 is an unsecured, point-to-point link. It provides digital surface-to-air, air-to-surface, and air-to-air tactical communications. It is a general-purpose digital communications link between a control station and a controlled aircraft. TADIL-C uses UHF. The information exchange may be half- or full-duplex, depending on the ground platform and aircraft.
- Army tactical data link (ATDL)-1 is a secure, full duplex, point-to-point link for exchanging digital information among Army systems and between Army or Marine INFOSYS and surface-to-air missile systems. ATDL-1 uses UHF, VHF, or landlines to exchange information.
- Interim JTIDS message specification (IJMS) is a secure, line of sight, half-duplex, netted link supporting both voice and data communications for JTIDS users. IJMS provides the means to exchange digital information between aircraft and land-based units. IJMS is jam resistant and will be used as the interim link until TADIL-J is fully fielded.
- TADIL-J/Link 16 is a secure, jam-resistant, netted link that supports both voice and data communications. TADIL-J is used to exchange real-time data of air, ground, and maritime surveillance, electronic warfare, and intelligence.
- Patriot digital information link (PADIL) is a secure, full duplex, point-to-point link for exchanging digital information among Patriot batteries and between the battery and battalion control vans. PADIL uses UHF or landlines to exchange information. Only the battalion fire direction center (FDC) can exchange data with non-Patriot units or centers.
- Forward area air defense (FAAD) data link is used exclusively within the forward area air defense command, control, and intelligence system. It supports rapidly disseminating information used for target alerting, warning, and cueing.
- NATO Link 1 is a point-to-point, digital data link employed for the automatic data exchange of real-time tactical air defense and aircraft control units. NATO Link 1 can be used as a one-way (simplex) or two-way (duplex) link.

SUBSYSTEMS DESCRIPTIONS

5-7. The elements of the subsystems function and connect in the Theater Air-Ground System (TAGS). These subsystems include the TBMCS; Command and Control Initiatives Program (C2IP) system; ABCS; GCCS-Army; Maneuver Control System (MCS); Advanced Field Artillery Tactical Data System (AFATDS); Aviation Mission Planning System (AMPS); Joint Warning and Reporting Network (JWARN); Air and Missile Defense Planning and Control System (AMDPCS); Air Defense System Integrator (ADSI); TAIS; All Source Analysis System (ASAS); Integrated Meteorological System (IMETS); Digital Topographic Support System (DTSS); Combat Service Support Control System (CSSCS); and FFCB2. This section highlights the ABCS capabilities used for A2C2 rather than provides a detailed description for each.

Subsystems Descriptions

- | | |
|---------------|----------|
| • TBMCS | • AMDPCS |
| • C2IP system | • ADSI |
| • ABCS | • TAIS |
| • GCCS-Army | • ASAS |
| • MCS | • IMETS |
| • AFATDS | • DTSS |
| • AMPS | • CSSCS |
| • JWARN | • FFCB2 |

TBMCS

5-8. The Air Force uses the Theater Battle Management Core System to construct, disseminate, and execute the air tasking order (ATO) and airspace control order (ACO). The TBMCS interfaces with AFATDS, AMDPCS, and TAIS to support the production of the ATO, ACO, and airspace control measures request.

C2IP SYSTEM

5-9. The C2IP system is the Air Force information system used by the airlift coordination cell within the joint air operations center (JAOC). The system manages the request and execution of in-theater airlift requests. The C2IP system receives airlift requests from the joint movement control center and tracks their status.

THE ARMY BATTLE COMMAND SYSTEM

5-10. The ABCS is an integrated combination of automated C2 systems with horizontal and vertical digital interoperability and connectivity from echelons above corps to the individual platform or soldier level. Its three major components are the Global Command and Control System-Army (GCCS-Army), Army Tactical Command and Control System, and FFCB2.

5-11. The Army Tactical Command and Control System is the group of automation systems supporting the major BOS at corps, division, brigade, and battalion operations centers and command posts. Its major component systems that support the Army Air-Ground System include—

- MCS. Maneuver Control System (operations).
- ASAS. All Source Analysis System (intelligence).
- AFATDS. Advanced Field Artillery Tactical Data System (fire support).
- CSSCS. Combat Service Support Control System (administrative and logistics).

- AMDPCS. Air and Missile Defense Planning Control System (workstation for air defense elements from battery level to echelons above corps).
- TAIS. Tactical Airspace Integration System (air traffic services and A2C2).

5-12. These systems share information with each other, ensuring a common operational picture (COP). Friendly forces can develop and execute a highly integrated battle plan at a tempo that overwhelms opposing forces. It provides automatic data distribution for timely, horizontal, and vertical coordination by exchanging messages, maps, and graphic overlays.

GCCS-ARMY

5-13. The Global Command and Control System-Army provides a C2 system built around the defense information infrastructure common operational environment; it is being integrated with the DOD GCCS. GCCS-Army is fundamentally a GCCS with additional Army functionality. GCCS-Army displays the joint, globally-shared COP. The COP includes both friendly and enemy ground, air, and sea forces as well as battlefield geometry. Air tracks can be color-coded to reflect different ATO sorties.

5-14. The GCCS-Army capabilities cover communications, map backgrounds and overlay graphics, security, system management, workstation management, planning, intelligence, and user utilities. The capabilities of particular interest to A2C2 elements include communications, map backgrounds and overlay graphics, planning, and intelligence.

5-15. *Communications.* Communications include the Automated Message Handling System, message parsing, message fill, and routing.

5-16. *Map backgrounds and overlay graphics.* Map backgrounds and overlay graphics include—

- Standard National Imagery and Mapping Agency (NIMA) data.
- Datum transformation and coordinate conversion.
- Overlay graphics of—
 - Real-time display of friendly and enemy ground units.
 - Friendly and enemy aircraft.
 - Cruise missiles.
 - Unmanned aerial vehicles (UAVs) in flight.
 - Friendly and enemy ships.
 - Tactical ballistic missile (TBM) launch points, flight paths, and impact areas.
- Displayed battlefield graphics.
- Draw capability.

5-17. *Planning.* Planning includes—

- Global Status of Resources and Training System that graphically interfaces to a common pool of information about the status and location of military forces through the world.

- Joint Operation Planning and Execution System tools that develop courses of action for crisis management.
- Joint Maritime Command Information System that tracks the status, location, projected movement, and threat status of ships, submarines, airplanes, and shore units.

5-18. *Intelligence.* Intelligence includes the Joint Deployment Intelligence Support System that provides connectivity and interoperability with intelligence systems.

MANEUVER CONTROL SYSTEM

5-19. The MCS is the primary battle command automation system deployed from corps to battalion level. It provides commanders and operations staffs with the ability to collect, coordinate, and act on near real-time battlefield information and visualization. A MCS workstation also belongs to the G3 air. Designated S3 airmen at brigade and battalion use the S3's MCS. With MCS as the focal automation system supporting the G3 air, other liaisons to the A2C2 element bring digitized capabilities developed within their functional areas. These digital capabilities allow direct transfer of situation-specific A2C2 information and tailored display of the airspace overlay. Sending detailed graphics and large text files digitally to an A2C2 liaison officer (LNO) is more practical than sending lengthy voice communications required to convey the same information.

5-20. Digitization supporting other BOS at the A2C2 element may include the capability to cover map backgrounds and overlay graphics, messages and reports, planning, and user utilities. Capabilities of interest to A2C2 elements include map backgrounds and overlay graphics, messages and reports, and planning.

5-21. *Map backgrounds and overlay graphics.* Map backgrounds and overlay graphics include—

- Filter by unit type and size.
- Overlay creation and distribution.
- Overlay function for marking and labeling points of interest.
- Information sent on the MCS monitor using “Snap Shot” to AFATDS for comments.
- Attached operation orders (OPORDs) to the situation map.

5-22. *Messages and reports.* Messages and reports include—

- S302 free text messages.
- S507L friendly unit locations.
- S201 battlefield geometry.
- The ability to create distribution lists and automatically forwarded messages.

5-23. *Planning.* Planning covers—

- The course of action function allowing commanders to schedule events by unit to ensure proper coordination of effort.
- OPOrd and operation plan creation.

ADVANCED FIELD ARTILLERY TACTICAL DATA SYSTEM

5-24. The Advanced Field Artillery Tactical Data System is the fire support automated workstation component of ATCCS. It provides automated support for field artillery operations, to include joint and combined fires. It provides command, control, and communications for the Army and Marine Corps cannon, rockets, missiles, mortars, close air support, and naval surface weapon systems. This system enhances commanders with the ability to influence the battle by providing the right mix of firing platforms and munitions to defeat enemy targets. The system has high altitude weather sensors that input to the planned trajectory of munitions giving the most accurate projected use of airspace and airspace control measure requests to TAIS and TBMCS.

5-25. The AFATDS provides commanders with the ability to conduct automatic digital coordination on all fire support requests. It also checks incoming fire missions against the fire support coordinating measure (FSCM), airspace control measure (ACM), and unit zone of responsibility. AFATDS notifies the operator of any violations and electronically requests clearance from the unit that established the control measure. The unit must approve or deny the request before the mission can continue processing.

5-26. The AFATDS has capabilities of interest to A2C2 elements:

- Processes ATO (received from TBMCS, displayed, parsed, and transmitted to other information systems).
- Processes ACO (received from TBMCS, parsed specific ACMs, displayed as geometry, and transmitted to other information systems).
- Deconflicts ACMs with FSCMs.
- Transmits call for fires.
- Checks mission requests for violations to FSCMs and initiates automatic coordination.
- Displays airspace overlay provided by TAIS.

AVIATION MISSION PLANNING SYSTEM

5-27. The AMPS is an automated mission planning and synchronization workstation designed specifically for aviation brigade, battalion, and company commanders. Another system is authorized to each maneuver brigade and aviation A2C2 element liaison team. The AMPS provides the automated capability to plan, rehearse, and synchronize aviation missions. The aviation A2C2 LNOs—with the AMPS connected on the tactical operations center (TOC) local area network (LAN) and HF radio backup—can pull aviation mission planning to refine airspace requirements.

JOINT WARNING AND REPORTING NETWORK

5-28. The JWARN is an automated workstation linked via tactical communications to nuclear, biological, and chemical (NBC) detection devices in the theater. It provides comprehensive NBC warning, reporting, and analysis capabilities and can display the type of event, time of the event, type of burst or agent, area of contamination, downwind hazard, and units affected. It is the joint program that grew out of the Army Automated Nuclear, Biological, and Chemical Information System.

AIR AND MISSILE DEFENSE PLANNING CONTROL SYSTEM

5-29. The AMDPCS is a mission essential system that provides air defense artillery (ADA) commanders, staffs, and fire control crews with automated capabilities to enhance the execution of air and missile defense (AMD) operations. The AMDPCS is comprised of systems based on commercial and military power generation systems, environmental control systems, tentage or deployable rapid assembly shelters, and standard integrated command post shelters mounted on HMMWVs.

5-30. The AMDPCS contains Army generic and air defense unique radio systems. These radio systems support the multi-TADIL communication architecture, and commercial off-the-shelf and common hardware and software automated data processing equipment developed for the ABCS and the defense information infrastructure common operating environment. Appropriate configurations of the AMDPCS will be fielded at all echelons from short range air defense battery and high-to-medium altitude air defense battery through the echelons above corps (EAC) and corps ADA brigades to the Army air and missile defense command (AAMDC) or elements thereof.

5-31. The AMDPCS integrates AMD sensors, weapons, and command, control, communications, and intelligence (C3I) capabilities with those of higher echelon, adjacent and subordinate units. It then creates a cohesive, synergistic system capable of minimizing fratricide, protecting the force, and defeating or neutralizing the air and missile threat. It provides the automated interface for AMD elements at theater and below to the ABCS and the GCCS-Army, allowing unit commanders and staffs to plan, coordinate and control the AMD fight.

5-32. The AMDPCS is also capable of joint service information exchange and interfacing with appropriate allied C3I systems. The operators can automatically collect, process, sort, categorize, classify, correlate, store, and display air and missile track and battle command information. Commanders gain an automated data processing and exchange means by which to distribute decisions, orders, plans, and requests to higher, adjacent, and subordinate units and the supported force. The AMDPCS provides automated support to integrate engagement operations and force operations functions, while allowing for human intervention whenever required.

5-33. The AMDPCS produces a real- and near real-time airspace picture and provides the capability to coordinate A2C2 with other Army, joint, and combined elements. Significant capabilities of interest to the A2C2 functions are the AMDPCS's ability to provide either a stand-alone or fully integrated picture of the third dimension battlespace and its ability to influence combat identification. To help complete the A2C2 process, the air picture is provided to the division tactical and main command posts' A2C2 and G3 air, corps air defense elements, Army transformation elements, and various echelons above corps Army, joint, and combined locations. AMDPCS assets are the primary means of providing the air situational understanding picture to A2C2 locations and the Army Tactical Airspace Integration System. The AMDPCS can provide this air picture through unique communications assets. These assets support integration into the multi-TADIL communication architecture used

by joint, combined, and coalition platforms and by using special translator or forwarder systems such as the ADSI.

5-34. The AMDPCS capabilities include mapping; communications; call for fire; playback; security; and nuclear, biological, and chemical. Capabilities of interest to A2C2 elements include mapping and communications.

5-35. *Mapping*. Mapping includes—

- Composite military maps and false colored terrain from NIMA geospatial data. Available mapping options are ARC (equal Arc second raster Chart/map) digitized raster graphics (ADRG), digital terrain elevation data (gray scale or colored), satellite aerial image, and no map.
- Two-dimensional and three-dimensional draw and display capability.
- Sensor coverage.
- Datum transformation and coordinate conversion.
- Near real-time (as received) display of friendly and enemy ground units, friendly and enemy aircraft, cruise missiles, and UAVs in flight, friendly and enemy ships, and TBM launch points, flight paths, and impact areas.
- Displayed ACMs.
- Battlefield graphics display.
- Point-to-point distance and point-to-point sum determination.
- Line of sight determination.
- Common operational picture from MCS.
- Shot opportunity analysis.

5-36. *Communications* assets unique to the AMDPCS include—

- The AN/GSQ-240 Class 2M JTIDS radio. It allows the AMDPCS to receive IJMS data and to receive and transmit TADIL-J data. Future fieldings of the Multifunctional Information Distribution System radio will also support TADIL-J. TADIL-J is, or will be, the primary means by which the air picture information is shared among joint, combined, and coalition forces.
- The AN/ARC-187 UHF radio. It allows the AMDPCS to perform UHF voice communications with airborne platforms, such as AWACS and Hawkeye; land-based platforms, such as the Air Force air operations center and Marine tactical air operations center; and surfaced-based platforms, such as Aegis. This radio is used to coordinate TADIL-A net entry procedures, coordinate the joint interface control officer with the track data coordinator, monitor the voice product net, and participate on the air defense C2 net. A second AN/ARC-187 allows the AMDPCS to receive and transmit data using the TADIL-A UHF waveform. TADIL-A UHF can be designated as the secondary or tertiary means by which the air picture information is shared among joint, combined, and coalition forces.
- The Harris RF-350 Series HF radio and Harris RF-355 Power amplifier. They allow the AMDPCS to perform long-range HF voice communications with airborne platforms, such as AWACS and Hawkeye; land-based platforms, such as the Air Force air operations center and the Marine tactical air operations center; and surfaced-based platforms,

such as Aegis. This radio and amplifier are used to coordinate TADIL-A HF net entry procedures. Once permission to enter the TADIL-A HF net is granted, the RF-350 is switched to the data mode and allows the AMDPCS to receive and transmit data using the TADIL-A HF waveform at distances far greater than the capabilities of UHF radios. TADIL-A HF can be designated as the secondary or tertiary means by which the air picture information is shared among joint, combined, and coalition forces.

- Modems capable of supporting point-to-point protocols such as TADIL-B or the ATDL-1. These modems allow the AMDPCS to receive and transmit TADIL-B and ATDL-1 messages with land-based platforms, such as the Air Force air operations center, the Marine tactical air operations center, and other combined or coalition organizations. They use direct wire, mobile subscriber equipment, Army common user system, and Tri-Service Tactical Communications. They must use an indigenous analog-to-digital converter. TADIL-B or ATDL-1 can be designated the secondary or tertiary means by which the air picture information is shared among joint, combined, and coalition forces.
- The AMDPCS contains numerous other radios that are not unique to the AMD mission. However, without the radios identified above, no air picture provision would exist for the third-dimension battlespace for either the ABCS or A2C2 world.

5-37. Combat identification capabilities in the AMDPCS include:

- The ability to import external track data and identification information from airborne platforms, such as AWACS, Rivet Joint, and Hawkeye; land-based platforms, such as the Air Force air operations center and Marine tactical air operations center; and surfaced-based platforms, such as Aegis. This ability helps correlate with local track data, assign track identification, increase situational understanding, improve greater shot opportunities against hostile aircraft, and prevent or reduce fratricide events.
- The indigenous capability to interrogate selective identification features (SIF) and identification, friend or foe and to share that information among all multi-TADIL participants. Applying identifications assists the joint, combined, and coalition air defense units or platforms and A2C2 cells in their ability to command and control friendly assets and perform airspace deconfliction.
- The AMDPCS can interface directly with the Theater Battle Management Core System. This interface allows the AMDPCS to automatically download the ATO and ACO and submit airspace control requests as necessary. The ATO provides the air taskings for the period covered by the ATO and the associated SIF codes for each sortie. This information is provided to the A2C2 cells to assist in C2 and airspace deconfliction. Importing the ACO allows the AMDPCS to automatically display all airspace control measures being implemented during the associated time period. The AMDPCS can forward this graphic to the A2C2 cells and the TAIS to facilitate C2 and airspace deconfliction.
- The AMDPCS also can react outside the normal air tasking order cycle to initiate immediate identification and situational understanding of

friendly tracks over the multi-TADIL network that are not listed in the ATO. This capability does not reside anywhere else in the US Army. Commanders may implement this action under operational or emergency conditions and provide immediate support to the A2C2 cells. For example, prior to the conduct of a movement to contact, a corps or brigade commander may want to send out an UAV for reconnaissance of the expected maneuver area and enemy locations. As the UAV becomes airborne, the appropriate component of the AMDPCS will take the UAV under track, assign it a friendly identification, and transmit the track information and identification to all users in the airspace. In another example, during a movement to contact operation, a soldier is injured requiring medical evacuation air ambulance support. The AMDPCS will initiate track information, assign a friendly identification to the aviation asset, and provide the information to all users of the airspace, the A2C2 cells, and the TAIS. In both examples, the immediacy of the actions taking place precluded them from being incorporated in the normal ATO cycle. This means other users of the airspace would have no knowledge of the flights, which could result in friendly aircraft being engaged or cause safety of flight issues.

AIR DEFENSE SYSTEM INTEGRATOR

5-38. The ADSI is a multilink command, control, and communications system. It transmits, receives, translates, and forwards TADIL-A, TADIL-B, JTIDS or TADIL-J, FAAD data link, NATO Link-1, ATDL-1, tactical information broadcast service, tactical recovery of aircraft and personnel, surveillance radar data, and other source information among units. It provides a joint tactical picture at multiple operational facilities. The ADSI is a modular C2 system based on over 100 software modules and nearly 2 million lines of code. A typical ADSI has multiple processors connected over an Ethernet TCP and IP local area network. Army ADSIs are used today from the theater level down to the Patriot firing battery level. These integrators provide theater air and missile defense (TAMD) early warning, situational understanding, multi-TADIL and space-based intelligence communications processing, planning, and command and control. At the Army air and missile defense command, air defense artillery brigades, and Army aviation TAIS, the ADSI serves as the single point of entry for space-based intelligence and multi-TADIL architecture nets. This information is used for development of the single integrated air picture over the joint composite tracking network, common tactical picture over the joint data network, and the COP over the joint planning network. The ADSI is currently a commercial off-the-shelf product. However, the ADSI is the joint services go-to-war command, control, and communications processor. In the Army, it replaced a less capable, unsupported, and antiquated AN/TSQ-73, Missile Minder, at air defense units. At other Army locations, it provides a TAMD situational understanding capability that did not exist previously.

TACTICAL AIRSPACE INTEGRATION SYSTEM

5-39. TAIS is the designated ABCS used by the Army to integrate A2C2. It provides automated A2C2 planning; enhanced A2C2 execution; and improved theater, intracorp, intercorp, and division air traffic service (ATS) support.

It is used to synchronize battlespace in the third (altitude) and fourth (time) dimensions. It also has an added civil and government interagency capability. TAIS takes input from multiple sources and combines them into a single picture. Combined with the electronic ground picture, TAIS provides the commander with visualization for both the air and ground battlespace. TAIS provides a direct link to the TAGS through interface with the TBMCS. Replacing the AN/TSC-61B flight coordination central, TAIS provides automated A2C2 planning; enhanced A2C2 execution; and improved theater, intra- or inter-corps, and division ATS support. Although TAIS provides support at division levels and above, its products, such as the digital airspace overlay, are accessible from all Army Battle Command Systems, regardless of the echelon. Battalion and brigade-level A2C2 elements can access each TAIS A2C2 product from the Army Battle Command Systems located at their levels. TAIS is currently being fielded Armywide. Appendix C discusses TAIS in detail.

5-40. For A2C2 elements, TAIS provides—

- Two- and three-dimensional situational display.
- Integrated ground and air picture.
- ABCS communications.
- Air traffic control and tactical communications.
- Near real-time air track TADIL feeds.
- A2C2 battlespace situational understanding.
- Deconfliction of near real-time airspace requests.
- Distribution of battlefield overlays.
- Distribution of airspace control measures.
- Alert generation of aircraft within airspace control measures.

ALL SOURCE ANALYSIS SYSTEM

5-41. The ASAS is the intelligence and electronic warfare subelement of the ABCS. It provides the fused intelligence picture as received from the supporting analysis control element. The ASAS displays friendly and enemy units, receiving enemy units from the analysis control element and friendly units through the MCS. The ASAS disseminates the enemy picture to the MCS. It provides combat leaders with the all source intelligence needed to view the battlefield and more effectively conduct the battle. The ASAS provides a tactically deployable system. It can receive and correlate data from strategic and tactical intelligence sensors and sources; produce enemy situation displays; and rapidly disseminate intelligence information. In addition, it nominates targets, manages collection requirements, and provides operations security support. The ASAS is designed to operate in a joint environment across the spectrum of conflict.

5-42. The ASAS capabilities cover map backgrounds and overlay graphics, communications, databases, imagery, target planning, and user utilities. Capabilities of interest to A2C2 elements include map backgrounds and overlay graphics, communications, databases, imagery, target planning, and user utilities.

5-43. *Map backgrounds and overlay graphics.* Map backgrounds and overlay graphics include—

- Standard NIMA products World Vector Shoreline, digital feature analysis data, and digital terrain elevation data.
 - Datum transformation and coordinate conversion.
- 5-44. *Communications*. Communications include—
- Automatic message parsing, filling, and routing.
 - Report and message creation, edit, review, and dissemination.
 - Enhanced intelligence preparation of the battlefield tools.
 - Overlay creation, display, printing, unit plotting, and transmission to other systems.
- 5-45. *Databases*. Databases include—
- Displayed friendly and enemy databases.
 - Automated database fills from other intelligence systems.
- 5-46. *Imagery*. Imagery includes—
- Receiving, displaying, and annotating imagery in a national imagery transmission format.
 - Displaying live UAV video.
 - Situation and event planning to include named areas of interest (NAIs), time-phased lines, and event matrix reports.
 - Creating and modifying areas of interest, no-go and slow-go areas, avenues of approach, mobility corridors, and key terrain.
- 5-47. *Target planning*. Target planning includes creating and maintaining target databases and reports for NAIs, target areas of interest, high-payoff targets, high-value targets, and attack guidance.
- 5-48. *User utilities*. User utilities include—
- Coordinated conversions.
 - Filed manipulation.
 - Printed windows, reports, and overlays.
 - Overlaid plotting to map scales.

INTEGRATED METEOROLOGICAL SYSTEM

5-49. The IMETS provides commanders at all echelons with an automated tactical weather system. This system receives, processes, and disseminates weather observations, forecasts, battlefield visualization, and weather effects decision aids to ATCCS, BOS, and other users. The IMETS processes weather data into easily displayed digital information. This information ranges from forecasts tailored to the size of each commander's area of responsibility to the latest, high-resolution weather satellite imagery overlaid with fronts and weather systems. These digital products provide color-coded weather effects areas, showing when adverse weather limits critical combat systems capabilities. The IMETS provides weather support to both mission planning and execution. It supports day, night, and all weather operations; fixed- and rotary-wing, manned, and unmanned aerial vehicles; drop zones; low-level transit routes; and forward arming and refueling point missions. It provides weather products such as route weather visualization, mission weather forecasts and nowcasts, and visibility and wind overlays.

5-50. IMETS provides five products of interest to A2C2 elements:

- Integrated weather effects decision aid. This common ABCS application overlays forecasted favorable, marginal, or unfavorable weather effects on missions, weapon systems, subsystems, and components on the common tactical picture.
- Weather contours. This common ABCS application overlays forecasted weather parameters critical to the mission of the specific BOS being supported.
- WebPage products, such as—
 - Weather satellite imagery and sensor data.
 - Weather model visualization.
 - Radar images.
 - Battle update briefings, especially on weather.
- Messages, such as—
 - Weather warnings.
 - Forecasts.
 - Observations.
 - NBC basic wind report.
 - NBC chemical downwind report.
- Joint common database weather feature. This common ABCS application accesses the joint common database for severe weather warnings and mission area forecasts. In the case of severe weather warnings, it automatically alerts the user when new information shows up in the joint common database and plots the warning area on the common tactical picture.

DIGITAL TOPOGRAPHIC SUPPORT SYSTEM

5-51. The DTSS is a tactical, computer-based system that provides automated assistance to the Army's terrain analysis function. It can receive, format, reformat, create, store, retrieve, update, manipulate, and condense digital geospatial data. This system produces terrain analysis products such as on- and off-road mobility maps, line-of-sight intervisibility plots, concealment maps, on-road chokepoint maps, and tactical fording and bridging maps. The DTSS is fielded to terrain teams at brigade through EAC.

CSSCS

5-52. The Combat Service Support Control System is the combat service support administrative and logistic automated workstation component of ATCCS. It provides battlefield decision support and situational understanding for planning and controlling the personnel and logistic support of combat operations. This system provides information on all classes of supply, field services, maintenance, medical services, and movements. Staffs consolidate and collate the information into situation reports and planning estimates for current and future operations. CSSCS provides materiel, supply, and personnel status of units and identifies logistic capabilities to resupply units for subsequent combat operations. The commander's tracked items list includes those items of command interest. These items are controlled by command and tracked by CSSCS. Positioning of logistic support bases down to brigade and

task force level on CSSCS is a cue for the standard use Army aircraft flight route development by A2C2 elements. Other major capabilities are—

- Resource status summaries of current logistic information by class of supply, item, or unit (color-coded charts or detailed tabular reports).
- Deliberate or hasty course of action analysis, using either current or planned task organization, based on approved planning factors.
- Unit task organization tracked to company level, providing a structure for resource tracking.

FBCB2

5-53. Force XXI Battle Command Brigade and Below is a digital battle command information system that provides integrated, on-the-move, and timely battle command information to tactical combat, combat support, and combat service support leaders and soldiers. FBCB2 completes the ABCS information flow process from brigade to platform and across all platforms within the brigade. It supports situational understanding down to the soldier and platform level across the BOSs at brigade and below. Additionally, FBCB2 enables commanders to operate remotely and maintain connectivity to ABCS common operational picture information regardless of command location. It also enables commanders to digitally control and monitor their subordinate units' status and position. FBCB2 provides ABCS with automated positional friendly information and current tactical battlefield geometry for friendly and known or suspected enemy forces. FBCB2 will be fielded to mounted and dismounted maneuver forces—legacy, interim, and objective. FBCB2 will be fielded to armor, cavalry, reconnaissance, armored cavalry, mechanized infantry, infantry, and aviation units and their associated combat support and combat service support units normally provided from division or corps.

CONNECTIVITY AT ECHELONS ABOVE CORPS

5-54. At EAC, the A2C2 element must be able to receive and disseminate information from the TBMCS. The A2C2 element must be able to pass information from subordinate headquarters to TBMCS. It must also be prepared to deconflict airspace for both subordinate headquarters and joint airspace users. It must rapidly accomplish these functions while retaining the ability to display, send, and receive data electronically. TAIS, when fully fielded across the force, will become the primary system used by A2C2 elements at EAC to link joint and multinational systems such as TBMCS. In the interim, the A2C2 elements will use the various Army Battle Command Systems—GCCS-Army, MCS, AFATDS, AMDPCS, and ASAS—to integrate the A2C2 effort. The organizations available for A2C2 functions include the battlefield coordination detachment (BCD) and AAMDC.

5-55. The BCD accomplishes its mission with organic unit equipment and JAOC-provided systems. It task-organizes its systems to meet operational constraints—such as personnel and working space—and theater-specific requirements. The Army Battle Command Systems available to the BCD for airspace management and deconfliction are GCCS-Army, MCS, AFATDS, AMDPCS, TAIS, and ASAS. The JAOC provides TBMCS, C2IPs, and ADSI.

5-56. The AAMDC supports the ARFOR commander and integrates its efforts with the ARFOR A2C2 element. Additionally, the AAMDC LNO at the JAOC integrates his effort with the BCD A2C2 element. The AAMDC accomplishes its mission with organic unit personnel and equipment. It task-organizes its systems to meet operational constraints—such as personnel and working space—and theater-specific requirements. The automation systems available for airspace management and deconfliction are GCCS-Army, MCS, AFATDS, AMDPCS, ASAS, and joint defense planner.

CONNECTIVITY AT CORPS

5-57. Corps A2C2 cells must be prepared to receive and send information to and from every subordinate headquarters on every system occupying airspace within the corps area of operations (AO). These cells must rapidly pass information from EAC to the corps' subordinate units and deconflict airspace operations within and above their AO.

5-58. The corps A2C2 elements must be able to send, receive, and compile A2C2 overlays. It also must be able to access real-time aviation weather and disseminate it to subordinate headquarters as well as provide real-time notification of—

- UAV launch and recovery areas, launches, flight routes, mission orbit areas, orbit recovery areas, and recoveries.
- Artillery and ADA operational status, planned targets, and firing status.
- Enemy air movement and TBM launch data.
- Chemical attacks.
- Friendly air movements of division, corps, EAC, and special operations forces operations.
- Shaping operations.
- Air Force, Navy, and allied air sorties.

5-59. The six Army Battle Command Systems available to corps A2C2 elements for airspace management and deconfliction are GCCS-Army, MCS, AFATDS, AMDPCS, TAIS, and ASAS.

5-60. The corps A2C2 element at the main command post (CP) must ensure that connectivity is established with the corps tactical CP, corps rear CP, corps aviation brigade, corps ADA brigade, corps military intelligence brigade, and corps artillery. This element must also be established with the ARFOR A2C2 element, adjacent corps or multinational units, air support operations center, division A2C2 elements, and ATS battalion. It also must be established with any other unit that may be operating within the corps AO and requiring the use of airspace.

CONNECTIVITY AT DIVISION

5-61. The organization of the A2C2 elements within the command posts at division is similar to that at corps. The division's primary focus is on the conduct of battles and engagements. Airspace control tasks are primarily those required to synchronize all airspace users of the combined arms team and supporting sister services with the close battle.

5-62. The five Army Battle Command Systems available to division A2C2 elements for airspace management and deconfliction are MCS, AFATDS, AMDPCS, TAIS, and ASAS.

5-63. The division A2C2 element at the main CP must ensure that connectivity is established with the corps A2C2 element, air liaison officer (ALO), tactical air control party (TACP), subordinate brigade S3 air, and ATS company. It must be established with the division tactical CP, rear CP, aviation brigade, air defense artillery battalion, and military intelligence battalion. In addition, connectivity is established with adjacent division or multinational units, air defense artillery, and any other unit that may be operating within the division AO that requires the use of airspace.

CONNECTIVITY AT ECHELONS BELOW DIVISION

5-64. Formal A2C2 elements are not established below the division level. However, much information—such as the ACO, ATO, ACM, and FSCM—must rapidly move from the battalion level throughout every level of the Army to the JAOC level. Commanders must connect further within battalions and brigades and among the main CP, tactical CP, and brigade or battalion support areas. Information must flow freely within maneuver units as well as to higher and lower headquarters.

5-65. The Army Battle Command Systems available to the brigade and battalion staffs for airspace management and deconfliction are MCS, AFATDS, AMDPCS, and ASAS. Each system can display the airspace overlay provided by TAIS.

5-66. The S3 air at brigade and below must ensure that connectivity is established with its tactical and rear CPs; the next higher S3 air or division A2C2 element; ALO and TACP; fire support officers; liaison officers from supporting air defense artillery; the military intelligence UAV; and aviation units. It also is established with any other unit that may be operating within its area that requires the use of airspace.

INTERIM BRIGADE COMBAT TEAM

5-67. The interim brigade combat team (IBCT) does not have a formal A2C2 element. However, the air defense and airspace management cell functions as the IBCT staff integrator of A2C2. This cell assists the S3 in developing and requesting airspace control measures. It coordinates and integrates A2C2 throughout the IBCT by relaying appropriate information concerning airspace management. The air defense and airspace management cell may be required to coordinate with joint or multinational forces to integrate the IBCT A2C2 requirements into the operations. The IBCT requires augmentation by a divisional, corps, or echelons above corps TAIS to adequately deconflict airspace and perform the full spectrum of A2C2 planning, operations, and ATS.

Appendix A

Messages, Reports, and Overlays

This appendix provides information on commonly used messages and reports. It is not intended to be a comprehensive list of all messages and reports used by an Army airspace command and control (A2C2) element. The United States message text formats (USMTFs) and joint variable message formats (VMFs) are modified, added, and deleted to support ongoing developments in the Army Battle Command System (ABCS) and joint information systems (INFOSYS). Additionally, field units submit changes to the USMTFs and VMFs to support their message, report, and overlay requirements.

DIGITAL MESSAGE FORMATS

USMTF

A-1. The USMTF standardizes the use of equipment and methods for exchanging information between all theater command and control elements. Messages and reports for USMTF may be submitted by voice template, by record (digitally, using one of the ABCS or joint INFOSYS), or in some cases both. MIL-STD-6040 and CJCSM 6120.05 contain detailed explanations of these and other USMTF messages and reports.

VMF

A-2. The VMF provides a common means of exchanging digital data across a joint interface between combat units at varied echelons. It provides an extremely flexible message standard—only information required at that time is sent. The conveyed data requires varying amounts of volume and detail of information, and it can be transmitted over a broad range of tactical communication systems. VMF is the Army solution to the battlefield digitization interoperability and bandwidth problems. VMF accommodates existing character-oriented message text formats (MTFs) and bit-oriented tactical digital information links (TADILs) message standards. The information and addressing portions can be selectively adapted to suit the situation. Data fields can be selected or omitted from a message as required. “Null” or zero fill fields are not required when information is unavailable or redundant.

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Digital Message Formats	A-1	Army Battle Command System	
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USMTF A2C2 Voice Templates.....	A-2	List.....	A-15
USMTF and VMF Record Templates	A-3		

Fields can be repeated in a message without users having to send another message. Additional information can be found in MIL-STD-2045-47001B and MIL-STD-188-220B. The Army's current plans are to implement these message standards and formats in command, control, communications, computers, and intelligence systems brigade and below (fire support corps and below). Systems include Appliqué; Advanced Field Artillery Tactical Data System (AFATDS); Bradley; Multiple Launch Rocket System; Paladin; Crusader; Comanche (RAH 66); Longbow Apache; and Abrams tank.

USMTF A2C2 VOICE TEMPLATES

A-3. Listed below are some of the common voice template USMTF messages used by A2C2 elements. Note: These messages and reports may also be a record and are identified by "(Record)" at the end of the description. FM 6-99.2 contains all message and report formats.

A-4. (A263) Support-Air Corridor [SPRT.AIRCOR] is used to cancel an air-space coordination area.

A-5. (A656) Sortie Allotment [SORTIEALOT] is used to provide a means by which a joint force commander approves the air employment or allocation plans of his subordinate commanders and fills his subordinate commanders' requests from sorties declared in excess in the subordinate command's Air Allocation/Request message. (Record)

A-6. (A661) Air Mission Request Status/Tasking [REQSTATASK] is used to inform the requesting component command whether a request has been approved or disapproved and to inform the complying command that it satisfy the request in the immediate air tasking, search and rescue (SAR), or airlift. (Record)

A-7. (C420) Search and Rescue Situation Summary Report [SARSIT] is used to coordinate, summarize, or terminate joint search and rescue operations. (Record)

A-8. (C482) Search and Rescue Incident Report [SARIR] is used to report any situation that may require a search and rescue effort. (Record)

A-9. (C521) Weather Forecast [WXFCST] is used to provide the commander with forecasted weather for the area of operation until normal weather communications can be established. The frequency is every six hours or sooner as needed. (Record)

A-10. (C600) Close Air Support Summary [CASSUM] is used to provide timely reports of close air support (CAS) missions and other information obtained during post-flight aircrew debriefing. (Record)

A-11. (D630) Airlift Request [AIRLIFTREQ] is used to request common user airlift support for peacetime missions, exercises, contingencies, and wartime. (Record)

A-12. (D669) Search and Rescue (SAR) Request [SARREQ] is used to request forces to participate in a SAR mission. (Record)

A-13. **(D670)** Air Support Request [AIRSUPREQ] is used to request pre-planned and immediate CAS, interdiction, reconnaissance, surveillance, escort, helicopter airlift, and other aircraft missions. (Record)

A-14. **(E710)** Air Defense Command Message [AIRDEFCON] is used to direct weapon systems engagement for air defense or air support and to provide receipt and compliance for the engagement commands in the absence of a TADIL-A or TADIL-B link. The frequency to transmit or update is as required. This message is updated or corrected by transmitting a new message with the appropriate data. (Voice Only)

A-15. **(F632)** Flight Control Information [FLTCONTINFO] is used to provide control and coordination information for aircraft entering another service's or component's airspace. (Record)

A-16. **(F658)** Airspace Control Means Request [ACMREQ] is used to request that a specific airspace control means be specified in a future airspace control order. (Record)

A-17. **(F715)** Air Defense Warning [AIRDEFWARN] is used to transmit air defense warnings and weapons control conditions. The frequency to transmit or update is as required, based on the current enemy air threat, or as changes occur. The air defense warning and weapons control conditions established in the latest AIRDEFWARN remain in effect until updated by a subsequent AIRDEFWARN. The AIRDEFWARN does not have a termination requirement. (Voice Only)

A-18. **(F756)** Airspace Control Order [ACO] is used to provide detailed orders for airspace management from a higher command to subordinate units. (Record)

USMTF AND VMF RECORD TEMPLATES

A-19. Table A-1 provides the messages and reports commonly used by A2C2 elements. The various Army Battle Command Systems use these digitally transmitted messages (record). The message and report numbers listed in Table A-1 are described in paragraphs A-20 through A-74. This table is not all-inclusive. The ABCS can transmit many additional reports; however, this list contains those reports critical to A2C2 tasks.

Table A-1. ABCS Message and Report Matrix, Part 1

FROM	TO											
	GCCS-A		TAIS		ASAS		AMDPCS		AFATDS		MCS	
GCCS-A			F002	F014	A423	C002	F002	F014	F002	F014	A423	C203
			F015	F541	C505	F002	F015	F541	F015	F541	F002	F014
TAIS	F002	F014			F014	F015	A659	F002	A659	F002	A659	C002
	F015	F402			F015	F541	F014	F015	F014	F015	C400	F002
	F541	S201			F658	K01.1	F541	F658	F541	F658	F014	F015
					S201		F756	K01.1	F756	S201	F541	F658
							S201				F756	K01.1
											S507	S201

Table A-1. ABCS Message and Report Matrix, Part 1 (continued)

FROM	TO													
	GCCS-A		TAIS		ASAS		AMDPCS		AFATDS		MCS			
ASAS	C002 F002 F015 S201	C203 F014 F541 S309	C002 F002 F015 F658 S201	C203 F014 F541 K01.1 S309			C002 F002 F015 S102 S309	E500 F014 F541 S201 S401			C002 F002 F015 S201 S308	C203 F014 F541 S305 S309	C002 E400 F014 F541 S201 S309	C203 F002 F015 F541 S201 S507
AMDPCS	F002 F015 S201	F014 F541	E500 F014 F541 K01.1	F002 F015 S201	C002 F002 F015 S102 S303	E500 F014 F541 S201 S401			E500 F014 F541	F002 F015 S201			C203 D630 F002 F015 F658 S201	C400 E500 F014 F541 F756 S401
AFATDS	F002 F015 S201	F014 F541	F002 F015 F658	F014 F541 S201	C002 F002 F015 S201	C400 F014 F541	C400 F014 F541	F002 F015 S201					C400 F002 F015 S201	E400 F014 F541 S507
MCS	A423 C505 F014 F541	C203 F002 F015 S201	A423 C002 C400 C447 C501 C504 C506 C508 F002 F015 F658 G489 S201 S507	A659 C203 C443 C488 C503 C505 C507 E400 F014 F541 F756 K01.1 S303	A423 A656 C002 C400 F002 F015 S201	A659 A690 C203 C505 F014 F541	A423 C002 C400 E400 F014 F541 F756	A690 C203 C505 F002 F015 F658 S201	A423 C505 F014 F541	C400 F002 F015 S201				
CSSCS	F002 F015	F014 F541	D630 F002 F015 F631 S201	D851 F014 F541 F658 K01.1	C002 F014 F541	F002 F015 S303	C002 F002 F015 S507 S509	C400 F014 F541 S508 S509	C400 F002 F015 S507 S509	E400 F014 F541 S508			A423 C120 C400 C447 C501 D630 E400 F014 F541 S509	C002 C203 C443 C488 C506 D851 F002 F015 S507 S509
DTSS	F002 F015	F014 F541	F002 F015	F014 F541	F002 F015	F014 F541	F002 F015	F014 F541	C203 F014 F541	F002 F015			F002 F015	F014 F541
IMETS	C521 F002 F015	C523 F014 F541	C520 C523 F014 F541	C521 F002 F015 K01.1	C002 C521 F002 F015	C520 C523 F014 F541	C520 C523 F014 F541	C521 F002 F015	C520 C523 F014 F541	C521 F002 F015			C002 C507 C520 C523 F014 F541	C203 C508 C521 F002 F015
ISYSCON	F002 F015	F014 F541	C002 F002 F015	C120 F014 F541	C002 F002 F015 F541	D675 F014 F402 S303	C002 F014 F541	F002 F015	C120 F014	F002 F015			C002 C443 C488 C506 F014 F541 S507	C120 C447 C501 F002 F015 G489
FBCB2	N/A		K01.1 K05.2 K05.17	K05.2	K01.1		K01.1	K05.17	K01.1				K01.1 K05.2	K04.1 K05.17

Table A-1. ABCS Message and Report Matrix, Part 2

FROM	TO							
	CSSCS		DTSS		IMETS		ISYSCON	
GCCS-A	F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541	N/A
TAIS	F002 F014 F015 F541 F658 S201 K01.1	F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541 K01.1	F002 F014 F015 F541	F002 F014 F015 F541 K01.1	F002 F014 F015 F541	K01.1 K05.2 K05.17
ASAS	C002 F002 F014 F015 F541 S303	F002 F014 F015 F541 S201	F002 F014 F015 F541	C002 F002 F014 F015 F541 S201	C002 F002 F014 F015 F541 S201	C002 F002 F014 F015 F401 F541 G424 S309	C002 F002 F014 F015 F401 F541 G424 S309	K01.1
AMDPCS	C002 C400 E500 F002 F014 F015 F541 S507	E500 F002 F014 F015 F541	E500 F002 F014 F015 F541	E500 F002 F014 F015 F541	E500 F002 F014 F015 F541	C002 C120 E500 F002 F014 F015 F541	C002 C120 E500 F002 F014 F015 F541	K01.1 K05.13 K05.17
AFATDS	C521 C400 E400 F002 F014 F015 F541 S507	F002 F014 F015 F541	F002 F014 F015 F541	C120 F002 F014 F015 F541	C120 F002 F014 F015 F541	C120 F002 F014 F015 F541	C120 F002 F014 F015 F541	K01.1
MCS	A423 A656 C002 C120 C203 C400 C443 C447 C488 C501 C503 C504 C505 C506 C507 C508 E400 F002 F014 F015 F541 F631 G489 S507	A423 C203 E400 F002 F014 F015 F541 S201	A423 C002 C203 C443 C447 C488 C501 C503 C504 C505 C506 C508 E400 F002 F014 F015 F541	A423 C002 C203 C443 C447 C488 C501 C503 C504 C505 C506 C508 E400 F002 F014 F015 F541	A423 C002 C203 C443 C447 C488 C501 C503 C504 C505 C506 E400 F002 F014 F015 F541 G489 S201 S507	A423 C002 C120 C203 C443 C447 C488 C501 C504 C505 C506 E400 F002 F014 F015 F541 G489 S201 S507	A423 C002 C120 C203 C443 C447 C488 C501 C504 C505 C506 E400 F002 F014 F015 F541 G489 S201 S507	K01.1 K05.2 K05.13 K05.17
CSSCS		F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541	C002 C120 F002 F014 F015 F541	C002 C120 F002 F014 F015 F541	K01.1
DTSS	F002 F014 F015 F541			F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541	K01.1 K05.17
IMETS	C521 C523 F002 F014 F015 F541	C520 C521 C523 F002 F014 F015 F541				C521 C523 F002 F014 F015 F541	C521 C523 F002 F014 F015 F541	N/A
ISYSCON	C002 F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541	F002 F014 F015 F541			N/A
FBCB2	K01.1 K07.1	K01.1 K05.17	K01.1 K05.17	N/A	N/A	N/A	N/A	
ASAS—All Source Analysis System AFATDS—Advanced Field Artillery Tactical Data System GCCS-A—Global Command and Control System-Army AMDPCS—Air and Missile Defense Planning and Control System CSSCS—Combat Service Support Control System				DTSS—Digital Topographic Support System FBCB2—Force XXI Battle Command Brigade and Below IMETS—Integrated Meteorological System ISYSCON—integrated systems control MCS—Maneuver Control System TAIS—Tactical Airspace Integration System				

A-20. (A423) Order [ORDER] is used to provide the standard military five-paragraph order and is used to transmit instructions and directives to

subordinate and supporting military organizations. The ORDER may also be provided to senior headquarters and others to advise of pending operations. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-21. **(A656)** Sortie Allotment [SORTIEALOT] is used to provide a means by which the theater commander approves the air employment and allocation plans of his subordinate commanders and fills subordinate commanders requests, if possible. The primary method to transmit is record with voice as an alternate. This message is used only for preplanned missions and is transmitted daily, normally 19 hours prior to the start of the air tasking day or in accordance with established operation plans for the theater of operations.

A-22. **(A659)** Air Tasking Order [ATO] is used to task assigned and attached air resources, assigns cross-force tasking, and is also used for intraservice tasking. It is prepared using the joint standard air tasking order (ATO) software of the Theater Battle Management Core System. The method to transmit is record. Specific transmissions means are contingent on the in-place communication systems and the INFOSYS available to transmit and receive the ATO. To lessen the burden that large ATOs place on transmission systems, addressees must be limited to those who absolutely require a copy of the ATO and should be transmitted to each addressee by one means only. This message is transmitted or updated daily, 12 hours prior to the start of the air tasking day or according to the established operation plans for the theater of operations. The air tasking day will normally consist of consecutive 24-hour tasking periods with start and end times as specified by the theater commander.

A-23. **(A690)** Tactical Operational Data [TACOPDAT] is used to permit the joint operations center (JOC) to establish, change, or cancel air defense and antiair warfare responsibilities in a tactical area and to permit an area commander to provide supplement orders for his area of responsibility. This message is also used to report permanent changes to an operation order (OPORD). The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. However, the area air defense commander, as the joint task force commander's direct representative for air control and air defense, must publish tactical operational data (TACOPDAT) at least 24 hours prior to assuming duties or as soon as possible after emergency transfer to this function.

A-24. **(C002)** Message Correction/Cancellation [MSGCORRCANX] is used to cancel a message or to correct the information in a previously transmitted message. The method to transmit is record with voice as an alternate. The frequency to transmit or update is as required to cancel a message or add, delete, or replace information in a previously transmitted message.

A-25. **(C120)** Meaconing, Intrusion, Jamming, and Interference Feeder Report [MIJIFEEDER] is used as a primary means of sharing meaconing, interference, jamming, and intrusion (MIJI) incidents quickly. It provides for a joint exchange of tactical MIJI information, including electro-optic interference. The primary method to transmit is record with voice as alternate. The frequency to transmit or update is as soon as any MIJI incident occurs. Use IMMEDIATE precedence.

A-26. **(C203)** Graphical Report-Overlay [GRAPHREP-OVERLAY] is used to pass standard military symbology depicting situation information. Commands and units use this message to pass MIL-STD-2525B and FM 1-02 graphic symbols in strictly textual forms. Symbols represent installations, units, equipment, areas, lines, boundaries, points, events, and fire planning. The GRAPHREP-OVERLAY can report entire battlefield situation displays or small, localized scenes. It can also be used to modify or delete previously submitted data. It is submitted at the beginning of an operation or exercise to establish a baseline picture of the battlefield, theater, or area of interest. The method to transmit is record. As new information pertinent to that picture is received, updated GRAPHREP-OVERLAY messages are sent reflecting the latest known situation. The GRAPHREP-OVERLAY should be sent as soon as possible after receiving new information, but only when the amount or urgency of data warrants. The originator must use judgement to ensure a proper balance is struck between the necessity for distributing valuable information and overtaxing available communication resources.

A-27. **(C400)** Commander's Situation Report [SITREP] is used to inform unit commanders of operation plans (OPLANs), unit readiness degradation, and operational situations and summaries. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as specified by the SOP, OPORD, OPLAN, or commander.

A-28. **(C443)** NBC 3 Report [NBC3] is used to pass immediate warning of predicted contamination and hazard areas following nuclear, biological, and chemical (NBC) attacks. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. NBC3 is normally sent at IMMEDIATE precedence but may be sent FLASH as required by the situation.

A-29. **(C447)** NBC 4 Report [NBC4] is used to report NBC monitoring and survey results. The primary method to transmit is record with voice as an alternate. The frequency to transmit is as required. The NBC4 is normally transmitted from lower to higher headquarters. The NBC4 enables units to report the monitoring and survey data from any location at any time and eventually the information is developed into the NBC5.

A-30. **(C488)** NBC 1 Report [NBC1] is used to provide the observer's initial report giving basic data on a NBC attack. This NBC1 MTF layout will accommodate all NBC1 reporting requirements by selected use of sets. The NBC1 describing first use of NBC weapons will be transmitted as soon as possible by voice at FLASH precedence. A record message confirming the voice message will be sent at IMMEDIATE precedence. The NBC1 will be transmitted as soon as possible after the attack. Follow-up reports are made as required using IMMEDIATE precedence or if required by the situation, at FLASH precedence.

A-31. **(C501)** NBC 5 Report [NBC5] is used to pass information on areas of actual NBC contamination. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-32. **(C503)** NBC Effective Downwind Report [NBC EDR] is used to provide the effective downwind data needed for predicting fallout areas following nuclear bursts for either the nearest 6 hours or for a period more than 6

hours ahead. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is sent periodically, as frequently as new upper air data is received (normally once every 6 hours), and following a nuclear burst. The NBC EDR requires both vertical and lateral information flows.

A-33. **(C504)** Friendly Chemical Strike Message [CHEMWARN] is used to provide friendly forces with the necessary information needed to take safety precautions during friendly chemical strikes. The primary method to transmit is record with voice as alternate. The frequency to transmit or update is as rapidly as practical. Disseminating warning earlier than is necessary may permit the threat forces to learn of the planned strike and may result in a less effective attack. When there is insufficient time to warn, only those who might receive tactically significant weapon effects are given a warning. There is generally no requirement to warn subordinate units when the target analysis indicates no more than a negligible risk to unwarned, exposed troops. CHEMWARNs are broadcast in the clear when insufficient time remains for the enemy to react prior to the strike.

A-34. **(C505)** Friendly Nuclear Strike Warning [STRIKWARN] [NUC] is used to provide friendly forces with the information needed to take safety precautions against friendly nuclear bursts. The primary method to transmit is record with voice as an alternate. Transmissions or updates should be sent as rapidly as practical. Disseminating warning earlier than necessary may permit the threat forces to learn of the planned strike and may result in a less effective attack. When there is insufficient time to warn personnel within the limits of visibility, only those who might receive tactically significant weapon effects are given a warning. There is no requirement to warn subordinate units when the target analysis indicates no more than a negligible risk to unwarned, exposed troops.

A-35. **(C506)** NBC 6 Report [NBC6] is used to pass detailed information on chemical or biological attacks. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. Descriptions of agent effects and characteristics as well as methods of employment may be reported in free text in the message. In a combined operation, US forces will generate the NBC6 as requested.

A-36. **(C507)** NBC Chemical Downwind Report [NBC CDR] is disseminated by appropriate agencies every 6 hours. It contains a forecast of the meteorological data needed for the chemical hazard area prediction procedure for three consecutive 2-hour periods for either the nearest 6 hours or for a period more than 6 hours ahead. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is transmitted at 6-hour intervals. The NBC CDR requires both vertical and lateral information flows. This message affords subordinate commands direct and immediately usable information to predict the chemical downwind hazard area.

A-37. **(C508)** NBC Basic Wind Report [NBC BWR] is used to report wind direction and speed in 2,000-meter increments from the surface of the earth to 30,000-meter altitude for either the nearest 6 hours or for a period more than 6 hours ahead. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is periodically as

frequently as new upper air data is received (normally once every 6 hours) and following a nuclear burst. The NBC BWR requires both vertical and lateral information flows.

A-38. **(C520)** Weather Observation [WXOBS] is used to provide the commander with weather observations in the area of operations until normal weather communications can be established. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update normally averages every half-hour, but a minimum of every hour.

A-39. **(C521)** Weather Forecast [WFXCST] is used to provide the commander with an expected weather forecast for the area of operations until normal weather communications can be established. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is at a minimum, every 6 hours.

A-40. **(C523)** Severe Weather Warning [SVRWXWARN] is used to warn commanders of severe weather that affects the area of operations. This message will be transmitted as required until normal weather communications can be established. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required until normal weather communications and Air Weather Service support is established.

A-41. **(D630)** Airlift Request [AIRLIFTREQ] is used to request common user (intertheater and intratheater) airlift support for peacetime missions, exercises, contingencies, and wartime. The request may be preplanned or immediate. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is either daily or immediate. The AIRLIFTREQ message should be transmitted daily, not later than 0300 local or in accordance with established OPLANs for the theater of operations, or immediately, as required to request an immediate airlift mission.

A-42. **(D670)** Air Support Request [AIRSUPREQ] is used to request preplanned and immediate CAS, interdiction, reconnaissance, surveillance, escort, helicopter airlift, and other aircraft missions. The frequency to transmit is as required.

A-43. **(D675)** Stop Jamming [STOP JAMMING] is used to terminate a jamming task. The method to transmit is record with voice as an alternate. Voice may become primary if record means has been disrupted.

A-44. **(D851)** Air Evacuation Request [AIREVACREQ] is used to request an air evacuation mission. The method to transmit is either record or voice. Communications capabilities of originator and addressee, as well as urgency of message subject or text material, will determine method. The frequency to transmit or update is as required.

A-45. **(E400)** Operations Plan Change [PLANORDCHG] is used to update or change existing OPLANs and OPORDs. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-46. **(E500)** Air Early Warning Message [AIREWARN] is used to alert or warn the supported force of a potential aircraft attack, or an early warning.

The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. This message is Army unique.

A-47. **(F002)** General Administrative Message [GENADMIN] is used to pass administrative information. It is intended to allow reporting information not yet accommodated by formatted messages, but it is not intended to replace existing messages. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-48. **(F014)** Request for Information [RFI] is used to request information from other units. It may also be used to request the status of an anticipated response to another request. Information may be requested from any element. The units from which information may be requested are governed by command relationships or as specified in OPLANs, OPORDs, or local SOPs. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-49. **(F015)** Response to Request for Information [RRI] is used to reply to requests for information. If the information is contained in a previous message, the RRI should reference that message. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-50. **(F401)** Electronic Warfare Employment Message [EWEM] is used to provide the commander's intentions for using electronic attack (EA) for either a specific reporting period or for a specific electronic warfare (EW) mission. The commander, joint task force (COMJTF) establishes reporting requirements. The EWEM is used to eliminate potential EW mission conflicts. Commanders may use it to warn or notify of intended EA operations. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is established by COMJTF OPLAN.

A-51. **(F402)** Electronic Warfare Frequency Deconfliction Message [EWDECONFLICT] is used to promulgate a list of protected, guarded, and taboo frequencies so as to ensure friendly force use of the frequency spectrum without adverse impact from friendly EA. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is at least daily since the joint restricted frequency list (JRFL) is constantly modified and the EWDECONFLICT protects frequencies from jamming or other forms of manipulation.

A-52. **(F541)** Acknowledge Message [AKNLDG] is used to acknowledge receipt of a message and indicate planned or accomplished action, or to validate intelligence collection requirements. This is a command acknowledgement and not a communicator or computer acknowledgement. Transmitting the message implies understanding of the received message. The method to transmit is record with voice as an alternate. The frequency to transmit or update is as required to answer the request for intelligence collection.

A-53. **(F631)** Airlift Mission Schedule [ALMSNSCD] is used to provide the requesting agency with the mission details that will satisfy its airlift request. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is either preplanned or immediate. The preplanned ALMSNSCD should be transmitted daily no later than 0900 local

or in accordance with established OPLANs for the theater of operations. The immediate ALMSNSCD is transmitted as required to provide the requesting agency with the mission details required to satisfy the immediate airlift request.

A-54. **(F658)** Airspace Control Means Request [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 designated airspace manager's area of responsibility. The ACMREQ is normally submitted to the airspace manager in accordance with time lines established by the airspace control authority and reflected in the airspace control plan. These requests include measures such as restricted operations zones, high-density airspace control zones, standard use Army aircraft flight routes (SAAFRs), and coordinating altitude and minimum-risk routes. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-55. **(F756)** Airspace Control Order [ACO] is used to provide specific detailed orders for airspace management and control from a higher command to subordinate units. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-56. **(G424)** Electronic Warfare Mission Summary [EWMSNSUM] is used to summarize significant EW missions and the status of offensive EW assets. The method of transmission is to the JOC by record only; it is sent cross-service by record with voice as an alternate. The frequency to transmit or update is as required, as specified in COMJTF OPLAN, or in accordance with established OPLANs for the theater of operations.

A-57. **(G489)** NBC 2 Report [NBC2] is used to disseminate evaluated data of an NBC attack. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required to distribute evaluated information consolidated from the NBC1. The NBC2 description of enemy first use of NBC weapons is transmitted at IMMEDIATE precedence, unless FLASH precedence is required.

A-58. **(K01.1)** Free Text, VMF, is used to provide information that does not fall into a structured format. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-59. **(K04.1)** Spot/Salute Report, VMF, is used to provide timely intelligence or status regarding events that could have an immediate and significant effect on current planning and operations. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-60. **(K05.2)** Nuclear, Biological, Chemical Report One [NBC1], VMF, is used to transmit an observer's initial report of basic data pertinent to a NBC attack. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-61. **(K05.13)** Threat Warning, NBC and Air, VMF, is used to provide warning to friendly units of threat NBC and air attacks. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-62. **(K05.17)** Overlay Message, VMF is used to provide a means of sending and receiving overlay information. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-63. **(K07.1)** Medical Evacuation Request, VMF, is used to request medical evacuation of wounded or injured personnel. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required.

A-64. **(S102)** Enemy Activity Report [ENACTWPN] is used to exchange specific enemy activity and weapon data. It may provide early warning information, enemy location situation information, intelligence data, and surveillance information. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. This report is Army unique.

A-65. **(S201)** Support-Battlefield Geometry [SPRT.GEOM] is used to transmit information concerning battlefield terrain and those control measures or restrictions required or imposed to successfully guide battle formations over the described terrain. It may also be used to exchange information concerning other types of battlefield features to include installations, supply points, obstacles, or unit boundaries. The primary method to transmit is record with voice as an alternate. Record is primary with voice as an alternate (except fire support element to air support operations center is voice only and transmissions to air operations center [AOC] are voice with a record confirmation). The frequency to transmit or update is as required.

A-66. **(S303)** Enemy Observation Report [EOBSREP] is used to exchange essential elements of enemy activity. Forward observers, scouts, or other forward elements use this message to report to their higher headquarters. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. This report is Army unique.

A-67. **(S305)** Target Intelligence Data [TIDAT] is used provide supplemental intelligence for final targeting and to provide periodic updates to fire support (FS) on priority targets identified for attack by the Army Tactical Missile System (ATACMS). The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. This report is Army unique.

A-68. **(S308)** Artillery Target Intelligence—I EW Target Coordination Message [ATI.IEWTC] is used to coordinate fire support targets between intelligence and fire support elements. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. This report is Army unique.

A-69. **(S309)** Enemy Situational Awareness Message [ENSIT] is used to report the enemy situation update. (This should not be confused with the phrase “situational awareness;” the Army uses the phrase “situational understanding.”) The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. This report is Army unique.

A-70. (S401) Air Defense Artillery Battle Report [AIRBATREP] is used to provide information concerning the current air battle situation or a summary of air battle results for a reporting period. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. This report is Army unique.

A-71. (S506) Supply Shortages and Operational Constraints [SUPSHORTS] is used to report the identification of supplies which because of their shortage could affect the effectiveness of a unit. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. This report is Army unique.

A-72. (S507) Resource [RESOURCES] is used to report unit locations and unit supply locations. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. This report is Army unique.

A-73. (S508) Supply Constraints [SUPCONSTRAINT] is used to identify the priority of issue of supplies to different units and to report on shortages of supplies and personnel that could significantly affect operations. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. This report is Army unique.

A-74. (S509) Commander's Tracked Item List [CTIL] is used to inform units of materiel and personnel that a force level commander has directed to be tracked. The primary method to transmit is record with voice as an alternate. The frequency to transmit or update is as required. This report is Army unique.

ARMY BATTLE COMMAND SYSTEM OVERLAYS

A-75. Table A-2 provides overlays that are displayed by the ABCS INFOSYS. This listing is not inclusive of all overlays available for display on the ABCS. The intent is to provide the A2C2 planner a list of overlays that may be useful to developing and executing A2C2 tasks to support the commander's scheme of maneuver.

Table A-2. Army Battle Command System Overlays

Information Name	Applicable INFOSYS	Description
Position Report	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A report that provides friendly unit location data, preferably by automatic data exchange.
Operations Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of the OPORD showing units, boundaries, control measures, and so forth in a digital color map display or analog overlay.
Enemy Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of the location, size, and activity (past, current, or planned) of enemy units.
Obstacle Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of locations of friendly and enemy obstacles, including information on key terrain; status of friendly obstacles or barriers (completed, executed, planned, prepared); enemy obstacles; enemy ground avenues of approach; and effective times of the obstacles, if known.

Table A-2. Army Battle Command System Overlays (continued)

Information Name	Applicable INFOSYS	Description
Modified Combined Obstacle Overlay (MCOO)	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of the analysis results of the battlefield's effects on military operations. It depicts all obstacles to mobility. It also depicts the following, which is not prescriptive or inclusive: cross-country mobility classifications, objectives, avenues of approach, and mobility corridors; likely locations of countermobility obstacle systems and defensible terrain; and likely engagement areas and key terrain.
Combined Obstacle Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of terrain under dry, normal, or wet conditions that depicts mobility and cross-country movement rates for use in avenue of approach analysis. The overlay integrates all obstacles into a single display, greatly simplifying further avenue of approach and mobility corridor analyses.
Fire Support Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of FS coordinating measure text and graphics; locations of friendly artillery, mortar, and FS assets; areas that can be supported by FS weapons; areas that can be covered by FS sensors, radars, or observers; and ammunition supply points.
Airspace Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of the lateral boundaries of the airspace control areas, low-level transit routes, high-density airspace control zones, aircraft checkpoints, and SAAFRs.
Combat Service Support Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A map overlay that shows the current location of and mission information about combat service support operations. It can include information such as logistic release points, supply points, operational times, supply routes, and operational graphics necessary to identify unit boundaries or other important control measures. The other measures include locations of support area units and facilities; combat trains command posts; forward supply points for Classes III, V, and IX; unit maintenance collection points; maintenance support teams; medical support, ambulance exchange, and casualty collection points; field services, such as laundry, bath, or graves registration; and main supply routes, alternate supply routes, and SAAFRs.
Fire Plan Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of information used to control and to integrate direct and indirect fires at company level and below. It depicts the location of planned targets; target reference points; dead space; final protective fires; engagement areas; sectors of fire; and primary, alternate, and subsequent firing positions.
Traffic Control Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of the routes, locations, and sizes of depicted units. It visually depicts the physical relationships of units (represented by the overlay) and terrain (represented by the map).
NBC Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of the location of decontamination sites, reconnaissance sites, and smoke operation lines.
Communication Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of the location of current and projected communication equipment sites, their connectivity, allocated frequencies, applicable time frames, and electronic visibility.
Terrain Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction that emphasizes characteristics of the terrain for a selected area for use by a commander or staff.
Forecast Weather Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS, DTSS	An application that overlays forecasted weather parameters critical to the mission of the specific battlefield operating systems being supported.

Table A-2. Army Battle Command System Overlays (continued)

Information Name	Applicable INFOSYS	Description
Weather Effects Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS, DTSS	An application, IMETS Integrated Weather Effects Decision Aid (IWEDA), that overlays forecasted favorable, marginal, or unfavorable weather effects on missions, weapon systems, subsystems, and components on applicable ABCS.
Severe Weather Warning Alerts and Mission Area Forecasts	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS, DTSS	An application that accesses the joint common database for severe weather warning alerts and mission area forecasts. In severe weather warning alerts, the user is automatically alerted when new information is posted to the joint common database and the warning area is plotted on the applicable ABCS.
Population Center Overlay	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A graphical depiction of the population densities, political centers, cultural and religious sites, and other factors related to a people, their government, politics, culture, and economy that impact military operations.
GCCS-A—Global Command and Control System-Army TAIS—Tactical Airspace Integration System ASAS—All Source Analysis System AMDPCS—Air and Missile Defense Planning and Control System		AFATDS—Advanced Field Artillery Tactical Data System MCS—Maneuver Control System DTSS—Digital Topographic Support System IMETS—Integrated Meteorological System

ARMY BATTLE COMMAND SYSTEM DATA LIST

A-76. Table A-3 provides data elements that the ABCS INFOSYS displays. This list does not include all data elements available for display on the ABCS. The intent is to provide the A2C2 planner with a list of data elements that may be useful for developing and executing A2C2 tasks to support the commander’s scheme of maneuver.

Table A-3. Army Battle Command System Data List

Information Name	Applicable INFOSYS	Description
Sensor Data	ASAS, AMDPCS, AFATDS	Intelligence obtained from information collected by sensors regarding enemy movements or activities. It supports estimates of enemy capabilities and intentions. It is used primarily for imagery, such as joint surveillance target attack radar system, moving target indicators, fixed target indicators, and secondary imagery.
Threat Warning	GCCS-A, TAIS, ASAS, AMDPCS, AFATDS, MCS	A message notifying units, commanders, and personnel of an imminent ballistic missile; aircraft; or NBC attack.
Spot Report	TAIS, ASAS, AMDPCS, AFATDS, MCS	The standard verbal or digital report giving information about known or suspected enemy activity, including observer designation and size, activity, location, unit, time, and equipment data.
Obstacle Report	TAIS, ASAS, AMDPCS, AFATDS, MCS	A report giving obstacle type, location, impact on movement, bypass locations, safe corridors, and enemy activity near the obstacle.
Mine Field Report	TAIS, ASAS, AMDPCS, AFATDS, MCS	A report giving location and type of minefields employed by friendly forces. For minefields with automatic destruction capabilities, the time of destruction is also included.
Bridge Report	TAIS, ASAS, AMDPCS, AFATDS, MCS	A report that includes bridge, overpass, culvert, underpass, and tunnel data; location; entrance; exit; type; overall length; width of roadway; height restrictions; number of spans; length of spans; computed classification; bypass locations; and bypass conditions in the area of operations. It also reports or confirms the description and condition of a bridge to support trafficability or destruction.

Table A-3. Army Battle Command System Data List (continued)

Information Name	Applicable INFOSYS	Description
Situation Report	TAIS, ASAS, AMDPCS, AFATDS, MCS	An informal report submitted by subordinate units on request or their own initiative to their higher headquarters and adjacent units as necessary to report and define tactical situations and status.
Basic Weather Report	MCS, AFATDS, ASAS, TAIS	This report provides current weather observations and forecasts at predetermined intervals. It includes the forecast weather conditions and light data for the next 24 and 48 hours. Specific information that will be included are end of evening nautical twilight; beginning of morning nautical twilight; times for sunrise, sunset, moonrise, and moonset; percent of illumination; wind speed and direction; visibility; precipitation; temperature; ceiling; and barometric pressure.
GCCS-A—Global Command and Control System-Army TAIS—Tactical Airspace Integration System ASAS—All Source Analysis System AMDPCS—Air and Missile Defense Planning and Control System	AFATDS—Advanced Field Artillery Tactical Data System MCS—Maneuver Control System DTSS—Digital Topographic Support System IMETS—Integrated Meteorological System	

Appendix B

Army Airspace Command and Control Tasks

The commander must develop and implement the Army airspace command and control (A2C2) system for his assigned area of responsibility. To assist him in this effort, the commander utilizes his staff. This appendix discusses the basic tasks the staff must complete and how they will manage A2C2 information.

BASIC STAFF TASKS

B-1. The basic staff tasks to be accomplished are the same for A2C2 as for any other function. These tasks are—

- Facilitate and monitor the accomplishment of command decisions.
- Provide timely and accurate information to the commander and subordinate units.
- Anticipate requirements and provide estimates of the situation.
- Determine various courses of action and recommend one course of action that will best accomplish the mission.
- Prepare plans and orders.
- Integrate and implement airspace control measures directed by the airspace control authority.

B-2. This appendix lists basic A2C2 staff tasks and identifies the element or cell responsible for each task. The tasks in Table B-1 are divided into sub-tasks. The A2C2 staff section chief (echelon-dependent) must ensure that the appropriate staff completes the tasks or provides the information required.

Table B-1. Staff Tasks for A2C2

	BCD	CORPS	DIV	BDE	BN
Task 1. Identify and resolve airspace conflicts.					
a. Current Operations.					
(1) Monitor operations of airspace users.		X	X	X	X
(2) Monitor intelligence reports.	X	X	X	X	X
(3) Disseminate immediate airspace requests (CAS, aeromedical evacuation, deep attacks, and UAV).	X	X	X	X	X
(4) Inform airspace users at each echelon of any communication loss affecting any airspace user.		X	X	X	X

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Table B-1. Staff Tasks for A2C2 (continued)

	BCD	CORPS	DIV	BDE	BN
Task 1. Identify and resolve airspace conflicts (continued).					
(5) Identify and correlate situations affecting airspace use for unscheduled events.		X	X	X	X
(6) Analyze airspace use to determine and resolve conflicts.	X	X	X	X	
(7) Recommend shifting or ending fires when affecting high priority aviation missions.		X	X	X	X
(8) Disseminate changes of control or restriction measures, weapons control status, and NBC information that affect airspace users.	X	X	X	X	X
(9) Review immediate air requests (Army) for conflicts with current operations.		X	X	X	X
b. Future Operations (more fully developed under Task 4). Analyze the OPLANs and OPORDs for possible conflicts among flight routes, control measures, artillery/ADA locations, and flight obstructions.					
(1) Determine the impact.	X	X	X	X	X
(2) Develop and recommend alternatives.	X	X	X	X	X
Task 2. Develop and maintain A2C2 overlay.					
a. Air Defense Artillery.					
(1) Unit locations.	X	X	X	X	X
(2) Weapons control status.	X	X	X	X	X
(3) Weapon system coverage for HIMAD primary and short-range air defense, as required.	X	X	X	X	
b. Fire Support.					
(1) Coordinating measures.	X	X	X	X	X
(2) Planned targets.	X	X	X	X	X
(3) Ongoing fires.	X	X	X	X	X
(4) Firing battery locations.	X	X	X	X	X
c. Aviation.					
(1) Battle positions (current and preplanned).	X	X	X	X	X
(2) Assembly areas and unit locations.	X	X	X	X	X
(3) Forward arming and refueling points.	X	X	X	X	
(4) Air routes.	X	X	X	X	
d. Air Traffic Service.					
(1) Airspace control measures and restrictions.	X	X	X	X	
(2) Friendly aircraft locations.	X	X	X	X	X
(3) Instrumented landing sites.	X	X	X		
(4) Navigational aids.		X	X		
e. Intelligence.					
(1) Contaminated areas.	X	X	X	X	X
(2) Massed enemy aircraft locations.		X	X	X	
(3) Areas affected by friendly electronic countermeasures.	X	X	X	X	X
(4) Flight obstructions.					
(5) Special electronic mission aircraft (current and preplanned).	X	X	X	X	
(6) UAV flight routes and launch and recovery sites.	X	X	X	X	X
Task 3. Request, maintain, and disseminate A2C2 measures or restrictions.					
a. Request.					
(1) Joint measures or restrictions.	X	X	X		
(2) Army-specific measures (only affects Army users below coordinating altitude).		X	X	X	X

Table B-1. Staff Tasks for A2C2 (continued)

	BCD	CORPS	DIV	BDE	BN
Task 3. Request, maintain, and disseminate A2C2 measures or restrictions (continued).					
b. Maintain.					
(1) Joint measures or restrictions.	X	X	X	X	
(2) Army-specific measures.		X	X	X	X
c. Disseminate.					
(1) Joint measures or restrictions.	X	X	X	X	
(2) Army-specific measures (overlay if possible).		X	X	X	X
d. Determine the Mission.					
(1) Receive higher headquarters' operation plan.	X	X	X	X	X
(2) Extract required information from the plan.					
(a) Task organization.	X	X	X	X	X
(b) Mission statement.	X	X	X	X	X
(c) Concept of operation.	X	X	X	X	X
(d) A2C2 annex (include information from ATO with special instructions or ACO).		X	X	X	
Task 4. Develop and coordinate A2C2 annex to operation plan.					
a. Identify the following:					
(1) Area for which the commander is responsible, to include:					
(a) Vertical limits.	X	X	X	X	X
(b) Left and right limits.	X	X	X	X	X
(c) Front and rear limits.	X	X	X	X	X
(2) The degree of authority which has been vested in the ground commander.	X	X	X	X	X
(3) The users of the airspace:					
(a) Army aviation.	X	X	X	X	X
(b) Other services/multinational forces.	X	X	X	X	X
(c) Fire support.	X	X	X	X	X
(d) Air defense.	X	X	X	X	X
(e) Air traffic services.		X	X		
(f) Intelligence.	X	X	X	X	X
(4) Requirements for the uses of the airspace:					
(a) Combat.		X	X	X	X
(b) Combat support.		X	X	X	X
(c) Combat service support.		X	X	X	X
(5) A2C2 control measures imposed by higher headquarters.		X	X	X	X
(6) The commander's guidance or concept.		X	X	X	X
b. Determine. From information internal to the command post, determine:					
(1) A2C2 priorities.	X	X	X	X	
(2) All airspace user requirements:		X	X	X	X
(a) Combat missions.		X	X	X	
(b) Combat support missions.		X	X	X	
(c) Combat service support missions.		X	X	X	
c. Prepare Staff Estimates.					
(1) Consolidate airspace use requirements for each course of action. Integrate requirements when possible. Identify conflicts.		X	X	X	X
(2) For each course of action, determine the requirements to resolve conflict (control measures), the difficulty of solving conflict, and how the requirements to solve conflict affect the concept of the operations.		X	X	X	X

Table B-1. Staff Tasks for A2C2 (continued)

	BCD	CORPS	DIV	BDE	BN
Task 4. Develop and coordinate A2C2 annex to operation plan (continued).					
(3) Recommend one specific course of action.		X	X	X	X
(4) Receive commander's decision and guidance for implementation.		X	X	X	X
d. Develop A2C2 Annex (see FM 5-0 for format). Include the following as a minimum:					
(1) Delineate the airspace subsector:					
(a) Upper limits.		X	X		
(b) Left and right limits.		X	X		
(c) Front and rear limits.		X	X		
(2) Describe authority to be exercised by each echelon concerning:					
(a) Army users.		X	X		
(b) Other service users.		X	X		
(c) Establishment of control measures.	X	X	X	X	X
(d) Positive and procedural control requirements.		X	X	X	X
(3) State the commander's airspace priorities.		X	X	X	X
(4) State the A2C2 mission.		X	X	X	X
(5) Explain the concept of operations and scheme of maneuver, to include A2C2 overlay.		X	X	X	X
(6) Write subunit paragraphs for each airspace user (fire support, other services and multinational forces, aviation, AD, and ATS). Discuss for each user:					
(a) Type of control required (positive or procedural, when, and where).		X	X	X	X
(b) A2C2 responsibilities not covered in SOP, such as peculiar information requirements, changes to responsibility for managing subsectors, weapon control orders and autonomous operation procedures (if changed), and times of operations and restrictions.		X	X	X	X
(7) Delineate information affecting more than two users:					
(a) All procedural A2C2 control measures and restrictions (include fire support); information not included in overlays.		X	X	X	X
(b) Flight rules.		X	X		
(c) Airspace control order issuing times.		X	X	X	
(d) High-use areas.		X	X	X	
(e) Friendly electronic warfare operations which affect airspace users.		X	X	X	X
(f) FARPs (active and preplanned).		X	X	X	
(g) Airfield locations and /operations.		X	X	X	
(h) NAVAIDs locations (active and preplanned time of operation).		X	X	X	
(8) Address service support and command and signal requirements.		X	X	X	X
e. Generate Airspace Control Measure Requests.					
Support the annex and forward for approval (theater requirements and means to accomplish this may vary).		X	X	X	X
ATS—air traffic service		CAS—close air support		NAVAID—navigational aid	
BDE—brigade		DIV—division		NBC—nuclear, biological, and chemical	
BN—battalion		FARP—forward arming and refueling point			
CORPS also applies to echelons above corps.					
*In those commands where a BCD does not exist due to command and control arrangements and organization, the functions performed by the BCD are performed by the appropriate staff element.					

A2C2 INFORMATION MANAGEMENT

B-3. This section outlines the information required to operate an A2C2 system. The tables depict the primary players at the various headquarters organizations—ranging from the battlefield coordination detachment (BCD) to the maneuver battalion. The information required, the source of the information, the element of the staff using the information, and the expected uses of the information are shown. The information shown is not all-inclusive, nor is all required in every scenario; it is situation dependent.

BATTLEFIELD COORDINATION DETACHMENT

B-4. The A2C2 element representing the joint forces land component commander is located in the BCD. The A2C2 representatives work within the operations and plans division of the BCD.

Plans Division

B-5. The joint air operations center (JAOC) plans division has a BCD A2C2 representative. This representative needs information to interface in the Theater Air-Ground System airspace control center on all requests for control measures and restrictions. The appropriate corps A2C2 elements may provide this information:

- Forward line of own troops (FLOT) location and fire support coordination line (FSCL) locations.
- Friendly surface-to-air missile location and associated coverage.
- Air defense (AD) weapons control status.
- Significant planned indirect fires, particularly fires forward of the FSCL.
- Planned unmanned aerial vehicle (UAV) operations and launch sites.
- A2C2 priorities.
- Air tasking order (ATO) and airspace control order (ACO).
- Disposition of Army airfields and principal landing sites.

B-6. The BCD A2C2 representative, in coordination with the JAOC combat plans division, approves or disapproves notification for Army airspace requests, orders, and recommendations. These notifications are to the appropriate requesting corps A2C2 element (G3), corps fire support element (FSE), or control and reporting center (CRC). Additionally, the BCD A2C2 representative provides the current joint forces air component commander's airspace utilization priorities, control measures or restrictions, and all other elements of information necessary for the corps to maintain a complete A2C2 picture.

Operations Division

B-7. To interface with the JAOC combat operations division, the BCD A2C2 representative in the JAOC operations division needs information on—

- Requests for immediate changes to the current A2C2 plan (as established in the control plan, ATO, or ACO).
- Changes to the air defense artillery (ADA) high-to-medium-altitude air defense (HIMAD) locations.
- Changes to the weapons control status.

- Changes to FLOT and boundaries.
- Additions or changes to the significant planned indirect fires.
- Procedural changes to identification, friend or foe (IFF) or selective identification feature (SIF).
- ATO and ACO.
- UAV missions above the coordinating altitude.
- Locations of instrumented airfields.
- Movement of Army airfields.
- Reduction or suspension of Army air traffic management services.

B-8. Table B-2 depicts BCD vertical information requirements.

Table B-2. BCD Vertical Information Networking

Information Required		Received From	Action Officer	Action/Output
OPORD or OPLAN (Includes A2C2 Annex)	Corps	Corps A2C2 Element Corps G3	BCD A2C2 Element	P, C
	Requests	Corps A2C2 Element	BCD A2C2 Element	C, A
A2C2 Control Measures and Restrictions	Approvals	JAOC	BCD A2C2 Element	D Corps A2C2 Element ADA Brigade
		Corps A2C2 Element Corps G3	BCD A2C2 Element	P, C, D
FLOT		Corps A2C2 Element Corps G3	BCD A2C2 Element	P, C, D
A2C2 Priorities	Army	Corps A2C2 Element	BCD A2C2 Element	P, C, D JAOC Combat Ops
	Air Forces	Combat Ops	BCD A2C2 Element	P, C, D Corps A2C2 Element
ATO and ACO		JAOC Combat Ops	BCD A2C2 Element	P, C
ATO Issuing Times		Corps A2C2 Element	BCD A2C2 Element	P, C, D
IFF and SIF Procedures		CRC	BCD A2C2 Element	D Corps A2C2 Element JAOC and A2C2
Unscheduled, Large Formation Missions		JAOC Combat Ops	BCD A2C2 Element	C, D, Corps A2C2 Element ADA Brigade
NBC Contaminated Areas		Corps A2C2 Element	BCD A2C2 Element	P, C, D JAOC Combat Ops
Friendly ECM Activities (Affecting Avionics)		Corps A2C2 Element G2	BCD A2C2 Element	P, C, D JAOC Combat Ops and Plans
SEMA and UAVs (Above Coordinating Altitude)		Corps A2C2 Element G2 Corps FSE	BCD A2C2 Element	P, C, D JAOC Combat Ops and Plans
ADA Locations and Status (HIMAD)		Corps A2C2 Element ADA BDE	BCD A2C2 Element	P, C
ADA Weapons Control Status	Requests	Corps A2C2 Element G3	BCD A2C2 Element	P, C, A
	Approvals	CRC	BCD A2C2 Element	D Corps A2C2 Element
Army ADA Priorities		Corps A2C2 Element G3	BCD A2C2 Element	C, D JAOC Combat Ops

Table B-2. BCD Vertical Information Networking (continued)

Information Required	Received From	Action Officer	Action/Output	
AD Warnings	CRC Corps A2C2 Element	BCD A2C2 Element	C, D Corps A2C2 Element ADA BDE JAOC Defensive Duty Officer	
ADA Weapon Engagement Zones and Weapons Coverage	CRC JAOC Plans ADA Brigade	BCD A2C2 Element	P, C, D Corps A2C2 Element	
Significant Planned Indirect Fires	Corps FSE Corps A2C2 Element	BCD A2C2 Element	P, C	
Fire Support Coordinating Measures	Corps FSE Corps A2C2 Element	BCD A2C2 Element	C	
Locations and Status	Army Articles	Corps A2C2 Element Corps AVN Units	BCD A2C2 Element	P, C, D JAOC
	NAVAIDs	Corps A2C2 Element ATS Group and BN	BCD A2C2 Element	P, C, D JAOC
	AIC	Corps A2C2 Element ATS Group and BN	BCD A2C2 Element	P, C, D JAOC
SAAFRs	Corps A2C2 Element	BCD A2C2 Element	P, C, A (if above coordinating altitude)	
A-Approval ATS-air traffic service AVN-aviation BDE-brigade BN-battalion C-Coordination D-Distribution ECM-electronic countermeasures NAVAID-navigational aid NBC-nuclear, biological, and chemical Ops-operations P-Planning SAAFR-standard Army aircraft flight route SEMA-special electronic mission aircraft *Action/output assumes each A2C2 element section passes information it obtains to its parent unit.				

CORPS A2C2 ELEMENT

B-9. The corps A2C2 element has staff responsibility for A2C2 in the corps area. The corps A2C2 element staff function requires information provided from the sources listed in Table B-3. The staff elements using this information are shown by duty position.

Table B-3. Corps A2C2 Element Lateral Information Networking

Information Items	G3 Air	Corps Aviation Officer	Corps ADA Liaison Officer	Air Traffic Service Liaison Officer	Fire Support Coordinator	Air Liaison Officer
OPORD or OPLAN (Includes A2C2 Annex)	X	X	X	X	X	X
ATO and ACO	X	X	X	X	X	
Airspace Control Issuing Times	X	X	X	X	X	X
Airspace User Priorities	X	X	X	X	X	
A2C2 Restrictions and Control Measures (Current and Requested)	X	X	X	X	X	X
Army AD Priorities	X	X	X			
AD Warnings		X	X	X	X	X
AD Weapons Control Status (Current and Requested)	X	X	X	X		X

Table B-3. Corps A2C2 Element Lateral Information Networking (continued)

Information Items	G3 Air	Corps Aviation Officer	Corps ADA Liaison Officer	Air Traffic Service Liaison Officer	Fire Support Coordinator	Air Liaison Officer
Friendly ADA Locations and Coverage	X	X	X	X		X
ADA Weapon Engagement Zones		X	X	X		
FARPs		X		X		X
Location and Status of Airfields (Includes FARPs)	X	X		X		
Field Artillery Locations	X	X		X	X	X
Fire Support Coordinating Measures	X	X		X	X	
Significant Planned and Ongoing Fires (Assumes No Fires in Rear Areas)	X	X		X	X	
Army Aviation Airspace Requirements (Includes SEMA)	X	X	X			
Army Aviation Unit Locations (Company and Larger)	X	X		X		
Aviation Battle Positions		X	X		X	X
Massed Enemy Aircraft Locations			X			
IFF and SIF Procedures		X	X	X		
SAAFRs		X	X	X	X	
UAV Flight Paths and Routes		X		X	X	
UAV Launch Sites		X		X	X	
Flight Obstructions		X		X		
Sortie Allocation	X				X	
FLOT		X	X	X	X	
Positions of Instrument Landing Systems		X		X		
Location and Status of NAVAIDs		X		X		
Intelligence Summaries	X	X	X		X	X
Air Support Requests and Requirements (Includes SEMA and UAV)		X	X	X	X	
Air Support Requests and Requirements (Includes Air Force Only)					X	
NBC Contaminated Areas		X		X		
Unscheduled, Large Formation Missions				X		
Airborne Tactical Formations		X		X		
Friendly ECM Activities		X		X		
Location of AIC				X		X
NBC Reports		X		X	X	
Weather Reports	X	X		X		X
ECM—electronic countermeasures FARP—forward arming and refueling point NAVAID—navigational aid NBC—nuclear, biological, and chemical SAAFR—standard Army aircraft flight route SEMA—special electronic mission aircraft						

B-10. Table B-4 depicts corps A2C2 element information requirements:

- Where information from outside the corps A2C2 element originates.
- Who the primary corps A2C2 element action officer is.
- Where the information is sent when going outside the corps A2C2 element.
- What the information is used for.

Table B-4. Corps A2C2 Element Vertical Information Networking

Information Required		Received From	Action Officer	Action/Output
OPORD or OPLAN (Includes A2C2 Annex)	Corps	G3	G3 Air	P, C, D BCD
	Division	G3	G3 Air	P, C, A
A2C2 Control Measures and Restrictions	Requests	Corps G3, DIV A2C2 Element	G3 Air	P, C, A, D BCD
	Approvals	BCD A2C2 Element	G3 Air	P, C, D DIV A2C2 Element
FLOT		G3	G3 Air	P, D BCD
A2C2 Priorities	Army	G3	G3 Air	P, C, D BCD DIV A2C2 Element
	Air Forces	BCD A2C2 Element	G3 Air	P, C, D DIV A2C2 Element
ATO and ACO		BCD ASOC	G3 Air	P, C DIV A2C2 Element
ATO Issuing Times		BCD	G3 Air	P, C, D
IFF and SIF Procedures		BCD A2C2 element	G3 Air	P, D DIV A2C2 Element
Unscheduled, Large Formation Missions		BCD ASOC	G3 Air	D DIV A2C2 Element
NBC Contaminated Areas		Corps NBC Element	G3 Air	P, C, D DIV A2C2 Element All A2C2 Element Sections
Air Support Requirements and Requests	Army Aviation Attack	G3 Corps AVN Units DIV A2C2 Element	AVN LNO	P, C, D DIV A2C2 Element
	Airlift	G4/G3 Corps AVN Units DIV A2C2 Element	AVN LNO	P, C, D DIV A2C2 Element
	SEMA	G2/G3 Corps AVN Units DIV A2C2 Element	AVN LNO	P, C, D DIV A2C2 Element
	Air Forces CAS	G3	G3 Air	P, C
	Recon	G2/G3	G3 Air	P, C
	Airlift	G4/G3	G3 Air	P, C
ADA Locations and Coverage		Corps ADA Units DIV A2C2 Element	ADA LNO	P, C, D BCD A2C2 Element
ADA Weapons Control Status	Requests	G3 DIV A2C2 Element	ADA LNO	P, C, D BCD A2C2 Element
	Approvals and Modifications	Corps A2C2 Element	ADA LNO	P, D DIV A2C2 Element

Table B-4. Corps A2C2 Element Vertical Information Networking (continued)

Information Required		Received From	Action Officer	Action/Output
Army ADA Priorities		G3	ADA LNO	P, D DIV A2C2 Element
AD Warnings		BCD Subordinate Units DIV A2C2 Element	ADA LNO	C, D BCD DIV A2C2 Element
ADA Weapon Engagement Zones and Weapons Coverage		BCD ATO	ADA LNO	P
Significant Planned and Ongoing Indirect Fires		Corps Arty	FSCoord	P, C
Fire Support Coordinating Measures		Corps FSE	FSCoord	P, C, D DIV A2C2 Element BCD
Field Artillery Locations		Corps Arty	FSCoord	P, C, D DIV A2C2 Element
UAV Launch Sites		DIV A2C2 Element	FSCoord	P, C, D DIV A2C2 Element
UAV Flight Routes		DIV A2C2 Element	G3 Air	P, C, A, D DIV A2C2 Element UAV Units
SAAFRs		DIV A2C2 Element Corps AVN	G3 Air	P, C, A, D DIV A2C2 Element BCD (if above coordinating altitude)
Army AVN Unit Locations		Corps AVN Units G3	AVN LNO	P, C, D DIV A2C2 Element
Airborne Tactical Formations		Corps AVN Units G3	AVN LNO	C
Locations and Status	Army Articles	Corps AVN Units G3 DIV A2C2 Element	AVN LNO G3 Air	P, C, D DIV A2C2 Element BCD
	FARPs	Corps AVN DIV A2C2 Element	AVN LNO G3 Air	P, C, D DIV A2C2 Element
	NAVAIDs	ATS BN/CO G3	ATS LNO	P, C, D DIV A2C2 Element BCD
	AIC	ATS BN/CO	ATS LNO	P, C, D DIV A2C2 Element BCD
Flight Obstructions		ATS BN/CO Corps AVN Units DIV A2C2 Element	ATS LNO	P, C, D
Intelligence Summaries		G2	G3 Air	P, C
Friendly ECM Activities		G2	G3 Air	P, C
Massed Enemy Aircraft Formations		G2 ADA Units	G3 Air	P, C, D
A-Approval ASOC-air support operations center Arty-artillery AVN-aviation BN-battalion C-Coordination CAS-close air support CO-company D-Distribution DIV-division ECM-electronic countermeasures FARP-forward arming and refueling point FSCoord-fire support coordinator NAVAID-navigational aid NBC-nuclear, biological, and chemical P-Planning Recon-reconnaissance SAAFR-standard Army aircraft flight route SEMA-special electronic mission aircraft		*Action/output assumes each A2C2 element section passes information it obtains to its parent unit.		

DIVISION A2C2 ELEMENT

B-11. The division A2C2 element has staff responsibility for A2C2 in the division area, requiring information provided from the sources listed in Table B-5. The staff elements using this information are shown by duty position.

Table B-5. Division A2C2 Element Lateral Information Networking

Information Items	G3 Air	Aviation Officer	ADA Liaison Officer	Air Traffic Service Liaison Officer	Fire Support Coordinator	Air Liaison Officer
OPORD or OPLAN (Includes A2C2 Annex)	X	X	X	X	X	X
ATO And ACO	X	X			X	
Airspace Control Issuing Times	X	X	X	X	X	X
Airspace User Priorities	X	X	X	X	X	
A2C2 Restrictions and Control Measures (Current and Requested)	X	X	X	X	X	
Army AD Priorities	X		X			
AD Warnings	X	X	X	X	X	X
AD Weapons Control Status (Current and Requested)	X	X	X	X		X
Friendly ADA Locations and Coverages	X	X	X	X		X
ADA Weapon Engagement Zones	X			X		X
FARPs		X	X	X		X
Location and Status of Airfields (Includes FARPs)	X	X				
Field Artillery Locations	X			X	X	X
Fire Support Coordinating Measures	X	X		X	X	X
Significant Planned and Ongoing Fires (Assumes No Fires in Rear Areas)	X	X		X	X	X
Army Aviation Airspace Requirements (Includes SEMA)	X	X	X			
Army Aviation Unit Locations (Company and Larger)	X	X		X		X
Aviation Battle Positions	X					
Massed Enemy Aircraft Locations	X					
IFF and SIF Procedures		X	X	X		X
SAAFRs	X	X	X	X	X	X
UAV Flight Paths and Routes		X		X	X	
UAV Launch Sites		X		X	X	
Flight Obstructions		X		X		
Sortie Allocation	X				X	X
FLOT	X	X	X	X	X	X
Positions of Instrument Landing Systems		X				
Locations and Status of NAVAIDs		X		X		
Intelligence Summaries	X					
Air Support Requests and Requirements (Includes SEMA and UAV)	X	X			X	

Table B-5. Division A2C2 Element Lateral Information Networking (continued)

Information Items	G3 Air	Aviation Officer	ADA Liaison Officer	Air Traffic Service Liaison Officer	Fire Support Coordinator	Air Liaison Officer
Air Support Requests and Requirements (Includes Air Force Only)	X			X		X
NBC Contaminated Areas	X	X		X		
Unscheduled, Large Formation Missions	X					
Airborne Tactical Formations		X		X		
Friendly ECM Activities		X		X		
Location of AIC Logistic Resupply Requests		X		X		
ECM—electronic countermeasures FARP—forward arming and refueling point NAVAID—navigational aid		NBC—nuclear, biological, and chemical SAAFR—standard Army aircraft flight route SEMA—special electronic mission aircraft				

B-12. Table B-6 depicts division A2C2 element information requirements:

- Where the information is transmitted when going outside the division A2C2 element.
- Where information from outside the division A2C2 element originates.
- What the information is used for.
- Who the primary division A2C2 element action officer is.

Table B-6. Division A2C2 Element Vertical Information Networking

Information Required	Received From	Action Officer	Action/Output	
OPORD or OPLAN (Includes A2C2 Annex)	Corps	G3	G3 Air	P, C
	Division	G3	G3 Air	P, C, D Corps A2C2 Element
	Brigade	G3	G3 Air	P, C, A
A2C2 Control Measures and Restrictions	Requests	G3 BDE S3	G3 Air	P, C, A, D Corps A2C2 Element
	Approvals	Corps A2C2 Element	G3 Air	P, C, D BDE S3 Air
	Directed (current)	Corps A2C2 Element	G3 Air	P, C, D BDE S3 Air
FLOT		G3	G3 Air	P, D Corps A2C2 Element
A2C2 Priorities	Army	Corps A2C2 Annex G3	G3 Air	P, C, D Corps A2C2 Element BDE S3 Air
	Air Forces	Corps A2C2 Annex	G3 Air	P, C
Sortie Allocation		ASOC G3 Air	G3 Air	P, C, D BDE S3 Air
IFF and SIF Procedures		Corps A2C2 Element	G3 Air	P, D
Unscheduled, Large Formation Missions		Corps A2C2 Element G3	G3 Air	C, D
NBC Contaminated Areas		Corps A2C2 Element DIV NBC Element	G3 Air	P, C, D BDE S3 Air

Table B-6. Division A2C2 Element Vertical Information Networking (continued)

Information Required	Received From	Action Officer	Action/Output
Air Support Requirements and Requests	Army Aviation Attack	G3 DIV AVN Units BDE S3 Air	AVN LNO P, C, D S3 Air
	Airlift	G4/G3 DIV AVN Units BDE S3 Air	AVN LNO P, C, D S3 Air
	SEMA	G2/G3 DIV AVN Units BDE S3 Air	AVN LNO P, C, D S3 Air
	Air Forces CAS	G3 S3 Air	G3 Air P, C, D Corps A2C2 Element
	Recon	G3/G2	G3 Air P, C, D Corps A2C2 Element
	Airlift	G4/G3	G3 Air C, D Corps A2C2 Element
ADA Locations and Coverage		DIV ADA Corps ADA Corps A2C2 Element	ADA LNO P, C Division Aviation Brigade
ADA Weapons Control Status	Requests	G3 BDE S3 S3 Air	ADA LNO P, C, D Corps A2C2 Element
	Approvals and Modifications	Corps A2C2 Element	P, D BDE S3 Air
Army ADA Priorities		G3 Corps A2C2 Element	ADA LNO P, C, D S3 Air
AD Warnings		Corps A2C2 Element Subordinate Units	ADA LNO C, D Corps A2C2 Element S3 Air
Significant Planned and Ongoing Indirect Fires		DIV Arty	FSCOORD P, C, D DIV A2C2 Element
Fire Support Coordinating Measures		Corps A2C2 Element DIV Arty	FSCOORD P, C, D Corps A2C2 Element BDE FSO
Field Artillery Locations		DIV Arty	FSCOORD P, C, D Corps A2C2 Element
UAV Launch Sites		UAV Units	FSCOORD P, C, D Corps A2C2 Element
UAV Flight Routes		N/A	G3 Air P, C, D Corps A2C2 Element
SAAFRs		DIV AVN	G3 Air P, C, A, D Corps A2C2 Element S3 Air
Army AVN Unit Locations		DIV AVN Units Corps A2C2 Element	AVN LNO P, C, D Corps A2C2 Element
Airborne Tactical Formations		DIV AVN Units Corps A2C2 Element S3 Air	AVN LNO P, C, D Corps A2C2 Element S3 Air
AVN Battle Positions		DIV AVN Units Corps A2C2 Element BDE S3	AVN LNO P, C, D Corps A2C2 Element

Table B-6. Division A2C2 Element Vertical Information Networking (continued)

Information Required	Received From	Action Officer	Action/Output
Locations and Status	Army Airfields	Corps A2C2 Element G3 DIV AVN Units	AVN LNO G3 Air P, C, D Corps A2C2 Element
	FARPs	DIV AVN Units S3 Air	AVN LNO G3 Air P, C, D Corps A2C2 Element
	AIC	ATS CO/Platoon Corps A2C2 Element	ATS LNO P, C, D Corps A2C2 Element
Flight Obstructions		DIV AVN Units S3 Air ATS CO/Platoon	ATS LNO P, C, D Corps A2C2 Element
Intelligence Summaries		G2	G3 Air P, C, D S3 Air Corps A2C2 Element
Friendly ECM Activities		G2	G3 Air P, C, D Corps A2C2 Element S3 Air
Massed Enemy Aircraft Formations		G2 Corps A2C2 Element ADA Units	G3 Air P, C, D Corps A2C2 Element S3 Air
A—Approval Arty—artillery AVN—aviation BDE—brigade C—Coordination CAS—close air support CO—company D—Distribution DIV—division ECM—electronic countermeasures FARP—forward arming and refueling point FSCoord—fire support coordinator N/A—not applicable NBC—nuclear, biological, and chemical P—Planning Recon—reconnaissance SAAFR—standard Army aircraft flight route SEMA—special electronic mission aircraft *Action/output assumes each A2C2 element section passes information it obtains to its parent unit.			

BRIGADE A2C2 ELEMENT

B-13. The brigade staff performs A2C2 at brigade. Since no formalized A2C2 element exists at brigade, the brigade staff extracts information from various sources to perform A2C2. The brigade commander may form a brigade A2C2 element from the ADA liaison officer (LNO), the brigade fire support officer (FSO), the air liaison officer (ALO), and the Army aviation LNO. When the Army aviation LNO is not present, the S3 air assumes his duties. When present, the Army aviation LNO performs these functions to coordinate with the brigade staff:

- Reviews the airspace utilization and Army aviation plans and graphics from the division operation order (OPORD) or operation plan (OPLAN); advises the brigade commander and staff on actions required at the brigade to follow or to implement the required A2C2 measures.
- Receives the division aviation battalion OPORD or OPLAN; advises the brigade commander and staff on Army aviation support in the brigade area.
- Receives the brigade OPLAN or OPORD; advises on Army aviation annex when necessary; assists in planning operations requiring Army aviation support.

B-14. A2C2 priorities are established and coordination is accomplished on the brigade staff as—

- Division A2C2 priorities are received from the division A2C2 element for implementing at the brigade.

- Significant planned indirect fires are received from the FSO and sent to aviation unit operations. The staff sends significant indirect fires that are immediate to the airspace information center (AIC) either directly or via the division A2C2 element.
- Requests for brigade A2C2 priorities are received from the brigade S3 air and forwarded to the division A2C2 element for approval.
- Field artillery locations are received from the FSO and sent to aviation unit operations.
- Fire support coordinating measures are received from the FSO and sent to aviation unit operations.
- The ADA weapons control status is received from the ADA LNO and sent to aviation unit operations.
- A2C2 restrictions received from the division A2C2 element are passed to the FSO, S3 air, ALO, and ADA LNO for fire support planning. A2C2 restrictions originating at brigade to facilitate fire support planning are sent to aviation unit operations and the division A2C2 element.
- FLOT information is received from the brigade S3 and sent to aviation unit operations.
- AD warnings are received from the ADA LNO and sent to aviation unit operations.
- Requests for Air Force air support are received from the S3 air. Once requests are approved and scheduled, the staff sends information to aviation unit operations.
- Requests for Army aviation support are received from the S3 air and sent to the division A2C2 element and supporting aviation unit.

B-15. The brigade staff function requires information provided from the sources listed in Table B-7. The staff elements using this information are shown by duty position.

Table B-7. Brigade Staff Lateral Information Networking

Information Items	ADA Liaison Officer	Army Aviation Officer	Fire Support Officer	Air Liaison Officer	S3 Air
OPORD or OPLAN (Includes A2C2 Annex)	X	X	X	X	X
ATO and ACO	X	X	X	X	X
Airspace Control Issuing Times				X	X
Airspace User Priorities					X
A2C2 Restrictions and Control Measures (Current and Requested)	X	X		X	X
Army AD Priorities	X			X	X
AD Warnings	X			X	X
AD Weapons Control Status (Current and Requested)	X	X		X	X
Friendly ADA Locations and Coverage	X	X		X	X
ADA Weapon Engagement Zones	X			X	X
FARPs		X			X
Locations and Status of Airfields (Includes FARPs)	X	X		X	X
Field Artillery Locations		X	X	X	X

Table B-7. Brigade Staff Lateral Information Networking (continued)

Information Items	ADA Liaison Officer	Army Aviation Officer	Fire Support Officer	Air Liaison Officer	S3 Air
Fire Support Coordinating Measures	X	X	X	X	X
Significant Planned and Ongoing Fires (Assumes No Fires in Rear Areas)		X	X	X	X
Army Aviation Airspace Requirements (Includes SEMA)		X		X	
Army Aviation Unit Locations (Company and Larger)		X			X
Aviation Battle Positions		X	X		X
Massed Enemy Aircraft Locations					X
IFF and SIF Procedures	X	X		X	
SAAFRs	X	X	X		
UAV Flight Paths and Routes		X	X		
UAV Launch Sites		X	X		
Flight Obstructions		X			X
Sortie Allocation					X
FLOT	X	X	X	X	X
Positions of Instrument Landing Systems		X		X	
Locations and Status of NAVAIDs		X		X	
Intelligence Summaries					X
Air Support Requests and Requirements (Includes SEMA and UAV)	X	X	X	X	X
Air Support Requests and Requirements (Includes Air Force Only)	X		X		X
NBC Contaminated Areas		X			X
Unscheduled, Large Formation Missions					X
Airborne Tactical Formations	X				X
Friendly ECM Activities		X			X
Location of AIC		X		X	
ECM—electronic countermeasures FARP—forward arming and refueling point NAVAID—navigational aid NBC—nuclear, biological, and chemical SAAFR—standard Army aircraft flight route SEMA—special electronic mission aircraft					

B-16. Table B-8 depicts the brigade staff information requirements:

- Where information from outside the brigade originates.
- Who the primary brigade action officer is.
- Where the information is transmitted when going outside the brigade staff.
- What the information is used for.

Table B-8. Brigade Staff Vertical Information Networking

Information Required	Received From	Action Officer	Action/Output	
OPORD or OPLAN (Includes A2C2 Annex)	Division	G3	S3 Air	P, C
	Brigade	S3	S3 Air	P, C, D BN S3 DIV G3
	Battalion	S3	S3 Air	P, C, A

Table B-8. Brigade Staff Vertical Information Networking (continued)

Information Required		Received From	Action Officer	Action/Output
A2C2 Control Measures and Restrictions	Requests	S3 BN S3	S3 Air	P, C, A, D DIV A2C2 Element
	Approvals	DIV A2C2 Element	S3 Air	P, C, D BN S3
	Directed (Current)	DIV A2C2 Element	S3 Air	P, C, D BN S3
FLOT		S3	S3 Air	C, D DIV A2C2 Element
A2C2 Priorities	Army	S3 DIV A2C2 Annex	S3 Air	P, C, D BN S3
	Air Forces (if affects BDE)	DIV A2C2 Annex	S3 Air	P
Sortie Allocation		G3 Air	S3 Air	P, C, D BN S3 Air
Unscheduled, Large Formation Missions		DIV A2C2 Element G3 Air	S3 Air	C, D
NBC Contaminated Areas		DIV A2C2 Element BDE NBC Officer	S3 Air	P, C, D DIV A2C2 Element
Air Support Requirements and Requests	Army Aviation Attack	S3	S3 Air/AVN LNO	P, C, D BN S3 Air DIV A2C2 Element
	Airlift	S3/S4	S3 Air/AVN LNO	P, C, D DIV A2C2 Element
	SEMA	S2/S3	S3 Air	P, C, D DIV A2C2 Element
	Air Forces CAS	S3	S3 Air ALO	P, C, D BN S3 Air DIV A2C2 Element
	Recon	S3/S2	S3 Air ALO	P, C, D BN S3 Air DIV A2C2 Element
	Airlift	S3/S4	S3 Air ALO	P, C, D DIV A2C2 Element
Airspace Control Issuing Times		DIV A2C2 Element	S3 Air	P
ADA Locations and Coverage		ADA BN/Battery	ADA LNO	P, C
ADA Weapons Control Status	Requests	S3	ADA LNO	C, D DIV A2C2 Element
	Approvals and Modifications	DIV A2C2 Element	ADA LNO	P, D BN S3 Air
AD Warnings		DIV A2C2 Element Subordinate Units	ADA LNO	C, D DIV A2C2 Element BN S3 Air
Significant Planned and Ongoing Indirect Fires		DIV Arty DS Arty	FSO	P, C, D DIV A2C2 Element
Fire Support Coordinating Measures		DIV Arty DS Arty	FSO	P, C, D S3 Air
Field Artillery Locations		DIV Arty DS Arty	FSO	P, C, D DIV A2C2 Element

Table B-8. Brigade Staff Vertical Information Networking (continued)

Information Required		Received From	Action Officer	Action/Output
UAV Launch Sites		UAV Units	FSO	P, C, D DIV A2C2 Element
UAV Flight Routes		DIV A2C2 Element	S3 Air	P, C
Army AVN Unit Locations		DIV A2C2 Element AVN Units	S3 Air AVN LNO	P, C, D DIV A2C2 Element
Airborne Tactical Formations		AVN Units S3	S3 Air AVN LNO	C
FARPs		DIV A2C2 Element AVN Unit	S3 Air AVN LNO	P, C, D DIV A2C2 Element
AVN Battle Positions		AVN Unit	S3 Air AVN LNO	P, C, D DIV A2C2 Element
Intelligence Summaries		S2	S3 Air	P, C
Friendly ECM Activities		S2 DIV A2C2 Element	S3 Air	P, C
Massed Enemy Aircraft Formations		DIV A2C2 Element ADA Units	S3 Air	C
A—Approval Arty—artillery AVN—aviation BDE—brigade BN—battalion C—Coordination		CAS—close air support D—Distribution DIV—division DS—direct support ECM—electronic countermeasures FARP—forward arming and refueling point	NBC—nuclear, biological, and chemical P—Planning Recon—reconnaissance SEMA—special electronic mission aircraft	
*Action/output assumes each A2C2 element section passes information it obtains to its parent unit.				

BATTALION A2C2 ELEMENT

B-17. As with the brigade staff, no formal A2C2 element exists at battalion. The commander is the airspace manager and his staff performs the coordination. The information requirements by duty position are the same from brigade to battalion with one exception. The S3 or S3 air generates the ADA and aviation information if either the ADA or aviation LNO is not present.

B-18. Table B-9 depicts the battalion staff information requirements:

- Where information from outside the battalion originates.
- Who the primary battalion action officer is.
- Where the information is transmitted when going outside the battalion staff.
- What the information is used for.

Table B-9. Battalion Staff Vertical Information Networking

Information Required		Received From	Action Officer	Action/Output
OPORD or OPLAN (Includes A2C2 Annex)	Brigade	S3	S3 Air	P, C
	Battalion	S3	S3 Air	P, C
A2C2 Control Measures and Restrictions	Current	S3 Air	S3 Air	P, C
	Required	N/A	S3 Air	P, C, D BDE S3 Air

Table B-9. Battalion Staff Vertical Information Networking (continued)

Information Required	Received From	Action Officer	Action/Output
FLOT	S3	S3 Air	P, C
A2C2 Priorities (Army Only)	S3 BDE S3 Air	S3 Air	P, C
AD Warnings	BDE S3 Air	S3 Air	C
Sortie Allocation	BDE S3 Air	S3 Air	P
Air Support Requirements and Requests	Army Aviation Attack	Subordinate Units S3	S3 Air C, D BDE S3 Air
	Airlift	S4/S3	S3 Air C, D BDE S3 Air
	SEMA	S2/S3	S3 Air C, D BDE S3 Air
	Air Forces CAS	S3	S3 Air ALO C, D BDE S3 Air
	Recon	S2/S3	S3 Air ALO C, D BDE S3 Air
	Airlift	S4/S3	S3 Air C, D BDE S3 Air
Unscheduled, Large Formation Missions	BDE S3 Air	S3 Air	C
ADA Locations	ADA Unit	S3	C
ADA Weapons Control Status	S3	S3	C, D BDE
Significant Planned and Ongoing Indirect Fires	DIV Arty	FSO	C, D BDE S3 Air
Fire Support Coordinating Measures	DIV Arty DS Arty	FSO	C
Field Artillery Locations	DS Arty	FSO	C
Army AVN Locations and Coverage	AVN Units	S3 Air	C, D BDE S3 Air
AVN Battle Positions	AVN Units	S3 Air	C, D BDE S3 Air
A-Approval C-Coordination DS-direct support SEMA-special electronic mission aircraft Arty-artillery CAS-close air support N/A-not applicable AVN-aviation D-Distribution P-Planning BDE-brigade DIV-division Recon-reconnaissance			
*Action/output assumes each A2C2 element section passes information it obtains to its parent unit.			

Appendix C

Tactical Airspace Integration System

The Tactical Airspace Integration System (TAIS) is a battlefield automated system designed to meet both Army airspace command and control (A2C2) and air traffic service (ATS) airspace information center (AIC) requirements. Its role is to digitize the A2C2 and ATS en route airspace management processes at the echelons of division and above. The TAIS is composed of two transparent subsystems, allowing flexibility of use based on mission, enemy, terrain and weather, troops and support available, time available, civil considerations (METT-TC).

TAIS OBJECTIVES

C-1. The primary objectives of TAIS are to—

- *Integrate and synchronize.* TAIS fully integrates and synchronizes all operations in the third dimension of that battlespace delegated to the tactical commander. It assists in integrating and synchronizing the airspace controlled by the airspace control authority (ACA).
- *Deconflict.* TAIS immediately deconflicts operational airspace according to the tactical commander's priority of airspace usage or real-time decision. It promptly assists in deconflicting airspace controlled by the ACA.
- *Increase flexibility and offensive capability.* TAIS increases the tactical commander's flexibility and offensive capability by maximizing opportunities of continuous operations in time, location, and dimension.
- *Digitize and automate A2C2.* TAIS establishes transparent A2C2 planning and operations procedures through digitization and automation. It ensures this transparency extends to the supported AIC functions.
- *Reduce workloads.* TAIS reduces tactical staff workloads using automation. Its sensor inputs and digital position reports should reduce ground-to-air voice communications.

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- *Improve Theater Air-Ground System (TAGS) interface.* TAIS provides the tactical commander an improved near real-time interface with the TAGS.
- *Integrate with Army Battle Command System (ABCS).* TAIS communicates, shares, and coordinates airspace information with each ABCS.
- *Modernize AIC capabilities.* TAIS upgrades and integrates area and en route ATS support through automation and modernized communications. It is the primary tool that integrates all ATS assets into an Army airspace management system.
- *Enhance global interoperability.* TAIS enhances interoperability with joint, multinational, and civil command, control, communications, computers, and intelligence systems.

C-2. The A2C2 element and AIC maintain the same operational airspace picture at each echelon. The operational picture and AIC communication capabilities meet the joint prerequisites for delegation of airspace. TAIS provides the command, control, communications, and computer capabilities so the ACA can more easily manage greater blocks of assigned airspace. Other TAIS capabilities include—

- Automated assistance to A2C2 planning and operations (four-dimensional, tailorable, digital airspace overlay), coordination, monitoring of the air operations (including airspace usage), and time-sequenced rehearsal.
- Full digital and analog, multiband communications and flight following capability for AIC operations.
- Digital receipt and processing of an airspace control order (ACO), the related digital messages from the Theater Battle Management Core System (TBMCS), ABCSs, and the digital templates to readily convert analog information.
- Providing the unit airspace plan (UAP) with airspace data and overlay. Note: The UAP is accessible by other ABCSs via the United States message text format (USMTF) and airspace overlay provider.
- Processing inputs from multiple sensors for a near real-time display and tracking of air vehicles or air vehicle self-reporting.
- Tactical Internet (TI) capability between all systems of TAIS in their respective theater for airspace information flow and management.
- Area support to other ATS terminal and forward support operations, such as a flight plan relay, notice to airmen, weather update, and air warnings.
- An interface with all joint, combined, civil, and military airspace control agencies.
- Processing tactical digital information link (TADIL)-A, TADIL-B, TADIL-J, and a Transmission Control Protocol (TCP) data link, and an Internet Protocol (IP) forward area air defense (FAAD) data link for air track information.

SYSTEM DESCRIPTION

C-3. A complete TAIS consists of two identically mobile subsystems. Each is a modified standard Army shelter mounted on an expanded capacity vehicle, a

HMMWV variant. Each assembly is also equipped with a soft-sided shelter and tows a trailer-mounted (15 kilowatts) tactical quiet generator. Additional cargo vehicles authorized to the unit will carry the remaining equipment and common table of allowance items.

C-4. Each TAIS shelter contains an Air Defense System Integrator (ADSI)—the AN/TSQ-214(V). The ADSI consists of three significant modules: the tactical situational display, the router, and the master database. The ADSI can accept inputs from up to 15 external TADILs, TCP data links, IP FAAD data links, and sensor-linked data from various digital radar systems. The ADSI fuses these inputs of real-time airspace user data to create a near real-time A2C2 air picture. TAIS also contains an extensive communications suite to provide jam-resistant, real-time, secure, and nonsecure voice and data transmission and reception.

C-5. The “heart” of each TAIS vehicle is the group of TAIS workstations. Using ABCS common hardware and software, two workstations are permanently mounted inside the shelter with two additional remote workstations in operational transit cases that can be remotod up to 2000 meters (basic issue cabling limits this to 500 meters). These workstations support ABCS local area network (LAN), TI, and the near real-time A2C2 air picture by displaying digital aircraft. The workstations also use airspace management software capable of near real-time airspace deconfliction and two- or three-dimensional displays of the airspace common operational picture. Airspace deconfliction consists of two activities:

- Planning. Deconflicting planned airspace activities maximizes airspace usage and the application of combat power in a synchronized and safe manner.
- Operations. Modifying or adding airspace control measures (ACMs) and other effects such as weather must occur in near real-time to support battlefield flexibility, maneuver, and decisive action.

C-6. TAIS also contains software that supports the ATS AIC function, using the near real-time four-dimensional A2C2 air picture. The AIC mission, as the ground-to-air link, maintains a common operational picture of the battlespace and digital communications to ensure reliable connectivity beyond line of sight. Digital connectivity and position reporting reduce the voice communications requirements of the AIC and the airspace users. Nevertheless, all airspace users still must monitor the controlling facility’s frequency in accordance with joint doctrine.

TAIS MISSION

C-7. TAIS provides automated A2C2 planning, enhanced A2C2 operations, and improved theater, intracorp, intercorp, and division ATS AIC support. TAIS can effectively synchronize battlespace in the third and fourth dimensions (altitude and time, respectively). Simultaneously, it interfaces with civil and interagency authorities as well as joint command and control (C2) nodes and air users. The combination of these capabilities manages battlespace to support force operations while minimizing fratricide.

C-8. The capabilities of TAIS facilitate executing existing airspace management tactics, techniques, and procedures and provide the methodology to

plan, implement, and execute the integrated airspace control function for the Army. A single TAIS must be able to support two major functions. The major functions include—

- A2C2.
- A2C2 planning.
- A2C2 operations.
- Airspace information services.
- AIC operations.

A2C2

C-9. TAIS requires data input from the A2C2 element to provide the G3 air with automated planning assistance and full connectivity to higher airspace authorities. It also provides the G3 air with a near real-time complete or tailorable, common operational picture.

A2C2 PLANNING

C-10. TAIS fully integrates A2C2 planning methods and procedures digitally and automatically by interfacing with TBMCS and ABCS. TAIS receives both the projected battlefield plan (to include graphics) and planned airspace usage information digitally or by manual input. It then correlates the input information to assist the deconfliction of airspace (including preset commander priorities, prompted decisions, or manual tailoring by operators). TAIS continues this automated “building block” process over the planned operational time period until all the ACO and the unit’s A2C2 overlay include pertinent airspace usage requirements. For A2C2 planning and deconfliction, TAIS graphically displays two- and three-dimensional control measures as selected by the operator. TAIS can graphically project proposed ACMs and ACOs in time (the fourth dimension), disseminating them as a deliverable throughout the ABCS and TBMCS. Additionally, TAIS produces a template for the requisite A2C2 orders, annexes, and overlays, collectively called the unit airspace plan. The ACOs, operation orders, overlays, and ACMs produced in the planning phase enable the operations phase to occur. They are dynamically presented throughout that phase for A2C2 operational monitoring and updating.

A2C2 OPERATIONS

C-11. TAIS fully integrates A2C2 operational methods and procedures digitally and automatically into the total common operational picture process by interfacing with the ABCS and TAGS. TAIS provides the capability to—

- Monitor execution of ACMs and ACOs dynamically by time.
- Identify and propose resolutions of actual or imminent airspace conflicts in near real-time.
- Automatically modify and redistribute a revised UAP (or individually modified ACMs) as an update to the common operational picture process.
- Accept and deconflict near real-time airspace usage changes (either automatic receipt or manual input).

AIRSPACE INFORMATION SERVICES

C-12. The airspace information services have one function. They satisfy the air traffic controller requirement to visualize the unit airspace plan and then to directly communicate to air vehicles for executing the various options of airspace control, from procedural to positive.

AIC OPERATIONS

C-13. The methods and procedures of the airspace information center are characterized by digital and automated operations that include flight following, nonintrusive information exchanges by data burst, digital radar-fed representations, and modernized voice and data radio communications equipment. An A2C2-designated TAIS can pass planned operational information and accompanying overlays to the TAIS performing the AIC function. This allows air traffic control personnel to understand the scheme of maneuver. They can, in turn, provide feedback to the A2C2 system for near real-time operational changes to the airspace. Information about other effects on airspace usage—such as weather; enemy operations; and nuclear, biological, and chemical (NBC) contamination—can be readily transmitted to air vehicles to protect them within the battlespace. The AIC function also integrates other ATS systems within its area of coverage into the airspace management system.

TAIS FUNCTIONS

A2C2 FUNCTIONS

C-14. As discussed earlier, the TAIS provides the automated assistance for conducting A2C2 operations by performing planning and operation tasks. This section outlines and defines the critical tasks associated with the planning and operation functions.

A2C2 PLANNING

C-15. To conduct A2C2 planning, the TAIS will receive planning data (automated and manual), process planning data, deconflict A2C2 activities, and develop A2C2 deliverables. The TAIS will also transmit A2C2 deliverables (by appropriate ABCS means) directly to a Maneuver Control System (MCS) or other C2 systems with a validated user interface requirement. Through near real-time digital interfaces to the ABCS and TBMCS, TAIS automation allows prompt correlation, deconfliction, and synchronization of airspace and ground information, expeditiously assisting A2C2 methods and procedures. TAIS can complete several associated tasks:

- Process and display airspace control measures for an air tasking order.
- Receive ACMs from ARFOR elements.
- Receive ACMs from ARFOR elements.
- Input or edit.
- Deconflict ACMs and process them to the appropriate echelon.
- Provide feedback to ARFOR elements on ACM submissions.
- Display unit airspace plan.
- Construct, store, display, and share A2C2 overlay.

Process and Display Airspace Control Measures for an Air Tasking Order

C-16. The TAIS can identify and select the appropriate National Imagery and Mapping Agency (NIMA) map for loading through automatic and manual map selection. Based on map data codes received from automated data or graphics, the TAIS will automatically identify and add the planning activity database and planning display with the appropriate NIMA map data. Based on manual input, the TAIS will add the planning activity database and planning display with the designated NIMA map. The TAIS will also reference and affix the appropriate automated NIMA map data identification and recognition codes to any transmitted product generated from the TAIS. This action will allow other battlefield automated systems (BAS) to automatically recognize and upload a NIMA map pertaining to a TAIS-generated product. The TAIS two-dimensional window—the joint mapping tool kit—displays both digital terrain elevation data (DTED), levels 1 and 2. The TAIS three-dimensional window—the Dynamic Airspace Management System—currently displays DTED level 2 data in three dimensions.

C-17. The TAIS will receive the air tasking order (ATO) either through the MCS or by direct link from the joint force air component commander's (JFACC's) automated airspace control system. The ACMs identified in the ACO will be processed and displayed over the appropriate NIMA map selection.

Receive ACMs from ARFOR Elements

C-18. The TAIS receives requests for operational airspace reservations for multiple users. Functionally, under the ABCS, the TAIS and MCS will receive these messages from all Army Tactical Command and Control Systems (ATCCSs). The ATCCS nodes would have received these messages from subordinate supporting systems that represent units (airspace users). To facilitate A2C2 planning and coordination, the TAIS identifies and receives ACM requests, battlefield planning data, and graphics from five ARFOR sources:

- Maneuver.
- Fire support.
- Air defense artillery.
- Intelligence.
- Combat service support.

Input or Edit

C-19. The TAIS can manually input or edit any required data or graphics. An operator must enter the tabular data through the keyboard. The operator can manually enter any and all data that could otherwise be received digitally. This manual input function will support nonautomated airspace users or their planning headquarters. The operator also can input a new graphic or edit an existing graphic through a free-draw, on-screen activity.

Deconflict ACMs and Process Them to the Appropriate Echelon

C-20. A2C2 deconfliction operations consist of identifying and resolving operational conflicts for using airspace by two or more airspace users. User

requests or operational requirements for airspace usage with the same location, time, and altitude generate an airspace usage conflict.

C-21. For A2C2 purposes, ACMs are used to designate operational airspace for specified uses, users, locations, times, and altitudes. The TAIS automatically receives message sets and graphics that delineate ACM requests by parameters of use, user, location, time, and altitude. Additionally, the TAIS automatically determines and prepares ACMs for weapons and activities based on locations and missions derived from other shared, automated battlefield information. The TAIS operator also can manually input ACMs either through data input or free-draw, on-screen graphics that are internally converted to data. Both manual means also delineate ACM parameters in location, time, and altitude.

C-22. As the TAIS receives this ACM data, the system automatically stores the data and graphically plots the data on the planning map. Simultaneously, the system compares the parameters of each ACM resident within the database for any overlap in location, time, and altitude.

C-23. If comparison of all ACM parameters yields no conflict, then the cumulative set of ACMs will be considered deconflicted. Any overlap in which two or more airspace users might be in the same location, time, and altitude defines ACMs in conflict. For the TAIS, this equates to when any two “airspace volumes” overlap during the same time plot. Hence, two or more ACMs at the same time and altitude, but at different locations are not in conflict. Two or more ACMs at the same location and altitudes but at different times would likewise not be in conflict. Two or more ACMs at the same time and altitude with a location overlap would be in conflict.

C-24. Once the TAIS has determined that two or more ACMs have some level of overlap in all three parameters of location, time, and altitude, the TAIS proposes the ACMs as conflicting. The TAIS uses three means to identify the ACMs as conflicting:

- *Highlight ACM graphics in conflict.* Once the TAIS identifies ACMs in conflict, their graphic depiction on the planning screen is visually highlighted by a significant contrast change, color change, or blinking. The operator cannot remove this visual highlighting. It is only removed when a satisfactory conflict resolution has been selected or inputted into the TAIS.
- *Display text warning box.* Simultaneously with the visual highlighting, a text warning box appears on the screen notifying the operator of an airspace conflict. The operator can remove this box from the screen. When on the screen, the box automatically generates a separate table that will record information on the ACMs in conflict and track the status of all conflicts. The operator can retrieve this table for checks on conflict resolution. No A2C2 deliverables may be constructed or transmitted without a resolved status on each recorded conflict.
- *Initiate audio alarm.* Simultaneously with the visual highlighting and the text warning box, an intermittent audio alarm sounds as an additional warning to the operator for identified airspace in conflict. When an ACM is added into an ACO or UAP, the operator will get an alert and a visual display of all the ACMs in conflict. The TAIS also has

boundary alerts. When an air track enters, exits, or flies outside its boundary, the operator will be alerted. The operator can then contact the aircraft (pilot) via voice communications. In the A2C2 planning mode, the operator can remove this alarm, but it will return if conflict resolution is not reached prior to finalizing the UAP.

C-25. Once the TAIS has identified an airspace conflict, the next step is to resolve the airspace conflict to allow synchronized operations. Commanders generate initial priority of airspace usage listings for airspace users in their command. To avoid the absolute loss of lower-priority airspace usage requests and to provide maximum flexibility to the commander, airspace conflicts will be resolved with the least operational impact to all proposed users. For A2C2 purposes, two methods exist to resolve airspace conflicts. One is to change one or more of the ACM parameters to eliminate the conflict, the second is to accept the risk and take no action.

Provide Feedback to ARFOR Elements on ACM Submissions

C-26. When an ACM is approved, the commanding organization of the airspace users will be notified of the action. Two notification methods are used:

- Notification by data communication (preferred). This function is an automated data message (query and response free-text message) that is automatically formatted, addressed, and presented to the TAIS operator for transmission approval. The TAIS operator also can manually construct a free-text data message. The TAIS internally generates and maintains a retrievable status report on these messages.
- Notification by voice communication. This function is a voice communication from the TAIS operator to the requesting agency.

Display Unit Airspace Plan

C-27. At operator demand, the UAP is displayed on the TAIS display. This display can be an operator-selectable presentation (simultaneous or sequential) of ATO data tables (window, split, or full screen), A2C2 annex information, and the A2C2 overlay on one workstation; an individual presentation of these items on three workstations; or any combination of the above. Once the UAP has been developed, the TAIS internally designates and stores this plan as a retrievable entity.

Construct, Store, Display, and Share A2C2 Overlay

C-28. The A2C2 overlay is the most representative TAIS product of the UAP. In A2C2 planning, the A2C2 overlay, when joined with the NIMA map background and other battlefield graphics, provides a projection of a two- or three-dimensional common operational picture (COP) over time (the fourth dimension). The A2C2 overlay has four stages:

- *Construction.* The A2C2 overlay is simultaneously reconstructed with new A2C2 planning information. This process involves internal steps that dynamically reconstruct the A2C2 overlay in a “build” mode as ACM data or graphics are received, processed, and approved. The A2C2 overlay “build” function is constant regardless of the display option selected (on or off). In A2C2 planning, the A2C2 overlay is generally displayed to give planners the required COP for overall tactical

planning. When ACM requests are received, they should be added to the A2C2 overlay as “unapproved” ACMs. Unapproved ACMs are displayed in a checkerboard pattern vice the solid pattern of approved ACMs.

- *Store.* Once the A2C2 overlay data set has been developed and collated, the TAIS internally designates and stores this overlay as a retrievable entity.
- *Display.* The A2C2 overlay display function is clearly the most critical requirement in A2C2 planning. Significant on-screen initial planning and planning changes (manual inputs) will be performed during the A2C2 planning mission mode. On-screen planning changes are automatically converted to data sets in the TAIS database. The A2C2 overlay is correlated to NIMA map background data and display graphics (other overlays). Operator-selectable display options coupled with the decluttering capability are critical capabilities. In addition to graphics and display options, the following operator-selectable A2C2 overlay display options will be available:
 - Selection of effective times. This option serves to partition a portion of the A2C2 overlay display and reduce the number of graphics present on the display screen for a set time frame. In A2C2 planning, the A2C2 overlay correlates to the overall UAP by scheduled execution times.
 - Selection of start time. Self-explanatory.
 - Selection of stop time. Self-explanatory.
 - Selection of A2C2 measures. Another method to reduce the number of graphics present on the display screen, or to limit the focus to specific types of ACM measures, is to select only certain A2C2 measures for display.
- *Share.* The TAIS overlay provider gives several capabilities to other ABCSs. They can pull the current A2C2 overlay from TAIS using a direct socket TCP or IP connection, display the overlay on their screens, monitor it as a dynamic product that will refresh and update as TAIS makes changes, and get more detailed information on any airspace control element by right clicking on that element.

A2C2 OPERATIONS

C-29. A2C2 actions taken during the planning cycle are one aspect of the A2C2 process. Reacting to changes in the tactical situation during the conduct of the battle requires similar A2C2 actions (A2C2 operations). Although similar, these actions are characterized by time sensitivity (near real-time). A2C2 operations demand immediate action not required in A2C2 planning. While executing tactical missions, changes in missions are received (location, time, or altitude for A2C2 purposes), the situation is evaluated, and requirements for airspace and potential conflicts between airspace users are identified. Then options are proposed, selected, coordinated, and implemented to resolve the conflicts and synchronize the forces. These critical tasks are associated with A2C2 operations:

- Display digital situation map of area of interest.
- Monitor battle tempo.

- Adapt to unit airspace plan change.
- Deconflict airspace usage and process to the appropriate echelon.
- Provide feedback to ARFOR elements on airspace usage.
- Forward ACMs and airspace usage conflicts to affected elements.
- Revise the unit airspace plan.
- Retransmit A2C2 deliverables.

Display Digital Situation Map of Area of Interest

C-30. The TAIS displays the execution plan, which includes operational overlays, while displaying near real-time COP data. With numerous overlays—such as maneuver and fire support—covering an extended execution period, display saturation can occur. Once A2C2 operations are initiated, the TAIS operator receives a prompt with these segmenting options:

- *Select all COP information.* This functional selection is the default setting and displays all COP information (both planning and real-time) available for the identified operation.
- *Select COP by time period.* This functional selection has a dual selection capability. One is a designated time period correlated to the operation (such as H-hour to H + 1.00 hour, H + 1.5 hour, or H + 2.00 hour); the other is a designated time period by date-time group, such as 240600Z OCT 96–250600Z OCT 96.
- *Select COP by units.* This functional selection displays the COP of only those units or participants designated by the TAIS operator.
- *Select COP by data.* This functional selection displays the COP generated by TAIS operator-selected data or data sets, such as boundaries, locations, and objectives.
- *Select COP by graphics.* This functional selection displays the COP generated by TAIS operator-selected graphics or graphic sets, such as graphics by category—battle positions, assembly areas, or phase lines.
- *Select COP by activity.* This functional selection displays the COP for identifiable portions or phases of an operation, such as attack, defense, consolidation, or designated (Phase I, II, or III).
- *Select no COP information.* This functional selection displays no common operational picture.

C-31. In conjunction with COP segment selection, the TAIS operator also must further declutter the active display. Generally, he declutters this display after COP segmentation to further reduce screen saturation or to tailor the common operational picture display for specific A2C2 operations functions.

Monitor Battle Tempo

C-32. A key element in successful A2C2 operations is executing the planned airspace activities within the parameters reserved for these activities. During dynamic battlefield operations, many factors influence the ability for these activities to occur in the reserved time, location, or altitude provided during A2C2 planning. Examples can include delays, faster or slower advances, friendly or enemy advances, unexpected enemy activities, or execution errors.

C-33. The sophistication of new weapons and BAS allows for more immediate and automatic transmission of parametric data regarding airspace use. When available, the TAIS uses this information to automatically compare (monitor) the execution accuracy of the airspace user to that of the planned execution for that airspace user. If an actual or projected variance exists, the TAIS automatically reprocesses this variance for conflict to existing and projected (planned) airspace use to determine conflicts. If conflict exists, the TAIS enters its functional “Conduct Deconfliction Operations.” This process remains cyclical, as needed, with continuing receipt of automated data.

C-34. By directly observing the display and monitoring voice communications of airspace users, the TAIS operator scrutinizes the real-time UAP execution activities, compares them with the expected parameters, and identifies actual or potential variance. If actual or potential variance exists, the TAIS operator automatically reviews this variance for conflict to existing and projected (planned) airspace use to determine conflict. If conflict exists, the TAIS operator uses the system’s functional “Conduct Deconfliction Operations” by either automated or manual modes. The manual function may include appropriate AIC coordination with airspace users before initiating action.

Adapt to Unit Airspace Plan Change

C-35. When conducting A2C2 operations, changes in airspace use requirements will occur. For TAIS operations, these changes are functionally separated into planned and unplanned ACM changes. These changes may be received automatically or manually by voice or data communications. The major impacts of these changes on A2C2 operations and TAIS functioning are processing requirements and time availability.

C-36. A planned ACM change occurs when operations span time periods that can be hours in length, can be phased, or can be objectively progressive (future actions relying on previous success). With all these variables present once a planned operation starts, a high probability exists that changes will be required later in time but within the execution cycle of the current operation. Since some time will be available to input these changes, they are less reactive time-wise than unplanned execution changes. Each planned ACM change, addition, and deletion will require full TAIS reprocessing (Conduct Deconfliction Operations) of all data to ensure continued synchronization of the operation with the changed parameters. Unplanned ACM changes are more time-sensitive, are more reactive than proactive in nature, and result in unforeseen changes.

C-37. The ability to repetitively identify and resolve airspace conflicts in real-time during A2C2 operations is the single most important functional requirement for TAIS. It represents one of the major “value added” applications of automation to A2C2. The functional steps to accomplish this conflict resolution are the same as those for A2C2 planning. Time-sensitive execution of these steps is necessary to ensure synchronized near real-time operations.

Deconflict Airspace Usage and Process to Appropriate Echelon

C-38. In A2C2 operations, airspace users attempting to use operational airspace at the same location, time, and altitude generate airspace usage conflicts. Due to the real-time nature of A2C2 operations, mission changes—

new or modified, ACM-protected, locations, times, or altitudes required—or user deviations—operations outside the previously approved, ACM-protected, locations, times, or altitudes—predominantly cause this conflict.

C-39. For A2C2 purposes, ACMs are used to identify operational airspace for specified uses, users, locations, times, and altitudes. The TAIS automatically receives message sets and graphics that delineate ACM requests by parameters of use, user, location, time, and altitude. The TAIS operator can also manually input ACMs either through data input or free-draw, on-screen graphics that are internally converted to data. Both manual means also delineate ACM parameters in location, time, and altitude.

C-40. As the TAIS receives this ACM data, the system automatically stores the data and graphically plots the ACM on the planning map. Simultaneously, the system compares the parameters of each ACM resident in the database for any overlap in location, time, and altitude. Once the ACM set is deemed deconflicted and additional ACMs are received or inputted affecting the period of operational planning, the functional cycle will immediately revert to the parameter comparison functional step of “Identify Airspace Conflicts.” This step becomes a dynamic cyclical function leading to total airspace deconfliction either through no noted conflicts, conflict resolution, or risk acceptance. Conflict resolution and risk acceptance may require additional coordination through the AIC directly to airspace users.

Provide Feedback to ARFOR Elements on Airspace Usage

C-41. When an ACM is approved, command echelons down to the requestor will be notified of the action. Two notification methods are used:

- Notification by data communication (preferred). This function is an automated data message (query and response free-text) that is automatically formatted, addressed, and presented to the TAIS operator for transmission approval. The TAIS operator also can manually construct a free-text message. The TAIS will internally generate and maintain a retrievable status report on these messages.
- Notification by voice communication. This function will be a voice communication from the TAIS operator to the controlling headquarters.

Forward ACMs and Airspace Usage Conflicts to Affected Elements

C-42. This function is direct notification of the actual airspace users in conflict. Due to time requirements or fratricide potential, this notification method may take priority over notifications to C2 elements. This method will also be used for those airspace users who have no controlling headquarters, for those airspace users whose headquarters cannot be reached, or for any other reason that dictates direct contact. The airspace users with the remaining conflict will be notified directly of the conflict for further coordination or acceptance of the risk. The AIC is notified to coordinate and resolve conflicts with ongoing airborne operations. The ACM request information has a source and destination location via the ABCS address book. TAIS software ensures that receivers acknowledge receipt of messages. Failure to acknowledge message receipt generates a prompt to the TAIS operator that the message has not been received. The operator then knows he must transmit the message by other means. He will use these methods for notification:

- Notify by data communication (preferred). This function will be an automated data message that is automatically formatted, addressed, and presented to the TAIS operator for transmission approval. The TAIS operator also can manually construct a free-text message. The TAIS will internally generate and maintain a retrievable status report on these messages.
- Notify by voice communication. This function will be a voice communication from the TAIS operator directly to the airspace users in conflict notifying them of the conflict and the accepted risk decision. This method will be used to notify nonautomated users. The TAIS will prompt the operator for manual transmission of this message and track or record completion of the notification.

Revise Unit Airspace Plan

C-43. Once all ACM changes and accept risk decisions have been inputted and deconflicted, the TAIS will internally revise all system deliverables to reflect the updated information. Internally, this process may be modification of previous products or regeneration as long as the revised product is appropriately date-time coded. Receiving users, controllers, or C2 elements must recognize the code as the most current product. For A2C2 operations, the following A2C2 deliverables would be subject to this functional revision process:

- *ATO information.* Any approved change to ATO information received from the ACA automated airspace planning system will alert the TAIS operator who can view the data for use in A2C2 planning and operations. Any change to ATO information generated by the TAIS-supported unit (echelon) will require approval from the ACA automated airspace planning system.
- *A2C2 overlay.* Self-explanatory and previously defined.
- *ACO information.* Any approved change to ACO information received from the JFACC automated airspace planning system will be directly incorporated and integrated into the UAP of the TAIS-supported unit (echelon). Any change to ACO information generated by the TAIS-supported unit (echelon) will require approval from the controlling JFACC automated airspace planning system.
- *Special instructions information.* Any approved change to special instructions received from the JFACC automated airspace planning system is directly incorporated and integrated into the UAP of the TAIS-supported unit (echelon). Any change to special instructions generated by the TAIS-supported unit (echelon) requires approval from the controlling JFACC automated airspace planning system.
- *A2C2 annex.* Since the A2C2 annex serves as the A2C2 order and provides the procedural guidance for the particular operation, the likelihood (due to time and ongoing operations) of totally revising this deliverable during an operation is low. An A2C2 fragmentary order is used to address only those orders or procedures necessary to affect realigned operations.
- *A2C2 SOP information.* Since SOP information is generic and broad in application, the likelihood of permanent revisions is low. Operation-

specific SOP changes or expanded SOP procedures of a temporary nature may be required to streamline A2C2 operations.

C-44. If an aviation procedure guide is developed and maintained as a living document (Microsoft Word format) in the TAIS automation database, then the G3 air can approve updates and make them available to users. Approach and en route procedures for tactical instruments must have the approval of ATS battalion or group standardization before being submitted to the G3 air for final approval and inclusion.

Retransmit A2C2 Deliverables

C-45. The ability of the TAIS to retrieve the UAP and transition it to real-time operations by constantly adjusting and deconflicting for time and situational changes is paramount for effective A2C2 operations. The ability to transmit this total two- or three-dimensional, integrated COP to appropriate commanders and airspace users through ABCS is critical. (The other ABCSs will only be able to see a two-dimensional picture. Only another TAIS can display the three-dimensional picture.) This near real-time, deconflicted, and synchronized TAIS product should be a commander's critical information request as an on-demand display on the MCS. The ability to retransmit changed versions in near real-time is crucial.

AIC FUNCTIONS

C-46. The AIC is the primary ATS facility that provides airspace information services and coordinates Army, joint, civil, and combined air traffic operating within the area of operations. All AICs in theater form a system that interfaces with the joint, combined, and host-nation airspace management systems. The AIC primary function is to deconflict, separate, and monitor airspace users.

AIC OPERATIONS

C-47. The TAIS increases the AIC capabilities to meet joint airspace management requirements. The common airspace planning picture—coupled with near real-time surveillance data and more efficient reliable communications to air vehicles—quantitatively improves the AIC operations over those formerly performed with the AN/TSC-61B, flight coordination central.

TAIS DIGITAL NETWORK

C-48. TAIS relies on integrating with the ABCS, TBMCS, and civil aviation systems to access the most complete data essential for airspace management. TAIS also draws information from direct and indirect external sources to provide a near real-time air picture. To achieve this full integration, TAIS primarily uses the communications and mission equipment shown in Table C-1 to link into those networks.

Table C-1. Communication Links

Equipment	Network	Link	Purpose
AN/VRC-90F SINGGARS	Tactical Internet (TI)	Data	Data link to TI and back-up voice tactical FM radio.
AN/VRC-92E SINGGARS (2 R/Ts)	Operational ground and aviation FM nets	Voice	Voice communications with ground forces and tactical Army aviation elements. TAIS monitors appropriate frequencies; there is also a dedicated TAIS FM frequency per the SOI.
AN/VRC-83 HAVE QUICK Radio Set	UHF-AM	HAVE QUICK assigned SOI tactical aviation frequency	Secure frequency-hopping voice communications with aviation assets. TAIS monitors appropriate aviation frequencies; there is no dedicated TAIS UHF frequency.
AN/VRC-83 HAVE QUICK Radio Set	UHF-AM	HAVE QUICK assigned SOI tactical aviation frequency	Secure frequency-hopping voice communications with aviation assets. TAIS monitors appropriate aviation frequencies; there is no dedicated TAIS UHF frequency.
AN/VRC-83 HAVE QUICK Radio Set	VHF-AM	Assigned SOI tactical aviation frequency	Secure voice communications with aviation assets. TAIS monitors appropriate aviation frequencies; there is no dedicated TAIS VHF frequency.
AN/VRC-83 HAVE QUICK Radio Set	VHF-AM	Assigned SOI tactical aviation frequency	Secure voice communications with aviation assets. TAIS monitors appropriate aviation frequencies; there is no dedicated TAIS VHF frequency.
AN/ARC-220 HF Radio Set	HF (ALE)	Voice	(1) Long-range NLOS communications with any HF equipped platform. Automatic link establishment (ALE) communicates with ARC-220 equipped aircraft. (2) Long range TAIS-to-TAIS communications.
TADIL-A, HF (95-S)	AWACS/CRC TADIL-A	Assigned SOI frequency (dedicated) to AWACS or CRC	Receiver of air track data used for battle tracking and airspace procedures compliance.
SATCOM, UHF (PSC-5)	UHF-TACSAT	Assigned SOI frequency	Warfighter net (1) Long-range communications with SATCOM-equipped aircraft. (2) Long-range (over the horizon) TAIS-to-TAIS communications.
UHF/VHF COMM (URC 200)	UHF-AM VHF-AM	Assigned SOI tactical aviation frequencies and UHF/VHF guard	Nonsecure commercial off the shelf air traffic control radio. Primarily used to monitor and transmit on UHF and VHF guard frequencies.
AN/VSQ-2 EPLRS Radio Set	TI and FAAD EO	Assigned SOI	Radio data link capability. Provides common tactical picture, VMF, data messaging, and TAIS-to-TAIS link.
2 x Secure Telephones (DNVT)		Supporting communications SEN	Telephones that provide voice and data (TADIL-B) communication.
4-Channel Modem	FAAD	Ethernet LAN via AN/VRC-90F SINGGARS	Modem that receives air track data used for battle tracking and airspace procedures compliance.
Signal Entry Panel	ABCS	TOC LAN	Panel that accesses ABCS data used to receive and transmit situational and airspace procedures data.
Signal Entry Panel	TADIL-B	TOC LAN	Panel that receives air track data used for battle tracking and airspace procedures compliance.

Table C-1. Communication Links (continued)

Equipment	Network	Link	Purpose
Signal Entry Panel	TBMCS	TOC LAN	Panel that accesses TBMCS data used to receive or transmit situational and airspace procedures data.
Signal Entry Panel	Voice and Data (TADIL-B)	Landline	Panel that uses nine voice lines for AIC and A2C2 communications needs and one data line for TADIL-B.
KG40/40X Encrypter	N/A	HF	Device to encrypt HF (95-S) radio.
KY-68 Encrypter	N/A	MSE/DNVT	Device to encrypt MSE and DNVT radio.
<p>AM—amplitude modulation AN—Army-Navy ARC—aircraft radio configuration AWACS—Airborne Warning and Control System COMM—communications CRC—control and reporting center DNVT—digital nonsecure voice terminal EO—electro-optical EPLRS—Enhanced Position Location Reporting System FM—frequency modulation HF—high frequency KG—encryption device KY—encryption device MSE—mobile subscriber equipment</p> <p>NLOS—non line of sight PSC—portable satellite configuration R/T—receiver/transmitter SATCOM—satellite communications SEN—small extension node SINCGARS—Single-channel Ground and Airborne Radio System SOI—signal operating instructions TACSAT—tactical satellite TOC—tactical operations center UHF—ultra high frequency URC—universal radio configuration VHF—very high frequency VRC—vehicular radio communications VSQ—vehicular satellite quest</p>			

C-49. The lowest echelon for TAIS employment is division. However, significant A2C2 coordination occurs below the division level. To fully incorporate A2C2 throughout all echelons, the MCS and Aviation Mission Planning System fulfill the airspace management role for brigade and below. The MCS serves as the enabling system since it is designed to cross-level information with the other ATCCSs.

TAIS MESSAGING

C-50. The TAIS primarily uses the USMTF and variable message format (VMF) to receive data from other ABCSs. These messages are passed via LAN to the TAIS or retrieved from the joint common database. Table C-2 on page C-16 depicts the messages TAIS sends and receives.

Table C-2. Messages Used by TAIS

ABCS Component	Receives from TAIS			Sends to TAIS		
AFATDS (Artillery)	A659* F015 F756*	F002 F541 S201*	F014 F658*	F002 F541	F014 F658*	F015 S201*
AMDPCS (Air Defense)	A659* F015 F756*	F002 F541 K01.1	F014 F658* S201*	E500 F015 K01.1	F002 F541 S201*	F014 F658*
ASAS (Intelligence)	C002 F014 F658*	C203 F015 K01.1	F002 F541 S201*	C002 F014 F658* S309	C203 F015 K01.1	F002 F541 S201*
CSSCS (Service Support)	F002 F541 S201*	F014 F658*	F015 K01.1	D630 F014 F631 S201*	D851 F015 F658*	F002 F541 K01.1
DTSS (Geospatial Information)	F002 F541	F014	F015	F002 F541	F014	F015
IMETS (Weather Data)	F002 F541	F014 K01.1	F015	C520 F002 F541	C521 F014 K01.1	C523 F015
ISYSCON (Network Data)	F002 F541	F014 K01.1	F015	C002 F014	C120 F015	F002 F541
MCS (Maneuver)	A659 F002 F541 K01.1	C002 F014 F658* S201*	C400 F015 F756 S507	A423 C203 C447 C503 C506 E400 F015 F756 S201*	A659 C400 C488 C504 C507 F002 F541 G489 S507	C002 C443 C501 C505 C508 F014 F658* K01.1 S303
FBCB2	K01.1	K05.2	K05.17	K01.1	K05.2	K05.17
GCCS-A	F002 F402	F014 F541	F015 S201*	F002 F541	F014 S201*	F015
AFATDS—Advanced Field Artillery Tactical Data System AMDPCS—Air and Missile Defense Planning and Control System ASAS—All Source Analysis System DTSS—Digital Topographic Support System IMETS—Integrated Meteorological System ISYSCON—integrated systems control FBCB2—Force XXI Battle Command Brigade and Below System GCCS-A—Global Command and Control System-Army *TAIS automatically fills and posts						

USMTF AND VMF TITLES

C-51. Table C-3 lists a summary of the key A2C2 USMTF and VMF titles used by TAIS. Appendix A discusses these messages in detail.

Table C-3. USMTF and VMF Titles

Number	Title	Number	Title
A423	Order	D630	Airlift Request
A659	Air Tasking Order	D851	Air Evacuation Request
C002	Message Correction/Cancellation	E400	Operations Plan Change
C120	Meaconing, Intrusion, Jamming, and Interference Feeder Report	E500	Air Early Warning Message
C203	Graphical Report-Overlay	F002	General Administration Message
C400	Commander's Situation Report	F014	Request for Information
C443	NBC 3 Report	F015	Response to Request for Information
C447	NBC 4 Report	F541	Acknowledge Message
C488	NBC 1 Report	F658	Airspace Control Means Request
C501	NBC 5 Report	F756	Airspace Control Order
C503	NBC Effective Downwind Report	G489	NBC 2 Report
C504	Friendly Chemical Strike Message	S201	Support-Battlefield Geometry
C505	Friendly Nuclear Strike Warning	S507	Resource
C506	NBC 6 Report	K01.1	Free Text
C507	NBC Chemical Downwind Report	K05.2	Nuclear, Biological Chemical Report One
C508	NBC Basic Wind Report	K05.17	Overlay Message

Glossary

The glossary lists acronyms and terms with Army or joint definitions, and other selected terms. Where Army and joint definitions are different, (Army) follows the term. Terms for which FM 3-52 is the proponent manual (the authority) are marked with an asterisk (*). The proponent manual for other terms is listed in parentheses after the definition.

*A2C2	Army airspace command and control
AADC	area air defense commander
AAGS	Army Air-Ground System
AAMDC	Army air and missile defense command
AAW	antiair warfare
ABCCC	airborne battlefield command and control center
ABCS	Army Battle Command System
ACA	airspace control authority
ACE	aviation combat element Marine air-ground task force (MAGTF)
ACM	airspace control measure
ACO	airspace control order
ACP	airspace control plan; air control point (graphics only)
AD	air defense
ADA	air defense artillery
ADC	air defense commander (graphics only)
ADIZ	air defense identification zone
ADLS	air defense liaison section
ADRG	ARC digitized raster graphics
ADSI	Air Defense System Integrator
AFARN	Air Force air request net
AFATDS	Advanced Field Artillery Tactical Data System
AFFOR	Air Force forces
AFLE	Air Force Liaison Element
AFSOC	Air Force special operations commander (graphics only)
AIC	airspace information center

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- *air control point** (Army) an easily identifiable point on the terrain or an electronic navigational aid used to provide necessary control during air movement. Air control points are generally designated at each point where the flight route or air corridor makes a definite change in any direction and at any other point deemed necessary for timing or control of the operation.
- air corridor** a restricted air route of travel specified for use by friendly aircraft and established for the purpose of preventing friendly aircraft from being fired on by friendly forces (JP 3-52)
- air defense identification zone** airspace of defined dimensions within which the ready identification, location, and control of airborne vehicles are required (JP 3-52)
- air defense warning conditions** a degree of air raid probability according to the following code. The term air defense division/sector referred to herein may include forces and units afloat and/or deployed to forward areas, as applicable. Air defense warning yellow—attack by hostile aircraft and/or missiles is probable. This means that hostile aircraft and/or missiles are en route toward an air defense division/sector, or unknown aircraft and/or missiles suspected to be hostile are en route toward or are within an air defense division/sector. Air defense warning red—attack by hostile aircraft and/or missiles is imminent or is in progress. This means that hostile aircraft and/or missiles are within an air defense division/sector or are in the immediate vicinity of an air defense division/sector with high probability of entering the division/sector. Air defense warning white—attack by hostile aircraft and/or missiles is improbable. May be called either before or after air defense warning yellow or red. The initial declaration of air defense emergency will automatically establish a condition of air defense warning other than white for purposes of security control of air traffic. (JP 1-02)
- air defense** all defensive measures designed to destroy attacking enemy aircraft or missiles in the Earth's envelope of atmosphere, or to nullify or reduce the effectiveness of such attack (JP 3-56.1)
- air liaison officer** an officer (aviator/pilot or naval flight officer) attached to a ground unit who functions as the primary advisor to the ground commander on air operation matters (JP 1-02)
- air operations center** 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 agency of the Air Force Component Commander from which command and control of air operations are coordinated with other components and Services. (JP 3-56.1)
- airspace control** asee airspace control in the combat zone
- airspace control area** airspace which is laterally defined by the boundaries of the area of operations. The airspace control area may be subdivided into airspace control sectors. (JP 3-52)

- airspace control authority** the commander designated to assume overall responsibility for the operation of the airspace control system in the airspace control area (JP 3-52)
- 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. (JP 3-52)
- airspace control measures** rules, mechanisms, and directions governed by joint doctrine and defined by the airspace control plan which control the use of airspace of specified dimensions (FM 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. (JP 3-56.1)
- 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 and/or joint operations area (JP 3-52)
- airspace coordination area** a three-dimensional block of airspace in a target area, established by the appropriate ground commander, in which friendly aircraft are reasonably safe from friendly surface fires. The airspace coordination area may be formal or informal. (JP 1-02)
- airspace management** the coordination, integration, and regulation of the use of airspace of defined dimensions (JP 3-52)
- air support operations center** an agency of a tactical air control system collocated with a corps headquarters or an appropriate land force headquarters, which coordinates and directs close air support and other tactical air support (JP 1-02)
- air tasking order** a method used to task and disseminate to components, subordinate units, and command and control agencies projected sorties, capabilities and/or forces to targets and specific missions. Normally provides specific instructions to include call signs, targets, controlling agencies, etc., as well as general instructions (JP 3-56.1)
- ALO** air liaison officer
- AMD** air and missile defense
- AMDPCS** Air and Missile Defense Planning and Control System
- AME** air mobility element
- AMLS** airspace management liaison section
- amphibious objective area** a geographical area (delineated for command and control purposes in the order initiating the amphibious operation) within

which is located the objective(s) to be secured by the amphibious force. This area must be of sufficient size to ensure accomplishment of the amphibious force's mission and must provide sufficient area for conducting necessary sea, air, and land operations. (JP 3-02)

AMPS	Aviation Mission Planning System
ANGLICO	air and naval gunfire liaison company
ANGPLT	air naval gunfire platoon
AO	area of operations
AOA	amphibious objective area
AOC	air operations center (USAF)
AOR	area of responsibility
ARC	equal Arc second raster Chart/map
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. (JP 3-52)
area of interest	that area of concern to the commander, including the area of influence, areas adjacent thereto, and extending into enemy territory to the objectives of current or planned operations. This area also includes areas occupied by enemy forces who could jeopardize the accomplishment of the mission. (JP 3-0)
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. (JP 3-0)
area of responsibility	the geographical area associated with a combatant command within which a combatant commander has authority to plan and conduct operations (JP 3-0)
AREC	air resource element coordinator
ARFOR	the senior Army headquarters and all Army forces assigned or attached to a combatant command, subordinate joint force command, joint functional command, or multinational command.
*Army airspace command and control	(Army) the Army's application of airspace control to coordinate airspace users for concurrent employment in the accomplishment of assigned missions
ARSOC	Army special operations commander (graphics only)

ASAS	All Source Analysis System
ASC(A)	assault support coordinator (airborne)
ASOC	air support operations center
ATACMS	Army Tactical Missile System
ATACS	(Army) Amphibious Tactical Air Control System
ATC	air traffic control
ATCCS	Army Tactical Command and Control System
ATDL	Army tactical data link
ATK	attacking (graphics only)
ATO	air tasking order
ATS	air traffic service
avenue of approach	(Army) the air or ground route leading to an objective (or key terrain in its path) that an attacking force can use (FM 3-90)
AWACS	Airborne Warning and Control System
axis of advance	(Army) the general area through which the bulk of a unit's combat power must move (FM 3-90)
BAS	battlefield automated systems
base defense zone	an air defense zone established around an air base and limited to the engagement envelope of short-range air defense weapons systems defending that base. Base defense zones have specific entry, exit, and identification, friend or foe procedures established. (JP 3-52)
battle position	(Army) a defensive location oriented on a likely enemy avenue of approach (FM 3-90)
battlefield coordination detachment	an Army liaison provided by the Army component or force commander to the air operations center (AOC) and/or to the component designated by the joint force commander to plan, coordinate, and deconflict air operations. The battlefield coordination detachment processes Army requests for air support, monitors and interprets the land battle situation for the AOC, and provides the necessary interface for exchange of current intelligence and operational data. (JP 1-02)
BCD	battlefield coordination detachment (formerly battlefield coordination element)
BDE	brigade (graphics only)
BDZ	base defense zone (graphics only)
BN	battalion (graphics only)
BOS	battlefield operating systems
BSA	brigade support area (graphics only)

C2	command and control
C2IP	Command and Control Initiatives Program
C2WC	command and control warfare commander
C3I	command, control, communications, and intelligence
C4ISR	command, control, communications, computers, intelligence, surveillance, and reconnaissance
CAC	Combined Arms Center
CAP	combat air patrol
CAS	close air support
CATF	commander, amphibious task force
CCP	communications check point (graphics only)
CFL	coordinated fire line
checkpoint	(Army) a predetermined point on the ground used to control movement, tactical maneuver, and orientation (FM 3-90)
CJCSM	Chairman of the Joint Chiefs of Staff Manual
CLF	commander, landing force
close air support	air action by fixed- and rotary-wing aircraft against hostile targets which are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces (JP 3-56.1)
CLRS	central launch and recovery section
Co	company (graphics only)
combat air patrol	an aircraft patrol provided over an objective area, the force protected, the critical area of a combat zone, or in an air defense area, for the purpose of intercepting and destroying hostile aircraft before they reach their targets (JP 1-02)
combat service support	the essential capabilities, functions, activities, and tasks necessary to sustain all elements of operating forces in theater at all levels of war. Within the national and theater logistic systems, it includes but is not limited to that support rendered by service forces in ensuring the aspects of supply, maintenance, transportation, health services, and other services required by aviation and ground combat troops to permit those units to accomplish their missions in combat. Combat service support encompasses those activities at all levels of war that produce sustainment to all operating forces on the battlefield. (JP 4-0)
combat support	(Army) critical combat functions provided by units and soldiers in conjunction with combat arms units and soldiers to secure victory (FM 3-90)

- combat zone** 1. that area required by combat forces for the conduct of operations. 2. The territory forward of the Army rear area boundary. (JP 3-52)
- COMJTF** commander, joint task force
- 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. (JP 0-2)
- commander, amphibious task force** the Navy officer designated in the order initiating the amphibious operation as the commander of the amphibious task force (JP 3-02)
- commander's critical information requirements** (Army) elements of information required by commanders that directly affect decision making and dictate the successful execution of military operations (FM 3-0)
- commander's intent** (Army) a clear, concise statement of what the force must do and the conditions the force must meet to succeed with respect to the enemy, terrain, and the desired end state (FM 3-0)
- command post** (Army) a unit's headquarters where the commander and staff perform their activities during operations. It is often divided into echelons. The command post is the principal facility employed by the commander to control combat operations. (FM 6-0)
- common operational picture** (Army) an operational picture tailored to the user's requirements, based on common data and information shared by more than one command (FM 3-0)
- common reference system** common reference systems provide a universal, joint perspective with which to define specific areas of the battlespace, enabling the commanders to efficiently coordinate, deconflict, integrate, and synchronize attacks (JP 3-60)
- communications checkpoint** (Army) an air control point that requires serial leaders to report either to the aviation mission commander or the terminal control facility (FM 1-02)
- COMMZ** communications zone
- 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. (JP 1-02)

- concept of operations** (Army) describes how commanders see the actions of subordinate units fitting together to accomplish the mission. As a minimum, the description includes the scheme of maneuver and concept of fires. The concept of operations expands the commander's selected course of action and expresses how each element of the force will cooperate to accomplish the mission. (FM 3-0)
- control and reporting center** a center directly subordinate to the JAOC and is the senior TACS radar element responsible for decentralized execution of air defense and airspace control. The CRC provides battle management, weapons control, surveillance, identification, and link management. The CRC provides positive and procedural airspace control. The CRC is assigned a geographic sector by the JAOC, within which it manages all defensive air, offensive air and airspace management activities. The CRC is responsible for recommending changes in air defense (AD) warning conditions based on the air situation. (JP 1-02)
- controlled airspace** an airspace of defined dimensions within which air traffic control service is provided to controlled flights (JP 1-02) (this manual does not use the Army definition of this term)
- control measures** directives given graphically or orally by a commander to subordinate commands to assign responsibilities, coordinate fires and maneuver, and control combat operations. Each control measure can be portrayed graphically. In general, all control measures should be easily identifiable on the ground. Examples of control measures include boundaries, objectives, coordinating points, contact point, and direction of attack. (JP 1-02)
- coordinated fire line** the coordinated fire line (CFL) is a line beyond which conventional, direct, and indirect surface fire support means may fire at any time within the boundaries of the establishing headquarters without additional coordination. The purpose of the CFL is to expedite the surface-to-surface attack of targets beyond the CFL without coordination with the ground commander in whose area the targets are located. (JP 3-09)
- coordinating altitude** a procedural airspace control method to separate fixed- and rotary-wing aircraft by determining an altitude below which fixed-wing aircraft will normally 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 (JP 3-52)
- COP** common operational picture
- counterair** a mission which integrates offensive and defensive operations to attain and maintain a desired degree of air superiority. Counterair missions are designed to destroy or negate enemy aircraft and missiles, both before and after launch. (JP 3-01)
- counterair operations** see counterair
- CP** command post

CRC	control reporting center
CRE	control and reporting element
CSSCS	Combat Service Support Control System
CV	aircraft carrier (graphics only)
CWC	composite warfare commander
DASC	direct air support center
DASC(A)	direct air support center (airborne)
DET	detachment (graphics only)
DIV	division (graphics only)
DOCC	deep operations coordination cell
DOD	Department of Defense
DSA	division support area (graphics only)
DTED	digital terrain elevation data
DTSS	Digital Topographic Support System
E-2C	Hawkeye—airborne early warning aircraft
EA	electronic attack
EAC	echelons above corps
EFF	effective (graphics only)
electronic warfare	any military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy (JP 3-51)
engagement area	(Army) where the commander intends to contain and destroy an enemy force with the massed effects of all available weapons and supporting systems (FM 3-90)
EW	electronic warfare
EW/C	early warning/control
FA	field artillery
FAAD	forward area air defense
FAC	forward air controller
FAC(A)	forward air controller (airborne)
FARP	forward arming and refueling point
FBCB2	Force XXI Battle Command Brigade and Below
FDC	fire direction center
FFA	free-fire area
FFCC	force fires coordination center (graphics only)

fighter engagement zone	in air defense, that airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with fighter aircraft (JP 3-52)
fire support	fires that directly support land, maritime, amphibious, and special operation forces to engage enemy forces, combat formations, and facilities in pursuit of tactical and operational objectives (JP 1-02)
fire support coordinating measure	a measure employed by land or amphibious commanders to facilitate the rapid engagement of targets and simultaneously provide safeguards for friendly forces (JP 1-02)
fire support coordination	the planning and executing of fire so that targets are adequately covered by a suitable weapon or group of weapons (JP 3-09)
fire support coordination line	a fire support coordinating measure that is established and adjusted by appropriate land or amphibious force commanders within their boundaries in consultation with superior, subordinate, supporting, and affected commanders. Fire support coordination lines (FSCLs) facilitate the expeditious attack of surface targets of opportunity beyond the coordinating measure. An FSCL does not divide an area of operations by defining a boundary between close and deep operations or a zone for close air support. The FSCL applies to all fires of air, land, and sea-based weapons systems using any type of ammunition. Forces attacking targets beyond an FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid fratricide. Supporting elements attacking targets beyond the FSCL must ensure that the attack will not produce adverse attacks on, or to the rear of, the line. Short of an FSCL, all air-to-ground and surface-to-surface attack operations are controlled by the appropriate land or amphibious force commander. The FSCL should follow well-defined terrain features. Coordination of attacks beyond the FSCL is especially critical to commanders of air, land, and special operations forces. In exceptional circumstances, the inability to conduct this coordination will not preclude the attack of targets beyond the FSCL. However, failure to do so may increase the risk of fratricide and could waste limited resources. (JP 3-09)
flight corridor	see air corridor
flight following	the task of maintaining contact with specified aircraft for the purpose of determining en route progress and/or flight termination (JP 1-02)
FLOT	forward line of own troops
FM	field manual
FOC	flight operations center (graphics only)
force projection	the ability to project the military element of national power from the continental United States (CONUS) or another theater, in response to requirements for military operations. Force projection

operations extend from mobilization and deployment of forces to redeployment to CONUS or home theater. (JP 3-0)

forward air controller (airborne) a specifically trained and qualified aviation officer who exercises control from the air of aircraft engaged in close air support of ground troops. The forward air controller (airborne) is normally an airborne extension of the tactical air control party. (JP 1-02)

forward arming and refueling point a temporary facility—organized, equipped, and deployed by an aviation commander, and normally located in the main battle area closer to the area where operations are being conducted than the aviation unit's combat service area—to provide fuel and ammunition necessary for the employment of aviation maneuver units in combat. The forward arming and refueling point permits combat aircraft to rapidly refuel and rearm simultaneously. (JP 1-02)

forward line of own troops a line that indicates the most forward positions of friendly forces in any kind of military operation at a specific time. The forward line of own troops (FLOT) normally identifies the forward location of covering and screening forces. The FLOT may be at, beyond, or short of the forward edge of the battle area. An enemy FLOT indicates the forward-most position of hostile forces. (JP 1-02) This manual does not use the Army definition of this term.

FRAGO fragmentary order

fratricide (Army) the unintentional killing or wounding of friendly personnel by friendly firepower (FM 3-0)

free-fire area a specific area into which any weapon system may fire into without additional coordination with the establishing headquarters (JP 3-09)

FS fire support

FSCC fire support coordination center

FSCCL fire support coordination line

FSCM fire support coordinating measure

FSE fire support element

FSO fire support officer

FTR fighter (graphics only)

G2 assistant chief of staff, intelligence

G3 assistant chief of staff, operations

G4 assistant chief of staff, logistics

GCCS Global Command and Control System

GCE ground combat element (graphics only)

GLO ground liaison officer

- Global Command and Control System** highly mobile, deployable command and control system supporting forces for joint and multinational operations across the range of military operations, any time and anywhere in the world with compatible, interoperable, and integrated command, control, communications, computers, and intelligence systems (JP 1-02)
- ground liaison officer** an officer trained in offensive air support activities. Ground liaison officers are normally organized into parties under the control of the appropriate Army commander to provide liaison to Air Force and naval units engaged in training and combat operations (JP 1-02)
- H** hour
- HELO** helicopter (graphics only)
- HF** high frequency
- HIDACZ** high-density airspace control zone
- high-altitude missile engagement zone** in air defense, that airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with high-altitude surface-to-air missiles (JP 3-52)
- high-density airspace control zone** 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. (JP 3-52)
- HIMAD** high-to-medium-altitude air defense
- HMMWV** high mobility multipurpose wheeled vehicle
- hostile acts** basic rules established by higher authority for defining and recognizing hostile acts by aircraft, submarines, surface units, and ground forces that will be promulgated by the commanders of unified or specified commands, and by other appropriate commanders when so authorized (JP 1-02)
- hostile criteria** description of conditions under which an aircraft or a vehicle may be identified as hostile for engagement purposes (see also hostile acts and rules of engagement) (JP 1-02)
- HQ** headquarters
- HRN** helicopter radio net (graphics only)
- IBCT** interim brigade combat team
- ID** identification
- identification, friend or foe** a system using electromagnetic transmissions to which equipment carried by friendly forces automatically responds, for

	example, by emitting pulses, thereby distinguishing themselves from enemy forces (JP 3-52)
IEW	intelligence and electronic warfare
IFF	identification, friend or foe
IJMS	interim JTIDS message specification
IMETS	Integrated Meteorological System
information operations	actions taken to affect adversary information and information systems while defending one's own information and information systems (JP 3-13)
INFOSYS	information systems
Intell	intelligence (graphics only)
intelligence	1. the product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information concerning foreign countries or areas; 2. information and knowledge about an adversary obtained through observation, investigation, analysis, or understanding (JP 1-02)
intelligence preparation of the battlefield	(Army) an analytical methodology employed as part of intelligence planning to reduce uncertainties concerning the enemy, environment, and terrain for all types of operations. Intelligence preparation of the battlefield is conducted during mission planning to support the commander's decisionmaking and to form the basis for the direction of intelligence operations in support of current and future missions. It utilizes existing databases and identifies gaps in intelligence needed to determine the impact of the enemy, environment, and terrain on operations and presents this in an appropriate form to facilitate operational planning. It forms the basis for situation development. (FM 1-02)
IO	information operations
IP	Internet Protocol
ISR	intelligence, surveillance, and reconnaissance
IWEDA	Integrated Weather Effects Decision Aid (graphics only)
JAOC	joint air operations center
JFACC	joint force air component commander
JFC	joint force commander
JFLCC	joint force land component commander
JFSOC	joint force special operations commander (graphics only)
JFSOCC	joint force special operations component commander
JOA	joint operations area
JOC	joint operations center

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- joint air operations** air operations performed with air capabilities/forces made available by components in support of the joint force commander's operation or campaign objectives, or in support of other components of the joint force (JP 3-56.1)
- joint air operations center** a jointly staffed facility established for planning, directing, and executing joint air operations in support of the joint force commander's operation or campaign objectives (JP 3-56.1)
- joint engagement zone** in air defense, that airspace of defined dimensions within which multiple air defense systems (surface-to-air missiles and aircraft) are simultaneously employed to engage air threats (JP 3-52)
- joint force air component commander** the commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for making recommendations on the proper employment of assigned, attached, and/or made available for tasking air forces; planning and coordinating air operations; or accomplishing such operational missions as may be assigned. The joint force air component commander is given the authority necessary to accomplish missions and tasks assigned by the establishing commander. (JP 1-02)
- joint force commander** a general term applied to a combatant commander, subunified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a joint force (JP 0-2)
- joint force land component commander** the commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for making recommendations on the proper employment of assigned, attached, and/or made available for tasking land forces; planning and coordinating land operations; or accomplishing such operational missions as may be assigned. The joint force land component commander is given the authority necessary to accomplish missions and tasks assigned by the establishing commander. (JP 3-0)
- joint force special operations component commander** the commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for making recommendations on the proper employment of assigned, attached, and/or made available for tasking special operations forces and assets; planning and coordinating special operations; or accomplishing such operational missions as may be assigned. The joint force special operations component commander is given the authority necessary to accomplish missions and tasks assigned by the establishing commander. (JP 3-0)
- JP** joint publication
- JRFL** joint restricted frequency list
- JSTARS** Joint Surveillance Target Attack Radar System
- JTIDS** Joint Tactical Information Distribution System

JTMD	joint theater missile defense
JUH-MTF	Joint User Handbook-Message Text Formats
JWARN	Joint Warning and Reporting Network
LAAD	low-altitude air defense
LAN	local area network
land forces	personnel, weapon systems, vehicles, and support elements operating on land to accomplish assigned missions and tasks (JP 1-02)
LC	line of contact (graphics only)
LD	line of departure (graphics only)
liaison	that contact or intercommunication maintained between elements of military forces or other agencies to ensure mutual understanding and unity of purpose and action (JP 3-08)
LLTR	low-level transit route
LNO	liaison officer
low-altitude missile engagement zone	in air defense, that airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with low- to medium-altitude surface-to-air missiles (JP 3-52)
low-level transit route	a temporary corridor of defined dimensions established in the forward area to minimize the risk to friendly aircraft from friendly air defenses or surface forces (JP 3-52)
LZ	landing zone (graphics only)
MACCS	Marine Air Command and Control System
MAGTF	Marine air-ground task force
MARFOR	Marine forces (graphics only)
Marine air command and control system	a system that provides the aviation combat element commander with the means to command, coordinate, and control all air operations within an assigned sector and to coordinate air operations with other Services. It is composed of command and control agencies with communications-electronics equipment that incorporates a capability from manual through semiautomatic control. (JP 1-02)
Marine air-ground task force	a task organization of Marine forces (division, aircraft wing, and service support groups) under a single command and structured to accomplish a specific mission. The Marine air-ground task force (MAGTF) components will normally include command, aviation combat, ground combat, and combat service support elements (including Navy Support Elements). Two types of Marine air-ground task forces which can be task organized are the Marine expeditionary unit and Marine expeditionary force. (JP 1-02)

MARLO	Marine liaison officer
MATC	Marine air traffic control
MAW	Marine air wing
MCOO	modified combined obstacle overlay (graphics only)
MCS	Maneuver Control System
MECH	mechanized (graphics only)
MEF	Marine expeditionary force (graphics only)
METT-TC	mission, enemy, terrain and weather, troops and support available, time available, civil considerations
MI	military intelligence
MIJI	meaconing, interference, jamming, and intrusion
MIL-STD	military standard
minimum attack altitude	the lowest altitude determined by the tactical use of weapons, terrain consideration, and weapons effects that permits the safe conduct of an air attack and/or minimizes effective enemy counteraction (JP 1-02)
minimum crossing altitude	the lowest altitude at certain radio fixes at which an aircraft must cross when proceeding in the direction of a higher minimum en route instrument flight rules altitude (JP 1-02)
minimum-risk route	a temporary corridor of defined dimensions recommended for use by high-speed, fixed-wing aircraft that presents the minimum known hazards to low-flying aircraft transiting the combat zone (JP 3-52)
MLRS	Multiple Launch Rocket System
MRR	minimum-risk route
MTF	message text format
multinational operations	a collective term to describe military actions conducted by forces of two or more nations, usually undertaken within the structure of a coalition or alliance (JP 0-2)
NAI	named area of interest
NALE	naval and amphibious liaison element
NATO	North Atlantic Treaty Organization
NAVAID	navigational aid
NAVFOR	Navy forces (graphics only)
NAVSOC	Navy special operations commander (graphics only)
NBC	nuclear, biological, and chemical
NFA	no-fire area
NFO	naval flight officer

NG	National Guard (graphics only)
NGFO	naval gunfire officer
NIMA	National Imagery and Mapping Agency
NO.	numbered (graphics only)
no-fire area	a land area designated by the appropriate commander into which fires or their effects are prohibited (JP 3-09)
NSFSN	naval surface fire support net (graphics only)
NTACS	Navy Tactical Air Control System
OBJ	objective (graphics only)
observation post	a position from which military observations are made, or fire directed and adjusted, and which possesses appropriate communications; may be airborne (JP 1-02)
OCT	October
offensive counterair attack operations	offensive action in support of the offensive counterair mission against surface targets which contribute to the enemy's air power capabilities. The objective of attack operations is to prevent the hostile use of aircraft and missile forces by attacking targets such as missile launch sites, airfields, naval vessels, command and control nodes, munitions stockpiles, and supporting infrastructure. Attack operations may be performed by fixed- or rotary-wing aircraft, surface-to-surface weapons, special operations forces, or ground forces. (JP 3-01)
officer in tactical command	in maritime usage, the senior officer present eligible to assume command, or the officer to whom the senior officer has delegated tactical command (JP 1-02)
operational control	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) and may be delegated within the command. When forces are transferred between combatant commands, the command relationship the gaining commander will exercise (and the losing commander will relinquish) over these forces must be specified by the Secretary of Defense. Operational control 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 direction 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; it does not, in and of itself, include authoritative direction for logistics or matters of administration, discipline, internal organization, or unit training. (JP 0-2)
OPLAN	operation plan
OPORD	operation order
Ops	operations (graphics only)
OTC	officer in tactical command
PADIL	Patriot digital information link
PL	phase line (graphics only)
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 (JP 3-52)
procedural control	a method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures (JP 3-52)
PZ	pickup zone (graphics only)
RAH 66	Comanche armed reconnaissance helicopter
real time	pertaining to the timeliness of data or information which has been delayed only by the time required for electronic communication. This implies that there are no noticeable delays. (JP 1-02)
reconnaissance	a mission undertaken to obtain by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area (JP 1-02)
REP	representative (graphics only)
restricted operations area	airspace of defined dimensions, designated by the airspace control authority, in response to specific operational situations/requirements within which the operation of one or more airspace users is restricted (JP 3-52)
restrictive fire line	a line established between converging friendly surface forces that prohibits fires or their effects across that line (JP 3-09)
RFA	restrictive fire area
RFL	restrictive fire line
RGT	regiment (graphics only)
ROA	restricted operations area
ROE	rules of engagement
ROZ	restricted operations zone

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 (JP 1-02)
S2	battalion or brigade intelligence staff officer
S3	battalion or brigade operations staff officer
S4	battalion or brigade logistics staff officer
SAAFR	standard use Army aircraft flight route
SACC	supporting arms coordination center
SADC	sector air defense commander
SALT	supporting arms liaison team
SAR	search and rescue
SAWC	sector air warfare coordinator
SCC	sea combat commander (graphics only)
scheme of maneuver	description of how arrayed forces will accomplish the commander's intent. It is the central expression of the commander's concept for operations and governs the design of supporting plans or annexes (FM 5-0)
selective identification feature	a capability that, when added to the basic identification friend or foe system, provides the means to transmit, receive, and display selected coded replies (JP 1-02)
SEMA	special electronic mission aircraft
SFCP	shore fire control party
short-range air defense engagement zone	in air defense, that airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with short-range air defense weapons. It may be established within a low- or high-altitude missile engagement zone. (JP 3-52)
SIF	selective identification feature
SLO	space liaison officer
SOC	special operations command
SOCCE	special operations command and control element
SOCOORD	special operations coordination element
SOF	special operations forces
SOLE	special operations liaison element
SOP	standing operating procedure
SPINS	special instructions
SPT	support (graphics only)

- standard use Army aircraft flight route** 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. (JP 3-52)
- STRATLAT** strategic liaison team (graphics only)
- STWC** strike warfare commander
- surveillance** the systematic observation of aerospace, surface or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic or other means (JP 1-02)
- SUWC** surface warfare commander
- TAAMDCOORD** theater Army air and missile defense coordinator
- TAC** tactical or terminal air controller or tactical command post, or terminal access controller
- TAC(A)** tactical air coordinator (airborne)
- TACC** tactical air command center (USMC)
- TACOPDAT** tactical operational data
- TACP** tactical air control party
- TACS** Theater Air Control System (USAF)
- tactical air command center** the Marine Corps' tactical air command center (TACC) is the senior agency of the Marine air command and control system (MACCS) (JP 1-02)
- tactical air control center** the principal air operations installation (ship-based) from which all aircraft and air warning functions of tactical air operations are controlled (JP 1-02)
- tactical air control party** a subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft (JP 1-02)
- tactical air direction center** an air operations installation under the overall control of the tactical air control center (afloat) or tactical air command center, from which aircraft and air warning service functions of tactical air operations in an area of concern are directed (JP 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. (JP 1-02)
- tactical control** command authority over assigned or attached forces or commands, or military capability or forces made available for tasking, that is limited to the detailed direction and control of movements

or maneuvers within the operational area necessary to accomplish missions or tasks assigned. Tactical control is inherent in operational control. Tactical control may be delegated to, and exercised at any level at or below the level of combatant command. When forces are transferred between combatant commands, the command relationship the gaining commander will exercise (and the losing commander will relinquish) over these forces must be specified by the Secretary of Defense. Tactical control provides sufficient authority for controlling and directing the application of force or tactical use of combat support assets within the assigned mission or task. (JP 0-2)

TADC	tactical air direction center
TADIL	tactical digital information link
TAGS	Theater Air-Ground System
TAIS	Tactical Airspace Integration System
TALCE	tactical airlift control element (graphics only)
TALO	theater airlift liaison officer
TAMD	theater air and missile defense
TAOC	tactical air operations center (USMC)
TAR	tactical air radio (graphics only)
TBM	tactical ballistic missile
TBMCS	Theater Battle Management Core System
TBP	to be published
TCP	Transmission Control Protocol
terrain flight	flight close to the Earth's surface during which airspeed, height, and/or altitude are adapted to the contours and cover of the ground in order to avoid enemy detection and fire (JP 1-02)
TF	task force (graphics only)
theater airlift	that airlift assigned or attached to a combatant command (command authority) of a combatant commander other than Commander in Chief, US Transportation Command, which provides air movement and delivery of personnel and equipment directly into objective areas through air landing, airdrop, extraction, or other delivery techniques; and the air logistic support of all theater forces, including those engaged in combat operations, to meet specific theater objectives and requirements. (JP 3-17) This manual does not use the Army definition of this term.
theater airlift liaison officer	an officer specially trained to implement the theater air control system and to control tactical airlift assets. Theater airlift liaison officers are highly qualified, rated airlift officers with tactical (airdrop) airlift experience and assigned duties, supporting US Army units. (JP 3-17)

theater of operations	a subarea within a theater of war defined by the geographic combatant commander required to conduct or support specific combat operations. Different theaters of operations within the same theater of war will normally be geographically separate and focused on different enemy forces. Theaters of operations are usually of significant size, allowing for operations over extended periods of time. (JP 3-0)
TI	tactical Internet
TLAM	Tomahawk land-attack missile
TOC	tactical operations center
TOE	table of organization and equipment
TRADOC	Training and Doctrine Command (Army)
TTP	tactics, techniques, and procedures
UAP	unit airspace plan
UAV	unmanned aerial vehicle
UHF	ultrahigh frequency
United States message text format	a program designed to enhance joint and combined combat effectiveness through standardization of message formats, data elements, and information exchange procedures. Standard message formats with standard information content provides all tactical commanders at the joint interface with a common playing field and a common language. (MIL-STD-6040)
unmanned aerial vehicle	a powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload. Ballistic or semi-ballistic vehicles, cruise missiles, and artillery projectiles are not considered unmanned aerial vehicles. (JP 3-55.1)
US	United States
USAF	United States Air Force
USMC	United States Marine Corps
USMTF	United States message text format
USWC	undersea warfare commander
VHF	very high frequency
VMF	variable message format
weapon control status	weapons control of surface-to-air units is expressed as a status declared for a particular area and time (JP 3-01)
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. See also fighter engagement zone, high-altitude missile engagement zone, low-altitude missile

	engagement zone, short-range air defense engagement zone, and joint engagement zone. (JP 3-52)
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. (See also weapons hold, weapons tight, and air defense weapon control status.) (JP 1-02)
weapons free zone	an air defense zone established for the protection of key assets or facilities, other than air bases, where weapon systems may be fired at any target not positively recognized as friendly (JP 3-52)
weapons hold	in air defense, a weapon control order imposing a status whereby weapons systems may only be fired in self-defense or in response to a formal order. (See also weapons free, weapons tight, and air defense weapon control status.) (JP 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. (JP 1-02)
WEZ	weapon engagement zone
WFZ	weapons free zone (graphics only)
WOC	wing operations center (USAF)

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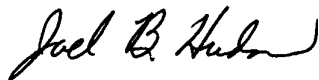
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