FM 3-52

AIRSPACE CONTROL

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Airspace Control

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Preface

FM 3-52, *Airspace Control*, provides commanders, staff officers, and airspace element personnel with tactics essential for the exercise of airspace control. Using the backdrop of the Army air-ground system (AAGS), the Army component of the theater air-ground system (TAGS), and the operations process, the manual addresses roles and responsibilities, by echelon, between Army and air support agencies of other Services in the planning, preparation, execution, and assessment of airspace use.

The principal audience for FM 3-52 includes commanders, leaders, and staffs across all Army echelons with responsibilities for airspace control, airspace element personnel, controllers, and airspace users from tactical to operational levels. Trainers and educators throughout the Army will also use this manual.

Commanders, staffs, and subordinates ensure their decisions and actions comply with applicable U.S., international, and, in some cases, host-nation laws and regulations. Commanders at all levels ensure their Soldiers operate in accordance with the law of war and the rules of engagement. See FM 27-10.

FM 3-52 implements the standardization agreement entitled AJP 3.3.5.

FM 3-52 uses joint terms where applicable. Selected joint and Army terms and definitions appear in both the glossary and text. Definitions shown in the text have the term italicized and the number of the proponent publication following the definition.

This manual uses the terms *command and control* and *command and control system* as defined in JP 1 and JP 6-0 respectively when referring to joint or other Service processes. This manual uses the term *mission command* when referring to U.S. Army processes.

FM 3-52 applies to the Active Army, Army National Guard/Army National Guard of the United States, and the United States Army Reserve unless otherwise stated.

The proponent for FM 3-52 is the United States Army Combined Arms Center. The preparing agency is the Combined Arms Doctrine Directorate, United States Army Combined Arms Center. Send comments and recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms) to Commander U.S. Army Combined Arms Center and Fort Leavenworth ATTN: ATZL-MCK-D (FM 3-52), 300 McPherson Avenue, Fort Leavenworth, KS 66027-2337, by e-mail to usarmy.leavenworth.mccoe.mbx.cadd-org-mailbox@mail.mil, or submit an electronic DA Form 2028.

Introduction

FM 3-52 *Airspace Control*, updates the previous 8 February 2013 version of FM 3-52 to reflect lessons learned through recent operational experience and to adapt to the joint airspace community's release of updates to JP 3-52, and ATP 3-52.1 as well as ATP 3-91.1. Two significant changes occur from the previous manual. First, the alignment of air support operation centers with active Army division headquarters allow for the greater responsiveness and flexibility of responsive fires and division assigned airspace. The central idea of this publication reflects the Army's role within a larger framework (unified action) and its focus on maximum flexibility through a philosophy of mission command and an operations process approach. The other significant change from the previous FM 3-52 is a reorganization of airspace coordinating measures and fire-support coordination measures aligning Army airspace doctrine with multi-service and joint doctrine.

To fully comprehend the doctrine contained in FM 3-52, readers must first understand how the Army conducts operations as described in: JP 3-0, ADP 3-0, ADRP 3-0; JP 6-0, ADP 6-0, FM 6-0; ADP 5-0, ADRP 5-0 readers should also understand doctrine for joint airspace control as described in JP 3-52.

Army forces operate as part of a larger national effort characterized as unified action. Army commanders understand that they do not operate independently but as part of a larger force. They integrate and synchronize their actions and operations within this larger framework, collaborating with entities outside their direct control. Just as commanders manage terrain throughout their area of operations, they continuously collaborate with unified action partners to integrate the use of airspace.

The Army air-ground system is used to coordinate and integrate Army airspace requirements. The Army air-ground system, a component of the TAGS, provides for interface between Army and air support agencies of joint air-ground operations and airspace use (see ATP 3.52.2). Army forces use the principles of airspace control, which complement joint airspace control principles, to integrate all airspace users.

Airspace planning focuses on setting conditions for near-real-time airspace control during mission execution thereby providing commanders flexibility while reducing risk. Airspace elements provide airspace control subject matter expertise in the planning process. Near-real-time airspace control pertains to the timeliness of data or information which has been delayed by the time required for electronic communication and automatic data processing; near-real-time implies that there are no significant delays.

As in planning, airspace element personnel play an integral role in preparation activities that a unit performs as it transitions from planning to execution. This is particularly relevant as it relates to improving situational understanding and developing a common understanding of the plan.

During execution, near-real-time airspace control requires airspace elements and users to continually monitor and assess the operations of all airspace users in support of their mission as well as those transiting through the air over their ground area of operations. This continuous assessment provides situational understanding in the command post and enables units to react to situations requiring immediate use of airspace.

Airspace elements assist commanders in assessing airspace operations. Airspace elements' continuous assessment of operations enables identifying shortcomings in key airspace planning documents. Based on these shortcomings, airspace elements recommend needed adjustments to establish the conditions for future operations.

The four chapters and their associated seven appendices constitute the doctrinal framework for the Army's use of airspace within the joint force commander's theater air-ground system. This framework leverages all the qualities of detailed airspace planning. It also focuses on the dynamic integration of all airspace users during execution. The framework ensures users follow the joint force commander's and the combined arms commander's (battalion through theater army) intent, priorities, and risk guidance. Lastly, the framework describes how Army capabilities—resident down to brigade level—expand airspace control options for the airspace control authority and for the joint force commander.

Chapter 1
Airspace Control Operational Context

This chapter refreshes the leader's understanding of relationships. It discusses the nature of unified land operations and unified action. Then it discusses airspace in operational environments with joint airspace control. Next, it discusses theater air-ground systems and methods of control. Lastly, it discusses airspace control through mission command and the operations process.

UNIFIED LAND OPERATIONS AND UNIFIED ACTION

1-1. For Army forces, airspace control primarily aims to integrate airspace users during planning and in near-real-time execution. Integration is one of the principles of unified land operations. Army commanders must integrate their actions and operations in the airspace over an area of operations within the larger framework of unified action. This integration occurs in accordance with the commander's intent, priorities, and acceptable levels of risk. Successful integration maximizes all airspace users' capabilities while minimizing adverse impacts.

1-2. Army forces conduct unified land operations as part of a larger national effort called unified action. *Unified action* is the synchronization, coordination, and/or integration of the activities of governmental and nongovernmental entities with military operations to achieve unity of effort (JP 1). See JP 3-0 for more information on unified action. Unified land operations are how the Army seizes, retains, and exploits the initiative to gain and maintain a position of relative advantage in sustained land operations to set the conditions for favorable conflict resolution. This is accomplished through the simultaneous combination of offensive, defensive, and stability operations that set conditions for favorable conflict resolution. The Army's two core competencies of combined arms maneuver and wide area security, provide the means for balancing the application of Army warfighting functions within the tactical actions and tasks inherent in offensive, defensive, and stability operations. See ADP 3-0 and ADRP 3-0 for more information on unified land operations.

1-3. Unified land operations acknowledge that strategic success requires fully integrating U.S. military operations with the efforts of interagency and multinational partners. As such, Army leaders integrate their actions and operations within this larger framework, collaborating with entities outside their direct control. This requirement to integrate actions is present at all echelons.

AIRSPACE IN OPERATIONAL ENVIRONMENTS

1-4. Army forces conduct unified land operations in operational environments that are complex, ever changing, and uncertain. An *operational environment* is a composite of conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander (JP 3-0). An operational environment includes physical areas (air, land, maritime, space, and cyberspace domains) and the information environment. See ADRP 3-0 for more information on an operational environment.

1-5. Army forces are assigned an area of operations by the joint force commander. An *area of operations* is an operational area defined by the joint force commander for land and maritime forces that should be large enough to accomplish their missions and protect their forces (JP 3-0). For land operations, an area of operations includes subordinate areas of operations as well. The Army or land force commander is the supported commander within an area of operations designated by the joint force commander. Within their areas of operations, commanders integrate and synchronize the elements of combat power. To facilitate this integration and synchronization, commanders have the authority to designate targeting priorities, effects, and timing.

1-6. Airspace is a component of an operational environment critical to successful Army or land operations. Army forces use airspace over an area of operations to—

- Collect information.
- Conduct air operations.
- Deliver direct and indirect fires.
- Conduct air and missile defense.
- Conduct sustainment.

1-7. Airspace is not owned by individual subordinate organizations in the sense that an assigned area of operations confers ownership of the ground. Airspace over an Army area of operations remains under the purview of the joint force commander (JFC). Other military and civilian organizations operating in the joint operations area have airspace requirements over an Army area of operations. These organizations may require airspace to—

- Conduct joint air operations.
- Conduct area air defense.
- Deliver joint fires.
- Conduct civil air operations (see appendix G).

1-8. Other commanders with a mission encompassing the joint operations area have the latitude to plan and execute these operations in the airspace over an Army area of operations. Commanders with such a mission must coordinate the operation to avoid adverse effects and fratricide. If those operations would have an adverse impact within an Army or land area of operations, the commander assigned to execute functions that extend across the joint operations area must readjust the plan, solve the problem, or consult with the JFC for resolution.

JOINT AIR OPERATIONS

1-9. Normally, the JFC designates a joint force air component commander (JFACC) to synchronize the joint air effort. Components retain organic capabilities (sorties) to accomplish missions assigned by the JFC. Components also make capabilities, either JFC directed or excess, available to the JFC for tasking by the JFACC. Generally, Army capabilities are normally included on the air tasking order, however, they are normally considered organic to ground units and not available for tasking by the JFACC. The JFACC plans for and tasks only those joint capabilities made available by the JFC for JFACC tasking. The JFACC has the authority to direct and employ these joint capabilities for a common purpose based on the JFC's concept of operations and air apportionment decisions. See JP 3-30 for more information on joint air operations.

1-10. The responsibilities of the JFACC, the area air defense commander (AADC), and airspace control authority (ACA) are interrelated and the JFC normally assigns them to one individual for unity of effort. These responsibilities are normally assigned to the JFACC. Designating one Service component commander as the JFACC, AADC, and ACA often simplifies the coordination required to develop and execute fully integrated air operations.

AREA AIR DEFENSE

1-11. The AADC oversees defensive counterair (DCA) operations, which include both air and missile threats. The AADC identifies airspace coordinating measures (ACMs) that support and enhance DCA operations, identifies required airspace management systems, establish procedures for systems to operate within the airspace, and incorporate them into the airspace control system. See JP 3-01 for more information on the AADC.

JOINT FIRES

1-12. *Joint fires* are fires delivered during the employment of forces from two or more components in coordinated action to produce desired effects in support of a common objective (JP 3-0). Often each Service component commander has airspace requirements that require close coordination and integration with another area of operations commander. See JP 3-09 for more information on joint fires.

CIVIL AIR TRAFFIC CONTROL

1-13. Typically, civilians use airspace alongside ongoing military operations. Civilian airliners, nongovernmental organizations, and relief agencies require airspace to continue their operations. They must have the ability to coordinate their activities with military airspace users (see aeronautical information publications (AIPs) published by the host nation).

JOINT AIRSPACE CONTROL

1-14. Competing airspace users balance the demands for and integrate their requirements for airspace. *Airspace control* includes the capabilities and procedures used to increase operational effectiveness by promoting the safe, efficient, and flexible use of airspace (JP 3-52). Airspace control increases combat effectiveness while placing minimum restraint upon airspace users. Airspace control relies upon airspace management capabilities provided by airspace control elements and U.S. civil and host-nation air traffic control.

1-15. *Airspace management* is the coordination, integration, and regulation of the use of airspace of defined dimensions (JP 3-52). Airspace management supports airspace control through the coordination, integration, and regulation of airspace users by airspace control elements within airspace of defined dimensions. See JP 3-52 for more discussion on airspace management.

1-16. The JFC is responsible for airspace control in the joint operations area. JFCs establish command relationships and direct and guide subordinate commanders. They organize forces to accomplish the mission based on their visions and a concept of operations. They develop this concept of operations with their service component commanders and supporting organizations. Their direction and guidance enable effective spans of control, responsiveness, tactical flexibility, and protection.

1-17. To help balance the various airspace user demands, the JFC usually designates an ACA responsible for establishing an airspace control system. An *airspace control system* is an arrangement of those organizations, personnel, policies, procedures, and facilities required to perform airspace control functions (JP 3-52). The JFC tasks the ACA to assume overall responsibility for operating the airspace control system in the airspace control area. The ACA, working with the other components, develops policies and procedures for all airspace users. In addition, the ACA establishes an airspace control system that coordinates and integrates airspace use under JFC authority.

1-18. The ACA approves, amends, or disapproves airspace requests according to the JFC's guidance and objectives. The ACA does not have the authority to approve, disapprove, or deny combat operations. That authority is only vested in operational commanders. If the ACA and an affected Service component commander cannot agree on an airspace issue, they refer the issue to the JFC for resolution. See JP 3-52 for more discussion on the ACA.

THEATER AIR-GROUND SYSTEM

1-19. The theater air-ground system (TAGS) is the sum of the component systems that support the airspace control system. The TAGS links decision makers and command posts from all components. The ACA may delegate authority to control an assigned volume of airspace to elements of the TAGS. For more information on the TAGS, see ATP 3-52.2.

1-20. The Army component of the TAGS is the Army air-ground system. The AAGS provides for interface between Army and air support agencies of other Services in the planning, preparation, execution, and assessment of airspace use.

1-21. The AAGS is used for coordinating and integrating air support requirements, joint air-ground operations and airspace users. The AAGS enables Army commanders and staffs to coordinate and integrate the actions of Army airspace users over the area of operations regardless of whether they have been assigned airspace control responsibility for a volume of airspace. AAGS also provides Army commanders the ability to control volumes of airspace when delegated control authority by the ACA. There are two methods of airspace control, positive and procedural.

METHODS OF CONTROL

1-22. Army commanders and staffs utilize positive control methods, procedural control methods, or a combination of both methods. When delegated control authority by the ACA, the Army procedurally controls assigned airspace—for example the airspace up to the coordinating altitude—and may use positive control for small volumes of airspace.

1-23. While the Army's airspace control methodology emphasizes procedural control of airspace use, it includes the flexibility to utilize positive control or a combination of the two throughout a commander's area of operations. For example, within a commander's area of operations, small areas of positive control as well as large areas under procedural control exist. In areas requiring positive control, air traffic services units provide positive airspace control. For all other areas, airspace users use procedural control. Current technology enables procedural control to be flexible and responsive and allowing for rapid airspace adjustments. There may be portions of an area of operations where preplanned airspace coordinating measures and procedures are the sole means of procedural control. This can result from a lack of communications (voice or digital) or electronically aided situational awareness due to terrain, mission profile, distance, or adversary actions to degrade the network.

POSITIVE CONTROL

1-24. *Positive control* is a method of airspace control that relies on positive identification, tracking, and direction of aircraft within an airspace, conducted with electronic means by an agency having the authority and responsibility therein (JP 3-52). Army air traffic service units train, man, and equip to perform positive control of established airfields and tactical landing sites.

PROCEDURAL CONTROL

1-25. *Procedural control* is a method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures (JP 3-52). Procedural control should be uncomplicated and understood by all aircrew members, air traffic control personnel, air defense and fires weapon system operators, and airspace element personnel. In addition to air traffic service personnel, the airspace elements in the AAGS are organized, trained, and equipped to ensure Army forces can provide near-real-time procedural control and balance airspace control system requirements with mission command. Near-real-time procedural control pertains to the timeliness of data or information which has been delayed by the time required for electronic communication and automatic data processing. Furthermore, the use of near-real-time implies that there are no significant delays to the process.

AIRSPACE CONTROL AND MISSION COMMAND

1-26. Mission command is essential to the effective conduct of operations. Through mission command, commanders initiate and integrate all military functions and actions toward a common goal of mission accomplishment. Through the mission command warfighting function, commanders (supported by their mission command system) integrate the other warfighting functions (movement and maneuver, intelligence, fires, sustainment, and protection) into a coherent whole to mass the effects of combat power at the decisive place and time.

1-27. Army airspace users are ground forces operating in an inherently joint environment. Commanders are responsible for integrating Army airspace users, regardless of who controls the airspace, within the larger unified action framework. Commanders continuously integrate airspace users throughout their areas of operations while conducting operations. This affords commanders the flexibility and responsiveness to capitalize on opportunities and operate in a manner consistent with mission command.

1-28. Commanders need support to exercise mission command effectively. At every echelon of command, each commander establishes a *mission command system*—the arrangement of personnel, networks, information systems, processes and procedures, and facilities and equipment that enable commanders to conduct operations (ADP 6-0). The AAGS is a supporting component of the mission command system.

AIRSPACE CONTROL AND THE OPERATIONS PROCESS

1-29. Airspace control is an additional task of the mission command warfighting function and a continually refined activity within the operations process. As a supporting task of the mission command warfighting function, airspace elements belong to the mission command functional cell and cross functionally organize into the integrating cells as required. As a continuing activity, commanders and staffs continuously plan for and coordinate airspace use with other components of the TAGS and AAGS.

1-30. The Army's overarching framework for exercising airspace control is the operations process. It consists of the major mission command activities performed during operations: planning, preparing, executing, and continually assessing the operation. The commander drives the operations process through leadership.

1-31. Airspace elements play an integral role in planning by providing airspace control subject matter expertise into the planning process. Airspace planning focuses on setting conditions for near-real-time airspace control during mission execution and so provides commanders flexibility while reducing risk. See Chapter 3 for more details.

1-32. Airspace elements participate in certain preparation activities performed by units to improve their ability to execute an operation. Planning revision and refinement as well as rehearsals are the particular preparation activities that airspace element personnel support. See Chapter 3 for more details.

1-33. By exercising mission command, commanders empower leaders to develop the situation, adapt, and act decisively to changes during mission execution. Using near-real-time procedural control, airspace element personnel can direct Army airspace users to shift airspace use to a different route, altitude, or volume of airspace. See Chapter 4 for more details.

1-34. Airspace elements continually monitor and assess operations, airspace use, and future airspace use as part of their running estimate. These running estimates provide the analytical basis for airspace use recommendations. These recommendations focus on near-real-time airspace control or on posturing for future use airspace. See Chapter 4 for more details.

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Chapter 2
Airspace Control in Operations

This chapter describes the Army's approach to airspace control. The chapter addresses exercising airspace control, the principles of effective airspace control, and delineates the key roles and responsibilities, by echelon, of the Army air-ground system.

AIRSPACE CONTROL INTEGRATION

2-1. Commanders exercise airspace control to integrate Army forces with all airspace users. Integration aligns the commander's intent, priorities, and risk guidance; maximizes all airspace users' capabilities; and minimizes adverse impacts. Commanders understand that they do not operate independently but as part of a larger force. They integrate and synchronize their actions and operations within this larger framework, collaborating with entities outside of their direct control. Just as commanders manage terrain throughout their areas of operations (AOs), they continuously collaborate with unified action partners to integrate the use of airspace. In essence, this affords commanders the same flexibility and responsiveness for airspace use as for ground operations. Army commanders are the supported commanders within their designated AOs. As such, other commanders must coordinate their airspace use to avoid adverse effects and fratricide.

2-2. Army commanders exercise mission command to control Army airspace users—commander-to-commander—while airspace elements control airspace use. This is a subtle but important distinction. Army commanders direct the employment of Army assets while airspace element personnel direct the best use of the airspace. To exercise mission command, Army commanders have the authority to direct (control) the maneuver of all Army airspace users within their designated AOs, so that the best use of airspace is made. If the airspace control authority assigns airspace control responsibility to the Army for a volume of airspace in the airspace control plan (ACP) or airspace control order (ACO), Army commanders exercise airspace control over all airspace users. This authority to exercise airspace control for an assigned volume of airspace does not include the authority to approve, disapprove, or deny joint combat operations.

2-3. Airspace elements do not routinely manage the flight path or trajectory of individual airspace users. Rather, airspace elements integrate airspace use for flight paths and trajectories in planning and execution to manage risk. Only when two or more airspace users conflict do airspace elements direct changes in flight path or, in the case of fires, coordinate with the fires cell to alter the trajectory or timing of fires. These changes are based on the commanders' mission priorities and risk guidance. Pilots, unmanned aircraft system operators, and weapon system controllers still maintain the responsibility to make the directed changes to their flight path or trajectory.

AIRSPACE CONTROL PRINCIPLES

2-4. Effective airspace control enables commanders to respond effectively to changing operational environments with appropriate, flexible, and timely actions. Army forces use the principles of airspace control, which complement joint airspace control principles, to integrate all airspace users. The five principles of Army airspace control are:

- Airspace control is action executed through combined arms formations.
- Airspace control is a commander's responsibility based on the commander's intent, priorities, and risk guidance.
- Airspace control is continually planned for and coordinated throughout the operations process.
- Airspace control is an integral part of risk management.
- Near-real-time airspace control requires continuous assessment.

2-5. Airspace control is action executed through combined arms formations. Airspace is a crucial part of the operational area and is inherently joint. The Army has fielded airspace element personnel and capabilities down to brigade level. These capabilities enable effectively integrating airspace use into operations. These capabilities are fully integrated with joint airspace control processes thereby providing the Army and joint force commanders with expanded airspace control options.

2-6. Joint aircraft control processes facilitate the integration of Army airspace users within airspace. However, ground commanders require greater responsiveness to defeat the enemy. Army air-ground operations are defined as the simultaneous or synchronized employment of ground forces with aviation maneuver and fires to seize, retain, and exploit the initiative. These type of operations require deliberate planning by the units conducting the operations in order to mitigate the risk posed from joint airspace users as well as ground fires. See FM 3-04 for additional information regarding Army air-ground operations.

2-7. Airspace control is a commander's responsibility. Commanders drive the operations process and airspace control is an additional task of the mission command warfighting function. To successfully command, commanders at all echelons must be capable of integrating and synchronizing forces and warfighting functions, both ground and air. The commander is the central figure in mission command, essential to integrating the capabilities of the warfighting functions to accomplish the mission.

2-8. Airspace control is a continuing activity of the operations process. Commanders use the operations process to help them decide when and where to make decisions, control operations, establish priorities, and provide command presence. Throughout the operations process, commanders, assisted by their staffs, integrate numerous processes and activities. Airspace control is an activity that commanders integrate and synchronize with other activities into operations. To be most effective, the airspace element must ensure deliberate airspace planning is conducted based on guidance from the commander. During the preparation phase of the operations process, the commander must ensure the staff conducts a thorough wargame and rehearsal of the airspace control plan. These actions help to validate the airspace control plan, as well as to identify any necessary changes prior to executing the plan. Airspace elements continually monitor and evaluate the situation and make recommendations or take action to integrate airspace users.

2-9. Airspace control is an integral part of risk management. Commanders at every echelon continuously assess risk of conflicts among airspace users and consequences of these conflicts, then they determine which consequences or conflicts they can accept based on an operational environment. Commanders determine what risks they can accept and include the risks in orders issued to subordinate units. When airspace conflicts arise between different airspace users or when users exceed a commander's risk guidance, the airspace element attempts to integrate the requirements by modifying planned airspace use without degrading the mission effectiveness of any airspace user. If airspace elements cannot resolve an airspace conflict without degrading the mission effectiveness of an airspace user or if the risk still exceeds risk guidance, airspace elements seek a decision from the operations staff officer (S-3/G-3) or commander. When risk involves forces not under tactical control of that commander, airspace elements share the risk assessment with affected component commanders, time permitting. Appendix A addresses risk considerations for airspace control.

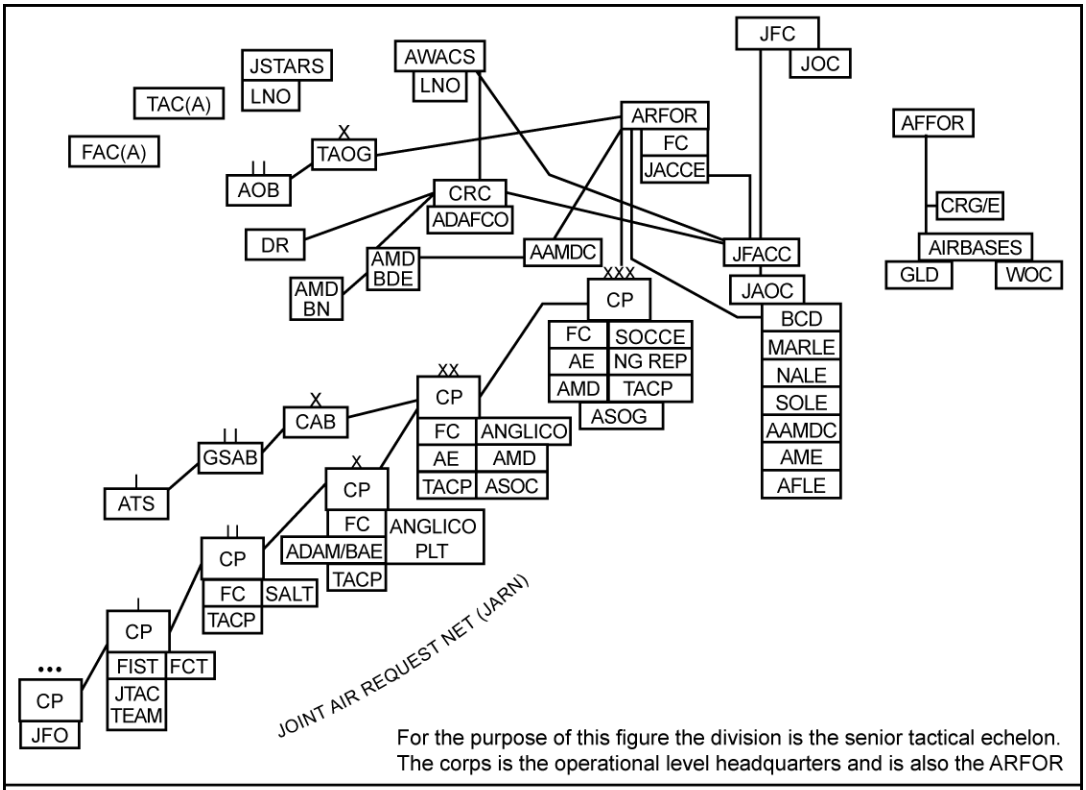
2-10. Near-real-time airspace control requires continuous assessment. Airspace elements continually monitor all airspace users to support their operations and those transiting through the airspace over their ground AOs. This continuous situational awareness ensures that commanders can react to any situation requiring immediate use of airspace, such as immediate fires or close air support (CAS) missions, unplanned unmanned aircraft system launch, or diversion of aviation assets in near-real-time.

ARMY AIR-GROUND SYSTEM

2-11. AAGS is used to coordinate Army airspace requirements. The AAGS, a component of theater air-ground system, provides for interface between Army and air support agencies of other Services in the planning, preparation, execution, and assessment of airspace use. The AAGS, comprised of elements organic at theater army level to brigade level, enhances situational awareness and understanding of all airspace users to reduce fratricide and assists in navigation and the location of airspace users.

2-12. Army components of the AAGS consist of airspace elements, fires cells, air and missile defense sections, and coordination and liaison elements embedded in Army command posts. Collectively, they coordinate and integrate airspace use—joint, coalition, nonmilitary and Army manned and unmanned aircraft

systems, directed energy, and munitions—for the echelons they are assigned. Specifically, these participants (see Figure 2-1) consist of airspace elements, fires cells, air defense airspace management/brigade aviation elements (ADAM/BAEs), an Army Air and Missile Defense Command (AAMDC), battlefield coordination detachments (BCDs), ground and reconnaissance liaison detachments, and the air defense artillery fire control officer (ADAFCO). Some participants of the TAGS, such as the tactical air control party and the air support operations center, remain under operational control of different Services but provide direct support during the conduct of operations.



AAMDC	Army Air and Missile Defense Command	FCT	firepower control team
ADAFCO	air defense artillery fire control officer	FIST	fire support team
ADAM	air defense airspace management	GLD	ground liaison detachment
AFLE	Air Force liaison element	GSAB	general support aviation battalion
AE	airspace element	JACCE	joint air component coordination element
AMD	air and missile defense	JAOC	joint air operations center
AME	air mobility element	JFACC	joint force air component commander
ANGLICO	air naval gunfire liaison company	JFC	joint force commander
AOB	airfield operations battalion	JFO	joint fires observer
ARFOR	Army forces	JOC	joint operations center
ASOC	air support operations center	JSTARS	Joint Surveillance Target Attack Radar System
ASOG	air support operations group	JTAC	joint terminal attack controller
AWACS	Airborne Warning and Control System	LNO	liaison officer
BAE	brigade aviation element	MARLE	Marine liaison element
BCD	battlefield coordination detachment	NALE	naval and amphibious liaison element
BDE	brigade	NG REP	naval gunfire representative
BN	battalion	SALT	supporting arms liaison team
CAB	combat aviation brigade	SOCCE	special operations command and control element
CP	command post	SOLE	special operations liaison element
CRC	control and reporting center	TAC (A)	tactical air coordinator (airborne)
CRG/E	contingency response group/element	TACP	tactical air control party
DR	deployed radar	TAOG	theater airfield operations group
FAC (A)	forward air controller (airborne)	WOC	wing operations center (USAF)
FC	fires cell		

Figure 2-1. Army air-ground system with other key theater air-ground system components

AIRSPACE RESPONSIBILITIES BY ECHELON AND ROLE

2-13. Airspace elements are organic to Army brigades and higher. Corps and division airspace elements are the same and are usually located in the forward command posts. Brigade Combat Teams, division artilleries, and field artillery brigades contain an airspace element referred to as an ADAM/BAE. Combat aviation brigades (CAB), and maneuver enhancement brigades contain an air defense airspace management ADAM. Sustainment brigades have no airspace control staff personnel. Sustainment brigades often occupy terrain in a maneuver brigade's area of operation. Any airspace requirements the sustainment brigade has are integrated with the requirements of the unit to which airspace control has been delegated. These airspace elements integrate brigade airspace, including air and missile defense (AMD) and aviation functions. Each of these elements coordinates with higher, subordinate, and adjacent elements to maximize the effectiveness of airspace control.

2-14. The airspace element also manages the airspace control working group. A *working group* is a grouping of predetermined staff representatives who meet to provide analysis, coordinate, and provide recommendations for a particular purpose or function (FM 6-0). For airspace control, the airspace control working group facilitates and synchronizes contributions from all the elements that perform the airspace collective tasks (see table E-2). The airspace control working group is led by the airspace control officer, warrant officer, or senior non-commissioned officer in the airspace element and typically consists of an air liaison officer (ALO) and representatives from: the airspace element, aviation element, AMD element, fires cell, tactical air control party, unmanned aircraft systems element, and other staff sections as required. Organizations without organic airspace elements accomplish airspace control through their airspace control working group.

THEATER ARMY

2-15. The theater army retains responsibility for contingency planning and coordination. This includes developing and maintaining operation and contingency plans while updating regionally focused intelligence estimates and supporting plans to a geographic combatant commander's theater campaign plan. In terms of airspace, the theater army primarily establishes airspace policy and standards and provides the Army's airspace requirements developed into operation plans and contingency plans. The theater army contingency command post has airspace, aviation, and air and missile defense elements roughly equivalent to a brigade combat team's (BCT's) ADAM/BAE. The contingency command post has the airspace control capability to support small, short-duration contingencies. As a joint operations area and subsequent Army operating forces are established, airspace control responsibilities transition to the operational Army force headquarters. As such, the operational Army force then provides the Army's input into the JFC's ACP and order as well as special instructions.

2-16. An operational Army force is the Army component headquarters for a joint task force (JTF) or a joint and multinational force. It consists of the senior Army headquarters and its commander (when not designated as the joint force commander) and all Army forces that the combatant commander subordinates to the JTF or places under the control of a multinational force commander. The senior Army headquarters identifies requirements and establishes priorities of support for Army forces within the operational area.

FIRE SUPPORT

2-17. The theater army fires cell plans, coordinates, integrates, and synchronizes the employment and assessment of all strategic theater fires to support current and future theater operations.

Army Air and Missile Defense

2-18. Army air and missile defense commands (AAMDCs) are placed under operational control (OPCON) to the joint force land component commander (JFLCC) or operational Army force and in direct support of the AADC for military operations. Other Army air defense artillery units in the area of responsibility are normally assigned, attached, or OPCON to the AAMDC. The JFC establishes AMD priorities, allocates forces, and apportions air power. The JFC typically assigns overall responsibility for counterair and airspace control to the JFACC and responsibility for defensive counterair operations to the AADC. The AADC oversees coordination with joint and multinational partners to develop procedures for a combined theater air

and missile defense (TAMD) plan. Typically, the AADC has the preponderance of AMD capabilities in theater and the ability to provide joint command and control.

2-19. The AAMDC has overall responsibility for planning Army AMD operations supporting the JFC. The AAMDC task organizes and assigns missions to the subordinate ADA brigades once planning is complete. The AAMDC has dedicated liaison teams that can deploy to liaise with major theater and Army forces elements (such as JFACC, JFLCC, joint special operations task force, and BCD) to facilitate and integrate Army forces AMD planning and operations. In some cases, the AAMDC conducts split-based operations that preclude them from being in theater. If the AAMDC is not located in theater, the responsibility for planning falls to the highest echelon ADA organization in the theater as well as for providing liaisons to the JFLCC, BCD, and AADC. FM 3-01, ATP 3-01.7, and ATP 3-01.94 provide a more in-depth explanation of the command and support relationships for theater AMD.

Air Traffic Service

2-20. Army air traffic service (ATS) units control airspace necessary to support airfield operations and can operate a fully instrumented airfield with control tower and airport surveillance and precision approach radar capabilities. ATS units are organic to either the CAB or the theater airfield operations group. Airfield operations battalions provide additional ATS forces that support theater-level requirements. One theater airfield operations group can support three theater airfields and operate from a single base or conduct split-based operations in multiple locations within the theater AO. These units establish and operate airfields as needed in the theater AO. The theater airfield operations group consists of an ATS standardization element that provides oversight, technical expertise, standardization to Army airfields at theater level and quality assurance for training and certification of controllers and ATS maintenance personnel.

Coordination and Liaison Elements

2-21. The JFACC establishes one or more joint air component coordination elements (JACCEs). JACCEs co-locate with the joint force commander's headquarters and other component commanders' headquarters. Such physical locations enable the JFACC to integrate air and space operations with component operations and the JTF headquarters to better integrate air and space operations within the overall joint force. When established, these elements act as the JFACC's primary representatives to the respective commanders and facilitate interaction among the respective staffs. The JACCE facilitates integration by exchanging current intelligence, operational data, and support requirements. It also aids integration by coordinating JFACC requirements for airspace coordinating measures (ACMs), joint fire support coordination measures, CAS, air mobility, and space requirements. As such, the JACCE is a liaison element, not a command and control node and thus, the JACCE normally has no authority to direct or employ forces. The makeup of the JACCE depends on the scope of the operation and the size of the staff with whom they will liaise. If the JACCE performs liaison duties for the commander, Air Force forces and JFACC staff, then it tailors the duties with the expertise necessary to perform effectively. Element expertise includes plans, operations, intelligence, airspace management, logistics, space, and air mobility, as needed. The JACCE also communicates the component commander's decisions and interests to the JFACC. However, the JACCE does not replace, replicate, or circumvent normal request mechanisms already in place in the component or JTF staffs, nor supplant normal planning performed by the Army operations center and Air Force forces staff. The JACCE director is the JFACC's personal and official representative.

2-22. As the Army liaison to the JFACC, the BCD is located in the joint air operations center (JAOC). The Army Service component commander provides the BCD as a liaison element to the Service component commander designated as the JFACC. The BCD personnel work with their counterparts in the JAOC to facilitate planning, coordination, and execution of joint air-ground in support of Army operations (see FM 3-94, FM 3-09, and ATP 3-09.13). BCD participates in airspace coordination by ensuring that—

- The JFACC understands the operational Army commander's intent, priorities, and objectives.
- BCD facilitates the exchange of operational and intelligence data between the air and ground component commanders.
- Process pre-planned Army airspace coordinating measure request (ACMREQ) with the appropriate JAOC elements.

- The air tasking order (ATO) accurately reflects scheduled Army aircraft and fire missions and ensures Army aircraft have valid identification friend or foe (IFF) or selective identification feature codes on the ATO.
- Ensure the airspace coordinating order identifies airspace requirements for the conduct of operations.
- Disseminate changes to theater-wide air defense warnings, weapons control status, rules of engagement, and aircraft identification standards among the JAOC, Army force headquarters, and senior land-based air and missile defense headquarters.
- Assist with informing other agencies changes to fire support coordination measures that impact joint operations such as the fire support coordination line.
- Coordinate the development of the airspace control plan on behalf of the ARFOR as directed.
- Maintains capability to digitally exchange information between the ARFOR and the JAOC.

2-23. The air defense artillery fire control officer provides a single point of contact between Army AMD fire direction centers and the regional or sector air defense commander who typically locates with the control and reporting center (CRC). However, based on theater requirements, these officers co-locate at the tactical air operations center, Air Electronic Guidance Information System, or Airborne Warning and Control System (AWACS). These officers advise and assist the controlling authority with integrating Army AMD capabilities into that part of the integrated air defense system. They identify and deconflict air tracks; provide early warning and cueing information to air and missile defense units, target weapons paring, and rapid engagement of targets; assist in airspace deconfliction between AMD fire and aircraft; and send engagement orders to AMD units.

CORPS AND DIVISION LEVELS

2-24. The corps headquarters oversees airspace control policy and standardization of tactics, techniques, and procedures throughout the corps AO. The senior Army airspace element (either corps or division depending on the force structure deployed) coordinates with the BCD's airspace section to ensure the joint airspace policies and documents incorporate the Army airspace priorities and requirements.

2-25. The corps and division airspace elements are designed to execute airspace responsibilities when a headquarters serves as an intermediate tactical headquarters, an operational Army force, a joint force land component headquarters or a JTF headquarters. Airspace element personnel integrate airspace operations with the functional cells and with the integrating cells. The airspace element also coordinates with the tactical air control party (TACP) and the air support operations center (ASOC) co-located with the headquarters.

2-26. As the airspace functional lead for the corps and division staff, the airspace element develops standard operating procedures and airspace control annexes that help standardize airspace control operations among subordinate units. These procedures and annexes ensure consistency with joint airspace procedures, the theater ACP, aeronautical information publications, and associated plans and orders. To support the corps and division mission, airspace elements in the main command post—

- Provide airspace control expertise for the commander.
- Monitor joint airspace operations.
- Plan and update input to the joint ACP.
- Integrate the airspace control architecture into the joint airspace control architecture.
- Develop the airspace control architecture to support plans.
- Draft all airspace control input for operation orders, operation plans, appendices, and estimates.
- Plan and request ACMs.
- Deconflict airspace through the appropriate authority.
- Coordinate with the movement and maneuver (for aviation), intelligence (for information collection), and fires and protection (for air and missile defense) cells.
- Provide ATS expertise to the headquarters.

2-27. The corps can function as a tactical headquarters subordinate to a joint force land component or JTF. In this case, the airspace element provides airspace requirements to the higher headquarters' airspace section

for integration into its airspace plan (see paragraph 3-34). This integration applies to the next ACO and the higher headquarters' airspace control appendix.

2-28. Normally the corps headquarters delegates airspace control to subordinate divisions within their respective AOs. Corps headquarters may also authorize direct liaison between subordinate divisions and other theater air-ground system airspace control nodes provided by other Services. These entities include United States Air Force (USAF) CRCs and AWACS, Marine Corps direct air support center and tactical air operations center, and other airspace control entities for rapid resolution of airspace issues. For headquarters subordinate to the corps which may be attached, OPCON, or under tactical control of subordinate BCTs or for other brigades assigned their own AO, the corps may delegate control over Army airspace users within the respective AOs. In these instances, the corps retains responsibility for integrating airspace users. The corps integrates all airspace requirements for corps BCTs and other brigades not assigned an AO. The corps airspace element retains responsibility for airspace control over portions of the AO not assigned to subordinate units.

2-29. The corps may have OPCON of a Marine air-ground task force (MAGTF). A MAGTF integration with the corps airspace element depends on the size and capabilities of the MAGTF. The MAGTF's aviation combat element includes Marine air command and control system capabilities tailored for the size of the aviation combat element. Smaller MAGTFs, a Marine expeditionary brigade with a regimental-based ground combat element and a composite group-based aviation combat element (with unmanned aircraft systems) may integrate in a similar manner with BCTs. Large MAGTFs bring the full joint capability to control airspace over the MAGTF AO. Large MAGTFs include a division-based ground combat element and wing-based aviation combat element with Marine rotary- and fixed- wing aviation as well as a robust Marine air command and control system. In this case, the MAGTF requires authorized direct liaison to coordinate airspace and air operations directly with the JAOC.

2-30. The corps and division headquarters provide airspace control to support multinational forces under OPCON to the corps if needed. If these forces lack airspace control capabilities, they require assistance from the corps airspace element. They receive support similar to Army functional brigades working directly for the corps. See paragraph 2-42.

2-31. The division airspace element oversees airspace control for all of the division's assigned airspace, regardless of whether the division AO has been further assigned to subordinate brigades. When a division allocates part of its AO to a subordinate brigade, it delegates some airspace management responsibilities too. However, the division airspace element still integrates airspace users over the entire division AO. If the division has an unusually large AO or if the division AO is noncontiguous, then it can delegate more airspace control responsibilities to subordinate units. Normally, delegation of airspace control for unified action partner airspace users requires augmentation of the brigade with ATS elements from the combat aviation brigade.

Fires Cell

2-32. The fires cell is responsible for targeting coordination and for synchronizing fires delivered on surface targets by fire support means under the control of or in support of the corps or division. This cell coordinates and deconflicts fire support coordination measures (FSCMs) with ACMs through close interface with ADAM/BAE and airspace elements, the ASOC, and the TACP. The airspace element works with the fires cell to integrate FSCMs with the unit airspace plan. Although the airspace element reviews and integrates the fire support overlay with other airspace requirements, FSCMs are normally sent to higher, lower, and adjacent headquarters through fire support channels. In some cases, both the fires cell and the airspace element send related control or coordination measures through their respective channels. The airspace element and the fires cell ensure the standard operating procedures and the airspace control appendices address the procedures for forwarding FSCMs and associated ACMs through appropriate coordination channels. Other complex control measures—such as kill boxes, counterfire restricted operations zones, and airspace coordination areas—also require this parallel teamwork. The airspace element and the fires cell need to review the ACO to ensure that ACMs avoid unnecessarily interfering with fires and that the ACMs are in a format that the fires digital information systems can process. If a conflict exists between the fire support plan and the ACO, the airspace element coordinates with the higher airspace elements to correct or modify the appropriate ACM. As Army rocket and missile based fires continue to increase in range and altitude, effective integration of fires and

other airspace users must occur during the planning and preparation phase in order to ensure efficient use of airspace.

Air and Missile Defense Element

2-33. The AMD element is the lead staff element for integrating the joint tactical data informational link network for the employment of Sentinel air defense radars and for the production of the air picture. See Appendix C for more details. The airspace element links with the AMD element for air track data. The airspace element depends on the AMD element for integrating the airspace element's joint data network systems. In turn, these airspace element systems provide backup support to the AMD element. The airspace element ensures that AMD airspace requirements integrate with the corps and division airspace plans.

Coordination and Liaison Elements

2-34. Some elements of the theater air-ground system are Air Force liaisons provided to the division, the corps, or operational Army forces. These liaisons include the ASOC, TACP, and air mobility liaison officer. Air Force liaisons function as a single entity in planning, coordinating, deconflicting, and integrating air support operations with ground elements. These liaisons work with Army airspace elements, fires cells, AMD elements, and aviation elements of the corps and division command posts. They also coordinate with liaison elements such as the BCD, AMD coordinator for the operational Army forces, and officers.

2-35. Ground-based liaison elements of the theater air-ground system subordinate to the JAOC provide similar capabilities as airborne elements but with reduced range, flexibility, and mobility. However, ground-based liaison elements do not depend on high-value assets for continuous operations. Additionally, they offer an important interface between the theater air-ground system and ground-based air defense activities. Ground-based liaison elements of the theater air-ground system include CRCs, tactical air operations centers (TAOCs), ASOCs, direct air support center (DASCs), and TACPs, and air mobility liaison officers.

2-36. The ASOC is the element responsible for planning, coordination, control, and execution of air operations that directly support the Army's ground combat forces. Each ASOC reports to the JAOC. The senior air director maintains the on-scene OPCON of the ASOC. The ASOC is directly subordinate to the JAOC and coordinates air operations directly supporting Army forces. Air operations include CAS, air interdiction, intra theater airlift, joint intelligence, surveillance, and reconnaissance, suppression of enemy air defenses, and combat search and rescue. The ASOC processes immediate requests submitted through TACP channels, utilizing the joint air request net (JARN), while synchronizing efforts with Army fires elements. While Army airspace elements normally control air assets organic to maneuver commanders, the ASOC normally controls all joint air allocated from the JFACC to support the Army component.

2-37. . The USAF TACPs are subordinate to the ASOC and are the single points of direct USAF interaction with supported ground combat units. Each maneuver battalion, brigade, division, and corps headquarters will have an aligned TACP. Staffed with ALOs and other terminal attack controllers, TACPs perform liaison and control functions appropriate to the level of combat maneuver force supported. Only joint terminal attack controllers (JTACs) or forward air controllers (airborne) (FAC[A]s) personnel have the authorization to perform terminal attack control of CAS aircraft during operations (combat and peacetime) within proximity of their supported ground combat units. For airspace use, TACPs integrate with fires cells and the Army airspace elements. TACPs assist ground maneuver units in the planning and coordinating of FSCMs and ACMs needed to integrate air and ground operations. TACPs assist the ASOC for tactical control of CAS and FAC (A) aircraft transiting from the ASOC to the JTAC contact point.

2-38. The air mobility liaison officer is a USAF officer specially trained to implement the theater air control system and to control airlift assets engaging in combat tactics such as airdrop. Air mobility officers are highly qualified, rated air mobility officers with experience in combat tactics and assigned duties supporting Army and Marine Corps units.

JOINT AIR GROUND INTEGRATION CENTER (JAGIC)

2-39. Beginning in fiscal year 2011, the United States Air Force began aligning its ASOC capabilities with each active duty Army division. The Air National Guard will have two non-aligned ASOCs to support Army National Guard divisions. Aligning ASOCs provides an effective method to command and control close air support, intelligence, surveillance, and reconnaissance, as well as dynamic and deliberate interdiction operations and to provide an effective means to coordinate suppression of enemy air defenses in division-assigned airspace. An effective technique to integrate the ASOC within the division command post is to form a joint air ground integration center (JAGIC). The JAGIC is a method to effectively organize personnel and equipment to build personal relationships and teamwork between Soldiers and Airmen. This is accomplished through the physical integration of ASOCs and tactical air control parties with division fires, airspace, air and missile defense, and aviation personnel and functions within the current operations integration cell (COIC). This gives the division a powerful joint team capable of collaborative fires while maximizing the use of airspace.

2-40. All JAGIC functions are in support of COIC. Specific functions of the JAGIC include fires, airspace control, interdiction coordination, friendly force identification, and information collection. These functions are fully described in ATP 3-91.1, The Joint Air Ground Integration Center.

2-41. The JAGIC provides the division with the capability to control joint airspace delegated by the ACA in accordance with the airspace control plan (ACP) and the airspace control order (ACO). The JAGIC's collocation of division and ASOC airspace personnel enables shared understanding and collaborative integration of airspace users. The JAGIC's control of airspace allows the division to effectively integrate fires and airspace control during operations with appropriate flexible and timely actions.

BRIGADE LEVEL

2-42. Brigades are responsible for airspace management of Army airspace users within their AO. The authority of the brigade over unified action partner airspace users varies and is specified in the higher headquarters airspace control appendix. All Army airspace users transiting a brigade AO coordinate with the brigade responsible for the AO they are transiting. The division only integrates Army airspace use between brigades if adjudication between brigades is necessary. Brigades normally contact the JAGIC to coordinate with joint airspace elements controlling airspace over the brigade (CRC, AWACS, and TAOC). In some situations, for example, very lightly used airspace or airspace with few unified action partner airspace users, the division may delegate this authority.

2-43. BCTs are not normally delegated control of joint airspace as they lack trained and equipped controllers. Rather BCTs are responsible for integrating airspace users supporting BCT air ground operations. Sometimes, the brigade requests approval to control a volume of airspace such as a high-density airspace control zone (HIDACZ). However, for a brigade to control airspace for an extended period, it needs to augment the ADAM/BAE with assets from the ATS company organic to the CAB. See paragraph 2-51 for more details on ATS assets available to the CAB and brigade.

2-44. Functional brigades without an organic ADAM/BAE still retain brigade responsibilities for some airspace tasks (see appendix E) but rely on their higher headquarters for complete airspace control. If a functional brigade falls under the control of a support brigade (for example, a military police brigade under a maneuver enhancement brigade), the support brigade integrates the functional brigade airspace requirements. If the functional brigade falls directly under the control of a corps or division, then the corps or division airspace element integrates the brigade airspace requirements.

2-45. Several multifunctional support brigades such as the combat aviation brigade or field artillery brigade do not routinely control AOs but conduct operations throughout the corps AO. Normally these brigades coordinate their airspace use with the divisions and brigades whose AOs they will transit (or with corps airspace elements for portions of the corps AO unassigned to a division or brigade). Airspace control becomes more complex when a corps tasks these brigades to accomplish a mission (such as Army aviation attacks or fires strikes) that affects airspace use by other divisions or brigades. The brigade conducting the operation is the lead airspace control planner with the higher headquarters airspace element providing planning and airspace control support to the brigade's ADAM element. The division or corps airspace element checks that it adjusts the airspace plan to account for the brigade commander's priorities and concept of operations.

Air Defense Airspace Management/Brigade Aviation Element

2-46. All brigade combat teams and multifunctional brigades (except sustainment) have an organic ADAM or ADAM/BAE. This staff element is composed of air defense artillery and aviation personnel and performs the airspace management, AMD, and aviation functions for the brigade. It also provides added capability into the theater air-ground system at the tactical level.

2-47. Compared to an ADAM, an ADAM/BAE has additional aviation personnel and a larger aviation planning capability. Members of the brigade staff consist of key members of the airspace control working group—fires cell TACP and the ADAM/BAE. The brigade aviation officer is the airspace control officer for the brigade S-3.

2-48. The ADAM/BAE supports the brigade commander by providing situational understanding of the airspace and early warning via connectivity with airspace users as well as with unified action partner's sensors and command networks. This element also continuously plans and executes airspace management requirements and integrates Army AMD and aviation requirements consistent with the brigade commander's intent, priorities, and acceptable risk levels.

2-49. The ADAM and ADAM/BAE continuously plan for, control, and monitor the operations of all airspace users to support their operations and those transiting through the air over their ground AOs. This continuous situational understanding is critical to ensure that the brigade can react to any situation requiring immediate use of airspace, such as immediate fires (offensive and defensive), CAS missions, unplanned unmanned aircraft system launches, or a diversion of aviation assets in real time. Table 2-1 illustrates ADAM/BAE functions. Note that ADAM capabilities resident in a CAB and maneuver enhancement brigade do not have an aviation operations component and therefore have a very limited capability to perform brigade aviation element (BAE) functions. The level of effort spent on core tasks (ADA tasks by the ADAM and aviation operations by the BAE) affect how much effort can be provided to airspace control. Recent stability operations were in a low air defense threat environment and permitted a significant level of effort to BCT airspace control. Future operations may face a significant unmanned aircraft system (UAS) air threat combined with high supporting Army aviation operations. While airspace control tasks will still be accomplished, the BCT will increasingly rely on the division JAGIC to support airspace control.

Table 2-1. Air defense airspace management and brigade aviation element functions

ADAM	*SHARED*	*BAE*
• Plans and synchronizes air and missile defense operations with the concept of operations. • Produces the integrated air picture. • Plans low-level sensor employment. • Develops and maintains air defense artillery overlay to include unit locations, weapons control status, and weapon system coverage.	• Plans for airspace use and executes near-real-time control during execution and monitors operations of airspace users. • Analyzes airspace use to determine and resolve conflicts. • Reviews immediate airspace coordinating measures requests for conflicts with current operations. • Requests, maintains, and disseminates joint airspace coordinating measures. • Develops and coordinates airspace control appendix.	• Plans and synchronizes aviation with the concept of operations. • Advises and plans the use of unmanned aircraft systems, reconnaissance, attack, assault, air movement, sustainment, and medical evacuation. • Standardizes brigade combat team unmanned aircraft system employment.
Legend ADAM air defense airspace management BAE brigade aviation element		

Fires Cell

2-50. The fires cell at brigade level is responsible for coordinating activities and systems that provide the collective and coordinated use of Army indirect fires and joint fires through the targeting process. The fires cell makes every effort to ensure that FSCMs and ACMs are coordinated and deconflicted through close interface with ADAM/BAE and the TACP. If this is not possible, the fires cell formulates and prepares to execute acceptable alternatives.

Air Traffic Service

2-51. Each CAB has an organic ATS company as part of the general support aviation battalion. The ATS company establishes and operates airfields to support CAB operations. The ATS company contains a terminal control platoon and an airspace information services platoon. The terminal control platoon can operate a fully instrumented airfield with a control tower and airport surveillance radar and precision approach radar capabilities. It also has communications resources available to facilitate the control of the local airspace necessary to support airfield operations. The airspace information services platoon, with two tactical aviation control teams each, can control up to two tactical landing sites (rotary-wing, fixed-wing, or both) while the airspace information center provides enroute flight management support.

Coordination and Liaison Elements

2-52. The TACP helps maneuver brigades integrate air-ground operations. The TACP coordinates ACMs and FSCMs with the ADAM/BAE, fires cells, and the ASOC during the accomplishment of CAS missions to support ground operations. This coordination includes assisting the ASOC and JTAC for tactical control of CAS and — FAC (A) — aircraft transitioning to the JTAC contact point.

BATTALION LEVEL

2-53. The operations section plans and coordinates airspace requirements for the battalion. The major actions include:

- Establishing and leading the airspace control working group.
- Establishing staff responsibility for airspace management from personnel assigned to the S-3 section.
- Receiving and disseminating airspace coordinating measures requests for approvals, changes, and disapprovals for small unmanned aircraft system.
- Reviewing and resolving planned and immediate airspace coordinating measures requests.
- Monitoring and analyzing aviation, small unmanned aircraft system, lethal miniature aerial munition systems, field artillery, air defense, and maneuver operations to determine and resolve conflicts.
- Submitting to ADAM/BAE all planned and immediate airspace coordinating measures requests including small unmanned aircraft systems (see Appendix C).
- Immediately communicating any deviations from pre-planned missions to the ADAM/BAE or higher headquarters.
- Informing airspace users at each echelon of any communication loss during operations.
- Tracking and reporting aviation, field artillery, air defense, small unmanned aircraft systems, lethal miniature aerial munition systems, and personnel status.
- Monitoring rotary- and fixed-wing aircraft in the battalion AO to aid in deconflicting small unmanned aircraft systems, lethal miniature aerial munition systems, and other air traffic.
- Managing separation and frequencies of battalion and below small unmanned aircraft system operations.

Fires Cell

2-54. The fire support officer and the fires cell are responsible for planning, coordinating, and synchronizing fire support operations to include joint fire support. The major actions of the fires cell include the following:

- Planning, controlling, and synchronizing all fire support.
- Establishing priorities and allocating available fire support resources to support the battalion.
- Participating in and supervising the routine activity and coordination of the targeting process within the main command post.
- Coordinating with the ADAM/BAE regarding airspace clearance, artillery, and mortar firing unit locations as well as changes to FSCMs, and ACMs and aviation support.
- Coordinating air support through the USAF TACP.
- Coordinating suppression of enemy air defenses.

Coordination and Liaison Elements

2-55. The TACP consists of the ALOs and two JTACs. The TACP has two primary missions: advise ground commanders on the capabilities and limitations of airpower and provide the primary terminal attack control of CAS to support ground forces. At the battalion level, the TACP provides the primary link for commanders to joint CAS assets made available to support the battalion's mission. Depending on the tactical situation, terminal attack control teams consisting of one JTAC, may co-locate with each maneuver company.

COMPANY OR TROOP LEVEL

2-56. The company commander is responsible for ensuring that airspace users (organic or in support) coordinate and share information concerning company airspace use by aircraft and fires. Airspace control information that should be shared with battalion and the fire support team (to include JFO's and JTACs) includes use of small unmanned aircraft systems, micro UAS, and lethal miniature aerial munition systems. If there is time to request that the BCT ADAM/BAE build ACMs for planned airspace use, the use of ACMs will simplify air ground operations. However, if the company must employ its systems for immediate combat missions (and is authorized by standard operating procedures and rules of engagement), then as a minimum, the company should notify the battalion ADAM/BAE so it may better synchronize airspace use.

2-57. The field artillery fire support personnel (fires cells and fire support teams) are organic to the BCT's field artillery battalion. However, these cells and teams are typically attached or fall under OPCON to maneuver battalions, companies or troops for tactical operations. Fire support teams provide fire support coordination, precision targeting, and assessment capabilities. These teams have responsibility for planning and coordinating all supporting fires including mortars, field artillery, naval surface fire support, and CAS integration through close coordination with JTACs.

2-58. A *joint fires observer* is a trained service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 close air support terminal attack control, and perform autonomous terminal guidance operations (JP 3-09.3). In type 2 control, the observer can see either target or attacking aircraft. In type 3 control, the observer can see neither target nor attacking aircraft. The joint fires observer also performs autonomous terminal guidance operations. Joint fires observers are typically members of a fire support team. A joint fires observer adds a joint warfighting capability without circumventing the need for qualified JTACs. These observers provide the capability to exploit those opportunities that exist in the corps AO where a trained observer could be used to efficiently support air-to-surface fires and facilitate targeting for the JTAC.

2-59. The JTAC, when employed by TACP at the company or troop level, directs the action of or controls aircraft engaged in CAS and other offensive air operations. The JTAC also provides the ground commander with recommendations on the use of CAS and its integration with ground maneuver. The JTAC and fire support team or joint fires observer may develop informal ACAs to coordinate attacking aircraft and surface fires.

Chapter 3
Airspace Control—Planning and Preparation

The operations process consists of the major mission command activities performed during operations: planning, preparing, executing, and continuously assessing the operation. This chapter discusses airspace control planning and the documents necessary for planning. It also discusses preparation activities. These activities, which are continuous, underpin successful unified land operations.

PLANNING

3-1. *Planning* is the art and science of understanding a situation, envisioning a desired end state, and laying out effective ways of bringing that future about (ADP 5-0). To operate successfully, commanders at all echelons must be capable of integrating and synchronizing forces and warfighting capabilities on the ground and in the air. Planning not only underpins this capability but also helps commanders reduce uncertainty and risk, providing the flexibility commanders need to conduct operations. Planning is both conceptual and detailed. Conceptual planning includes developing and understanding an operational environment, framing the problem, defining a desired end state, and developing an operational approach to achieve the desired end state. Detailed planning translates the broad concept into a complete and practical plan. Detailed planning works out the scheduling, coordination, and technical issues involved with moving, sustaining, administering, and directing the activities of forces in time, space, and purpose.

3-2. Commanders drive the operations process through understanding, visualizing, describing, directing, leading, and assessing operations. During planning, staff sections perform essential functions and activities that enable commanders to understand, visualize, and describe tasks. This results in the commander's intent and planning guidance. Refer to ADRP 5-0 for details on conceptual and detailed planning.

KEY DOCUMENTS

3-3. The JFC provides essential airspace planning documents to components to facilitate component planning and joint force standardization. These documents include plans, orders, messages, and any international agreements and letters of instruction. Although this publication lists these key documents in the discussion of planning, commanders and staffs also use or refer to these documents while they prepare, execute, and assess operations.

Joint Air Operations Plan

3-4. The joint air operations plan (JAOP) is the JFC's approved plan for integrating and coordinating joint air operations. When designated by the JFC, the JFACC is responsible for developing a JAOP to guide the employment of joint air capabilities and forces made available to accomplish missions assigned by the JFC. The JAOP encompasses air capabilities and forces supported by, and in support of, other joint force components. To ensure proper force integration, all service and functional components must participate in the development of the JAOP. The JAOP provides the air strategy, objectives, and a desired end state for each phase of the operation. This plan—

- Integrates the efforts of joint air and space capabilities and forces made available for JFACC tasking.
- Identifies desired end state objectives and tasks to be achieved through air operations.
- Identifies measures or indicators of success used to determine if air operations meet assigned objectives.
- Accounts for current and potential adversary offensive and defensive courses of action.

- Synchronizes the phasing of air and space operations with the JFC's operation or campaign plan. The first phase normally involves counterair operations to attain and maintain the required degree of air superiority to accomplish other joint actions.
- Specifies capabilities and forces required to accomplish operational and tactical objectives.
- Used to coordinate joint air operations with all other relevant lines of operations and lines of effort.
- The JAOP should be developed concurrently with the airspace control plan and the area air defense plan to facilitate the maximum combat effectiveness while minimizing risk.

Airspace Control Plan

3-5. An ACP details the broad policies and procedures for airspace control within the JFC's operational area. The ACA, working with other components, develops this plan. Effective ACPs include transitions between phases or are updated as phase transitions occur. When the JFC signs the ACP, this plan becomes the JFC's airspace policies and procedures. This plan—

- Describes the operational area within which airspace applies.
- Lists current existing capabilities within the operational area to provide airspace control.
- Describes and lists duties of the ACA, each airspace user (including requirements for liaisons to and coordination with the ACA), and elements used in airspace control system.
- Describes the interface among the ACA, the AADC, and fires elements with procedures for deconflicting air defense and operational requirements.
- Describes interface with the Federal Aviation Administration, host-nation air traffic control system, and International Civil Aviation Organization.
- Describes the interface between U.S. and multinational forces to coordinate and deconflict airspace requirements.
- Provides for continuity of airspace control operations under degraded conditions.
- Describes the airspace control procedures for the joint force including requesting, approving, modifying, and promulgating procedures.
- Describes identification friend or foe selective identification feature procedures.

Area Air Defense Plan

3-6. With the support of the component commanders, the AADC develops, integrates, and distributes a JFC-approved joint area air defense plan (AADP). This plan protects assets on the defended asset list, other critical assets, friendly forces, and civilian population centers according to JFC guidance. It details defensive counterair priorities, authorities, procedures, tasks, and actions throughout the joint operations area. This plan includes:

- A layered and overlapping defense to allow for multiple engagement opportunities.
- Information engagement strategies for counterair.
- Detailed weapons control and engagement procedures and authorities integral to a joint counterair operation.
- Specific airspace coordinating measures (ACMs) required to accomplish the mission.
- All surface-to-air capabilities assigned, attached, and supporting.
- Provisions for protecting high-value airborne assets.
- Guidance on electronic warfare to disrupt or destroy guidance systems.

3-7. Planners carefully integrate air defense in the AADP with the appropriate sections in the ACP. A viable ACP requires locations of specific types of air defense operations and exact procedures for the identification of aircraft. The AADC writes the AADP with detailed engagement procedures consistent with the ACP and operations in the joint operations area. Planners of the AADP understand the capabilities and limitations of fielded equipment used by the joint or multinational forces. When writing, planners anticipate using airspace control and area air defense operations in a degraded command network environment.

Airspace Control Order

3-8. An ACO directs the use of joint airspace and details the approved requests for ACMs. The combat plans division of the JFACCs air operations center, together with other components, develops this plan. Component commanders consolidate, deconflict, and forward their airspace requests to the ACA for further consolidation with other theater-wide inputs. While the air operation center's combat plans division develops and disseminates the ACO, the combat operations division executes the planned ACO and develops and executes changes to the ACO during the execution period. The ACO implements precise ACMs for specific times, adding or activating ACMs for the missions and times needed. All airspace users review their daily requests for ACMs, removing unnecessary ACMs that unduly restrict other airspace users. Staffs disseminate ACMs with expiration times. The ACO activates and deactivates procedural control measures and updates positive control procedures. Normally, the combat plans division publishes this order as a stand-alone document but sometimes as part of the air tasking order special instructions.

Air Tasking Order

3-9. An ATO is the daily operation order listing all aviation assets (component capabilities) directed by the JFC or made available to the JFC for JFACC tasking. It also includes other component's direct support missions. These direct support air missions that appear on the ATO are not under control of the JFACC but their presence on the ATO provides visibility to assist in overall coordination, deconfliction, prevention of duplication of missions, and prevention of fratricide. This document shows all missions operating in theater.

Special Instructions

3-10. The special instructions (SPINS) section of the ATO provides supplemental, corrective, or exact amplification to the general mission tasking of the specific ATO period. This information is not contained in other operational documents (such as JAOP, ACP, operation order, regulations, and precise directive U.S. message text format messages). These general instructions pertain to the theater as a whole. The staff ensures that the instructions are brought to the attention of readers up front and are of general interest to all executors of the ATO. Special instructions avoid specific units or topics that other operational documents more appropriately cover. Some theaters deviate from this general purpose as staffs publish numerous airspace procedures and airspace usages in the special instructions.

3-11. Special instructions contain a section that lists the airspace procedures. Other special instructions sections, such as tanker procedures or cruise missile procedures, also address airspace procedures within those particular sections. Special instructions often include rules of engagement and combat identification criteria for air defense. These instructions also include additional guidance, directives, or information that weapons system operators or aircrews require such as host-nation restrictions, base defense zone procedures, and special weapons systems control procedures (such as unmanned aircraft or cruise missiles). The combat plans division publishes special instructions as baseline, weekly, and daily.

Airspace Coordinating Measures Request

3-12. An ACMREQ is a request to reserve airspace for a specific use. An originator requests airspace for an operation within their assigned AO. An ACMREQ can consist of single or multiple ACMs. Appendix B has more details.

Air Operations Directive

3-13. The air operations directive (AOD) translates the JFC's JAOP into guidance for the planning and execution of joint air operations for a specified ATO period. Published by the JFACC, it describes the JFACC's implementation of JFC's intent for the use of joint air power. This document is reviewed by components and their liaisons to ensure that it meets unit requirements within the context of the JFC guidance and priorities. The daily AOD gives planners the priority of effort, operational constraints, and any other specific guidance governing the planning and execution of air and space operations during a particular ATO period. Airspace personnel review the AOD to gain an overall perspective of those priorities the ATO development planners will follow and to understand daily priorities for airspace deconfliction. In addition,

the AOD often has specific guidance which impacts the use of airspace (such as a plan for high-value airborne asset retrograde procedures due to threat).

3-14. The AOD contains the JFACC's intent, concept of operations, objectives, tactical tasks and priorities of effort for a specific ATO or period of time that guides the daily joint air tasking cycle. The AOD can also be used to communicate the priorities for airspace use for each air tasking order and airspace coordination order period.

3-15. The strategy guidance team within the air operations center's strategy division develops the air operations directive. The team distributes the directive via the theater battle management core system and the air component network, typically the SECRET Internet Protocol Router Network (SIPRNET). Though the air operations directive is not authoritative for Army forces, effective airspace element personnel read and understand the air operations directive to understand the JFACC's airspace priorities and guidance.

Tactical Operational Data

3-16. Tactical operational data is required to establish an integrated air defense (such as defense sectors, combat air patrol stations, and missile engagement zones). A joint operational commander uses this data to establish air defense and anti-air warfare responsibilities in a tactical area and to permit an area commander to provide supplementary orders for an area of operations. The AADC disseminates the tactical operational data.

3-17. The tactical operational data establishes command and control alignments of Air Force and Army air- and ground-based air defense systems as well as the tasking for air defense assets to include locations. The joint interface control officer coordinates the development of the tactical operational data message and manages all tactical data link interfaces to create a consolidated air picture.

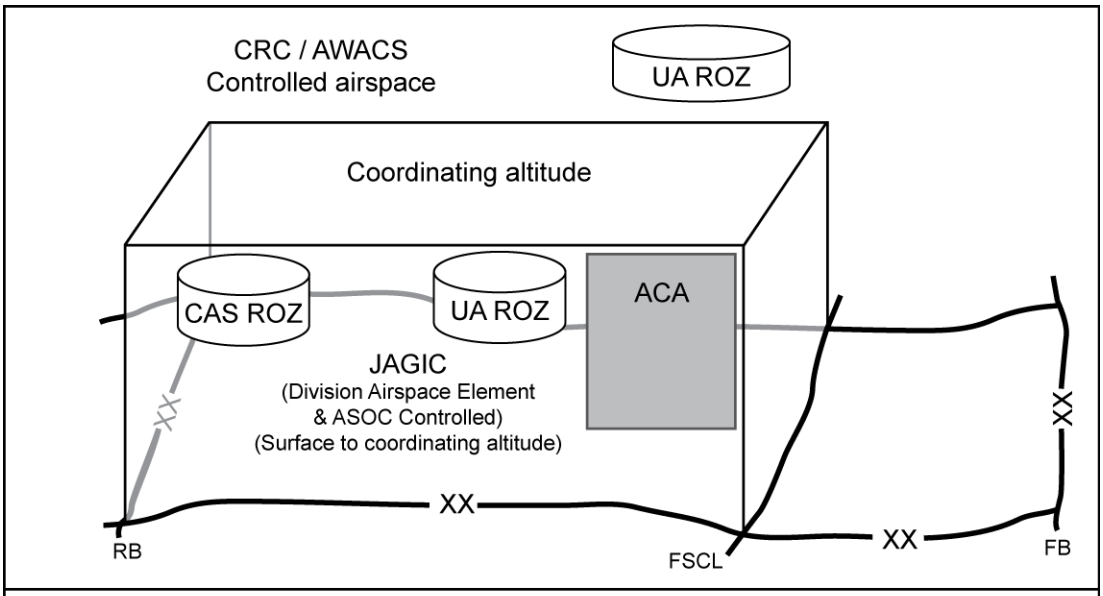
Operations Task Link

3-18. The operations task link (OPTASK LINK) is a message used to report changes to tactical data link operations. These changes are considered permanent. The operations task link provides detailed instructions regarding the operations of tactical data links, including information required to establish data links. The AADC disseminates the operations task link.

AIRSPACE CONTROL PLANNING

3-19. Airspace elements provide airspace control subject matter expertise into the planning efforts. Airspace planning focuses on setting conditions for near-real-time airspace control during mission accomplishment thereby providing commanders flexibility while reducing risk.

3-20. Army airspace planners at the senior tactical and operational levels must actively assist in the development of the joint airspace control plan. This is critical if the divisions intend to request the authority to control division-assigned airspace using the JAGIC technique. Division-assigned airspace is a volume of airspace in which the airspace control authority (ACA) has delegated the responsibility for control of that volume, in accordance with the airspace control plan and airspace control order (ACO), to the division. Division-assigned airspace is typically between the lateral boundaries of the division's area of operations, and up to the coordinating altitude (CA). This delegation of authorities does not include authorities vested in the area air defense commander (see Figure 3-1). A JAGIC enabled division is suitably manned and equipped to procedurally control the tactical airspace over the division AO up to the CA.



ACA	airspace coordination area	FB	forward boundary
ASOC	air support operations center	JAGIC	joint air ground integration center
CAS	close air support holding area	RB	rear boundary
CRC/AWACS	control and reporting center/airborne warning and control system	ROZ	restricted operating zone
		UA	unmanned aircraft
FSCL	fire support coordination line		

Figure 3-1. Division Assigned Airspace

3-21. A corps as a tactical headquarters is normally resourced with an ASOC and can employ the JAGIC technique. However, even with a JAGIC, the corps should manage airspace as described in paragraph 2-28 and delegate airspace control to the divisions within their respective AOs rather than trying to request corps assigned airspace. Controlling assigned airspace over the very large corps AO given the large numbers of non-corps airspace users operating over the corps AO would fully occupy the JAGIC and distract the JAGIC from enabling joint and Army fires supporting corps operations. Assigned airspace does not significantly enable corps fires and aerial surveillance. Corp fires are mostly long range fires requiring coordination for high altitude airspace above the CA, while, corps aerial surveillance platforms also will often be operating above the CA. The JAGIC's airspace control effort should be to establish immediate airspace coordination links with appropriate joint airspace control elements in order to rapidly coordinate airspace for corps fires and for dynamic repositioning of corps aircraft.

3-22. Using planning data from the fires and aviation planners Army airspace planners can integrate Army airspace requirements into the overall airspace control plan. Integrated planning ensures that the location and altitude of key ACMs, that define division assigned airspace such as the coordinating altitude, balance both JFACC and JFLCC requirements for airspace

3-23. At the brigade level, the ADAM/BAE's officer in charge leads the airspace control planning effort. The BAE represents Army aviation (manned and unmanned), ADAM personnel represent Army air defense and fires cell personnel represent fire support. Tactical air control party personnel represent the air component assets to include the unmanned aircraft system and defensive counterair. To increase flexibility and reduce risk, airspace element planners should do the following:

- Consider the echelon commander's priorities for airspace use.
- Keep the plan for integrating airspace users simple and flexible.
- Maximize the use of procedural means of control.
- Limit (in number, size, and duration) ACMs to the minimum required for mission accomplishment to maximize flexibility for airspace users.
- Structure ACMs to facilitate recognition by ground forces and aircrew members through alignment with major terrain features.

3-24. During course of action (COA) development and collaborative planning, airspace element planners—

- Ensure planned airspace use supports the commander's intent and concept of operations.
- Comply with the commander's airspace risk guidance.
- Address airspace conflict resolution procedures and war game to verify.
- Develop ACMs when ground units utilize Army aviation to conduct attacks when in close proximity to friendly forces.Address airspace conflict resolution procedures and war game to verify.

3-25. Airspace control planning is central to facilitating a shared understanding of joint air-ground integration. Planning contributes directly to the staff's ability to assist the commander to execute commander tasks: understand, visualize, and describe. As commanders visualize an operation during planning, they describe it to their staffs and subordinates. Commanders describe their visualization in their initial commander's intent, planning guidance, and operational approach that arranges warfighting function capabilities in time, space, and purpose.

3-26. Facilitating a shared understanding of joint air-ground integration and airspace use spans all aspects of planning. The staff facilitates understanding by translating all higher headquarters airspace guidance and risk guidance from the ACP, AADP, ACO, special instructions, higher headquarters airspace appendices, and other needed documents into airspace constraints for incorporation into the planning effort. This shared understanding also involves participating in COA development and war-gaming of joint air-ground integration using higher headquarters airspace constraints, commander's airspace priorities, airspace risk guidance, and conflict resolution guidance. The staff facilitates a shared understanding to utilize COA development and war-gaming. Using COA development ensures commanders understand that they normally are the final decision authority for assigning the mission and taking responsibility for prudent risk during combat operations. Commanders assess any higher commander constraints on the authority to accept prudent risk during COA development and war-gaming. If these constraints adversely impact mission success, they address constraints with higher headquarters through airspace and necessary operations channels. The staff facilitates a shared understanding by supporting the AMD and fires cells with their running estimates and appendix development. Lastly, the staff helps by shaping theater-level airspace planning to accommodate Army requirements. Establishing a shared understanding of joint air-ground integration and airspace use not only guides further planning but enables informed timely decisions during mission accomplishment.

Note: Lessons learned have shown that a detailed wargame of the selected COA is necessary to identify potential airspace conflicts between Army aviation, organic UAS, artillery and joint air assets. A detailed COA wargame also allows the development of a collaborative unit airspace plan (UAP) that resolves the conflicts in accordance with the commander's airspace priorities and risk guidance.

AIRSPACE CONTROL COLLECTIVE TASKS DURING PLANNING

3-27. Airspace elements perform a series of collective tasks during staff planning. Airspace elements may not perform all the tasks listed below but should be trained to conduct all of them. These tasks result in the production and refinement of the daily UAP and an Appendix 10 (Airspace Control) to Annex C (Operations) of the Army plans and orders. See appendix F of this publication and FM 6-0 for Army plans and orders. Commanders must ensure the airspace plan is deliberate and supports the ground tactical plan. Additionally, the UAP must be rehearsed to validate integration of airspace users and support of the commander's intent.

3-28. Airspace control is an integral part of planning. Airspace elements at all echelons perform collective tasks during planning:

- Determine integrated airspace user requirements.
- Develop airspace usage priorities.
- Coordinate ATS, sensor emplacement, and data links.
- Determine combat identification authority and procedures for airspace users.
- Develop rules of engagement and early warning procedures for air defense operations.
- Determine reporting requirements and monitoring methods for manual reporting.

- Integrate airspace use within the area of operations.
- Develop ACMs to support planned operations.
- Develop the airspace control appendix to the operation annex.

Determine Integrated Airspace User Requirements

3-29. During COA development, airspace control elements at all echelons solicit airspace user requirements from each of the functional and integrating cells as they develop airspace plans that support each COA. During COA analysis, airspace elements modify and synchronize each airspace plan to support each COA. Once the commander has selected a COA, they perform the final integration of airspace user requirements. Commanders submit the necessary ACMs, proposed risk guidance, and airspace priorities to higher headquarters for approval and integration into the higher headquarters UAP. Early and timely airspace planning at all echelons is a necessity. Airspace element personnel in Army operating forces remain actively and continually engaged with all higher echelons (such as joint force commander, joint force air component commander, AADC, and airspace control authority) while preparing key airspace planning documents. By staying engaged, these personnel ensure documents accommodate all Army airspace requirements and procedures and that airspace used by other components does not inadvertently constrain Army operations.

Develop Airspace Usage Priorities

3-30. Army airspace elements develop airspace usage priorities. First, the airspace elements determine and confirm the commander's intent and guidance, mission priorities, and risk guidance for airspace utilization. Then they examine pertinent airspace orders, directives, and the ground commander's concept of operations to develop recommended airspace usage priorities according to ground operations and ACA directives. Lastly, they synchronize plans, orders, and special instructions to facilitate current operations and future planning to promote situational understanding and to detail the future integration decision basis. The echelon commander's priority of airspace use prominently appears in Appendix 10 (Airspace Control) to Annex C (Operations) of the respective echelon operation plans and orders.

Coordinate Air Traffic Service, Sensor Emplacement, and Data Links

3-31. Controlling assigned airspace over the very large corps AO given large numbers of non-corps airspace users would fully occupy the JAGIC and distract from enabling joint and Army fires supporting corps operations.

Determine Combat Identification Authority and Procedures for Airspace Users

3-32. The AADP (see paragraph 3-6) contains the combat identification authority and associated procedures. The AMD element at the corps and division level, supported by the airspace element, makes inputs into the AADP. Based on this plan, the AMD element uses combat identification criteria to process and assign tracks as friend, neutral, hostile, or unknown. The AADP details—

- The authorities delegated to AMD fire controllers in individual areas of operations.
- The authorities delegated to execute identification of tracks in the joint data network.
- The airspace element's capability to provide identification friend or foe, precise position location information, and visual identification.
- The locations, number, and type of AMD sensors employed in the area of operations.
- The completeness of the low-level air picture.

3-33. The AMD element analyzes information from these documents. It determines if higher echelons retain combat identification authority or are delegated to lower echelons. If delegated to lower echelons, the AMD element determines whether the information is suitable for determining the identification of tracks in a unit's area of operations. AMD personnel determine whether to further delegate the responsibility of combat identification to subordinate units or retain at the highest tactical level.

Develop Rules of Engagement and Early Warning Procedures for Air Defense Operations

3-34. The AMD element at the corps and division levels, supported by the airspace elements, develops rules of engagement and early warning procedures for air defense operations in the area of operations. The element recommends rules of engagement for current and future operations within the unit controlled airspace or high-density airspace control zone. The AMD element forwards these recommendations to the AADC for inclusion in the JFC's rules of engagement. The airspace element and AMD element analyze all airspace documents and the JFC's rules of engagement to extract pertinent data for dissemination to all subordinate ADAM/BAEs. Based on the AADP, the AMD element identifies and establishes liaison with the appropriate air defense artillery fire control officers and establishes procedures to process engagements through these controllers. In coordination with the airspace element, the AMD element establishes early warning procedures.

Determine Reporting Requirements and Monitoring Methods for Manual Reporting

3-35. An airspace element, supported by the aviation and AMD elements, determines which agencies operating in the area of operations lack self-reporting capabilities and equipment for identification, friend or foe. An airspace element establishes procedures for those agencies to manually report their locations. This airspace element also ensures dissemination of this information to unified action partners operating air platforms in the area of operations. The airspace element ensures all manually reported tracks are integrated into the common operational picture. Integration maximizes the freedom of maneuver and all airspace users' capabilities as well as minimizes the potential for fratricide and adverse impacts on operations.

Integrate Airspace Use Within the Area of Operations

3-36. Airspace element personnel at all echelons integrate airspace use within the area of operations. They receive airspace control guidance (ACP, ACO, and special instructions) from the ACA and distribute the guidance through appropriate electronic systems to all subordinate airspace elements. The airspace element identifies all airspace users in the area of operations and then coordinates their airspace use. Coordination involves determining the length of time those users will require airspace, determining the altitude and type of airspace volume for each user, synchronizing all user requirements into a cohesive plan, and planning for airspace conflict resolution. The airspace element also identifies airspace control enablers such as ATS, AMD units, and unified action partner airspace elements in the area of operations.

Develop Airspace Coordinating Measures to Support Planned Operations

3-37. During planning, airspace element personnel at all echelons develop ACMs to support planned operations. These personnel use an airspace coordinating measures request to integrate and nominate planned ACMs to higher headquarters as part of a future ACO. Consolidated at each echelon, airspace coordinating measures requests form the basis of a unit's UAP. Lower echelons initiate UAPs on a schedule dictated by the battle rhythm. As these UAPs migrate up the chain of command, each higher echelon coordinates, consolidates, and integrates the plans until a single Army UAP exists. Airspace element personnel send this last UAP to the battlefield coordination detachment for coordination with the ACA and inclusion in the appropriate ACO (see Figure 3-1 on page 3-5). At each succeeding echelon, the staff coordinates the plan across the warfighting functions to ensure complete integration of fire support coordination measures and AMD planning. Timely feedback from each echelon throughout the process is essential for planning at lower echelons.

3-38. The corps and division airspace elements and ADAM/BAE develop ACMs to support the commander's concept of operations. The corps and division airspace elements and ADAM/BAE also ensure fire support coordination measures and AMD control measures are integrated with the UAP at each level. The staff disseminates these measures to higher, lower, and adjacent headquarters through fires and AMD channels.

3-39. To support planned operations, planners identify ACMs at each level and plan for the type of control required (positive, procedural, or a mix of both). Planners use tailored ACMs that minimize the necessary time and volume of airspace to accomplish each individual mission. Once they identify the required ACMs, airspace element personnel at each echelon develop and submit the UAP up the chain of command (see Figure

3-2). Each echelon integrates fire support coordination measures and AMD control measures into the UAP. As these individual UAPs move through the higher echelons, planners deconflict, coordinate, integrate, and collate them with other UAPs until a single Army UAP evolves. Planners submit this final UAP to the ACA via the battlefield coordination detachment for inclusion in the appropriate ACO. For detailed information on ACMs, see appendix B.

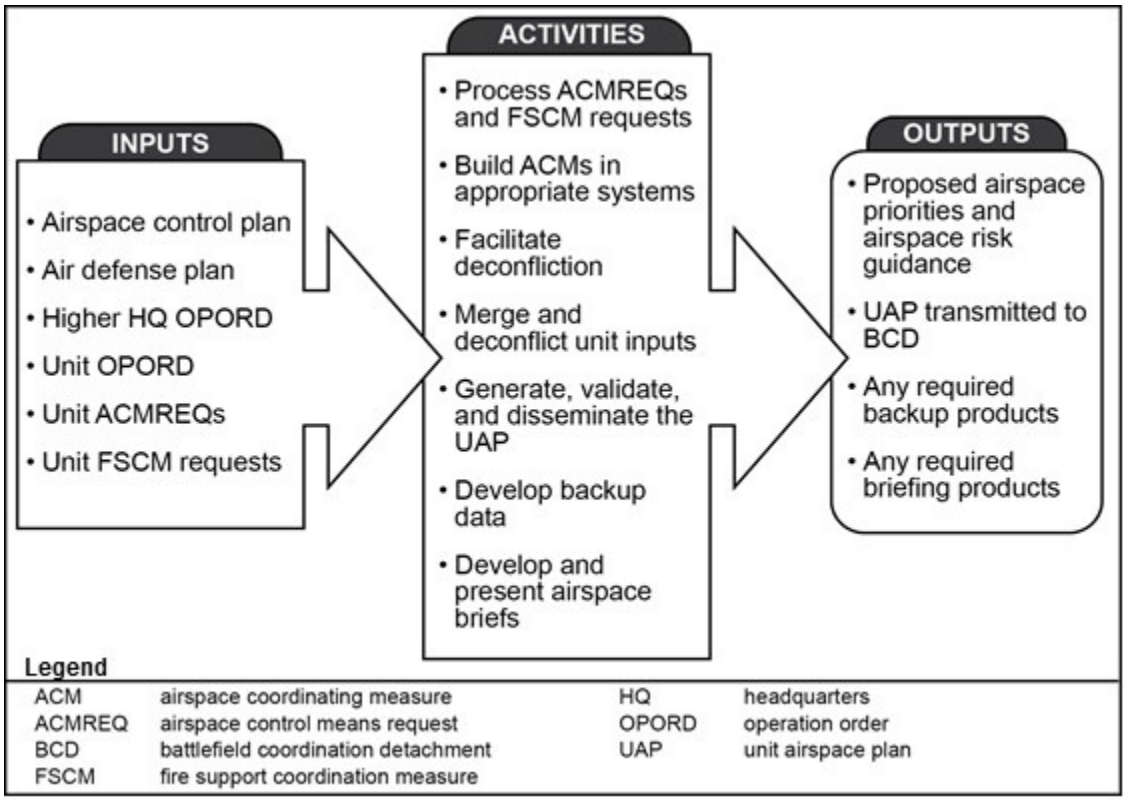


Figure 3-2. Development process for unit airspace plan

Develop Airspace Control Appendix to the Operation Annex

3-40. The airspace element develops an airspace control appendix to the operation annex. The result of the unit performing the collective tasks in paragraphs 3-27 through 3-37 is Appendix 10 (Airspace Control) to Annex C (Operations) of the unit's operation plan or operation order (see FM 6-0). The airspace control appendix articulates the airspace the commander is responsible for and states the commander's airspace priorities and the ACA's priorities and directives by phase. This appendix articulates the airspace element or ADAM/BAE mission. It lists the control authorities for each echelon as delegated or retained by the ACA and delineates the authority exercised at each echelon for each phase of the operation. It describes positive and procedural control requirements.

3-41. The airspace control appendix outlines the considerations of a radar versus a non-radar environment as well as airspace control in a degraded network environment. It includes the number and type of organic and joint sensors available in the area of operations to provide an air picture. Available sensors are addressed by phase as nonorganic assets flow in and out of the theater. Sensor availability or the risk associated with a lack of sensors may be addressed in OPLANs, OPORDs, or FRAGORDs.

BATTLE RHYTHM

3-42. Commanders establish and utilize a battle rhythm to synchronize operations. A *battle rhythm* is a deliberate cycle of command, staff, and unit activities intended to synchronize current and future operations (FM 6-0). As a practical matter, a headquarters' battle rhythm consists of a series of meetings, report requirements, and other activities synchronized by time and purpose. Planners logically sequence battle

rhythm events so that one meeting's outputs are available as another meeting's inputs to include higher headquarters meetings. The battle rhythm facilitates integration and collaboration between the commander and staff, synchronizing activities of the staff in time and purpose, and facilitates planning by the staff and decisionmaking by the commander. In developing the unit's battle rhythm, commanders and the chief of staff or executive officer consider—

- Higher headquarters battle rhythm and report requirements.
- The duration and intensity of the operation.
- Planning requirements of the integrating cells (current operations, future operations, and plans).

3-43. Airspace control planning is driven by not only higher headquarters battle rhythm but by external battle rhythm constraints. For example, the joint air tasking cycle (Figure 3-3), drives when UAP inputs are due, which in turn influences the battle rhythm of airspace control working groups. Planners disseminate the joint air tasking cycle, ACO timelines, and other pertinent airspace coordination instructions (specified in the ACP and the JAOP) into Appendix 10 (Airspace Control) to Annex C (Operations) of the Army plans and orders.

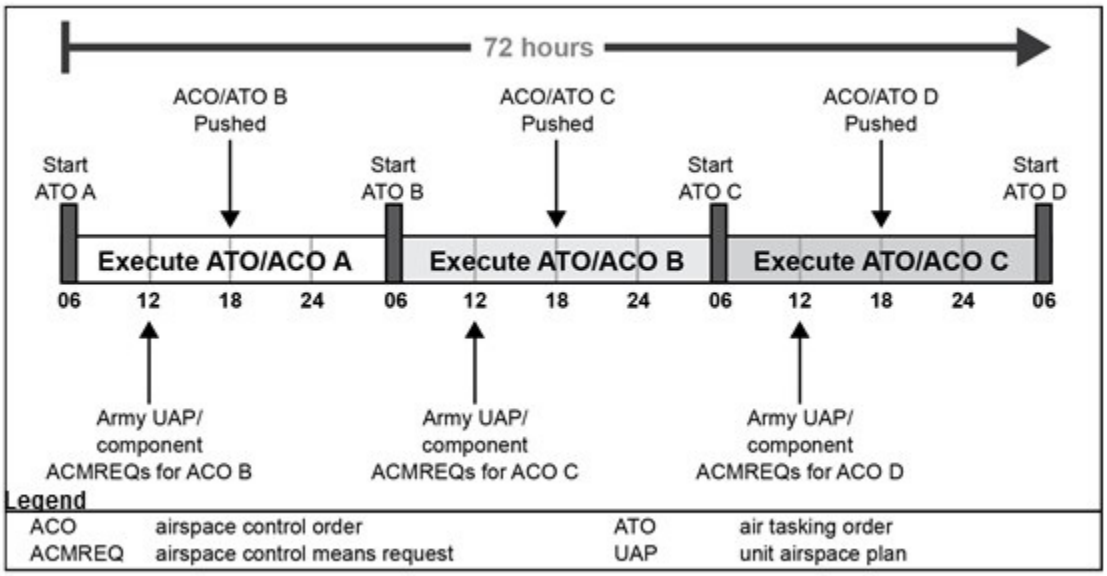


Figure 3-3. Notional 72-hour joint air tasking cycle

3-44. Working groups are types of meetings. Their cross-functional design enables working groups to synchronize contributions from multiple command post cells and staff sections. For airspace planning, the airspace control working group facilitates and synchronizes airspace collective task contributions from all the airspace elements. The airspace control working group, at a minimum, consists of the air liaison officer and representatives from: the airspace element, aviation cell, AMD element, fires cell, tactical air control party, unmanned aircraft systems element, and other staff sections as required. Airspace elements are integral participants in other working groups and provide expertise on how to maximize airspace use for information collection, targeting, and protection purposes. Some examples of working groups which airspace elements support are listed below.

- Operations and Intelligence working group (intelligence cell).
- Targeting working group (fires cell).
- Protection working group (protection cell).
- Assessment working group (plans or future operations functional cells).

Airspace elements also assist the S-3 and S-5 or G-3 and G-5 plans and future operations cells in assessing airspace integration of air-ground operations.

PREPARATION

3-45. Airspace elements participate in certain preparation activities performed by units to improve their ability to execute an operation. Preparation helps the force transition from planning to execution and normally begins during planning and continues into execution by uncommitted units.

3-46. Preparation activities help commanders, staffs, and Soldiers to understand the situation and their roles in the upcoming operation. As in planning, airspace element personnel play an integral role in preparation activities that a unit performs as it transitions from planning to execution. This is particularly relevant as it relates to improving situational understanding and developing a shared understanding of the plan. Depending on the situation, airspace elements participate in all of the unit's preparation activities. Most notably, airspace elements actively participate during rehearsals, facilitating a shared understanding of joint air-ground integration, potential ground operations effects on airspace use, and potential airspace use effects on ground operations. Plan revision and refinement as well as rehearsals are particular preparation activities that airspace personnel support.

PLAN REVISION AND REFINEMENT

3-47. Plan revision and refinement is a key activity of preparation. The airspace element supports this activity as planners validate planning assumptions or find them to be false, as enemy activities change in the area of operations, and as friendly capabilities expand or contract. The airspace element continually assesses the operation and makes recommendations for changes to unit plans and joint documents such as ACP and JAOP.

REHEARSALS

3-48. Rehearsals enable leaders to practice synchronizing operations and identify shortcomings (errors or omissions) while preparing to execute operations. A *rehearsal* is a session in which the commander and staff or unit practices expected actions to improve performance during execution (ADRP 5-0). Leaders use rehearsals to practice synchronizing operations, including airspace control requirements, at times and places critical to mission accomplishment. Commanders use this tool to ensure staffs and subordinates understand the concept of operations and commander's intent. Effective rehearsals imprint a mental picture of the sequence of the operation's key actions and improve mutual understanding and coordination of subordinate and supporting leaders and units.

3-49. Rehearsals are conducted by units at the lowest possible level. They vary with the complexity of the mission, the type and technique of rehearsal, and the level of participation. Four types of rehearsals exist: backbrief, combined arms rehearsal, support rehearsal, and battle drill rehearsals. Airspace elements participate in combined arms rehearsals enabling subordinate units to synchronize their plans with each other and support rehearsals that synchronize each warfighting function with the overall operation. FM 6-0 discusses rehearsals in detail.

3-50. Commanders integrate airspace use and key air-ground actions into larger combined arms and support rehearsals such that leaders and Soldiers build a lasting mental picture of the sequence of key air-ground actions and airspace use. During rehearsals, airspace elements ensure planned airspace use is consistent with the commander's intent and supports the concept of operations. Airspace elements ensure that all leaders and Soldiers understand the risk guidance. During rehearsals, staffs and units exercise key actions or procedures to achieve near-real-time airspace control to resolve events that cause airspace conflicts. Rehearsing these events builds requisite skills to successfully integrate airspace users and to quickly resolve conflicts. Examples of when near-real-time airspace control is required includes:

- Supporting troops in contact.
- Providing immediate fires or close air support.
- Engaging time sensitive targets.
- Engaging emerging or fleeting targets.
- Conducting casualty evacuation.
- Conducting personnel recovery.
- Supporting a mission change.

- Supporting mission delays (initiation or execution).
- Responding to enemy actions or reactions.

3-51. A rehearsal provides subordinates a final opportunity to identify and fix unresolved issues. Thorough preparation for rehearsals underpins successful outcomes that help commanders visualize conditions associated with decisionmaking. This visualization before and during operations affords commanders an opportunity to make necessary changes essential to mission success and risk mitigation. Following the rehearsal, based on the commander's guidance, airspace elements make or recommend necessary adjustments to appropriate ACMs, UAPs, the airspace control appendix, and the Fires annex including the AMD appendix of operation plans at all echelons as well as to the ACP, JAOP, and AADP.

3-52. Successful airspace elements participating in rehearsals—

- Complete the airspace control appendix and airspace overlays that underpin air-ground operations that units rehearse.
- Clearly describe the ACMs that support air-ground operations.
- Clearly describe airspace constraints.
- Clearly describe near-real-time control and conflict resolution procedures.

Chapter 4

Airspace Control—Execution and Assessment

This chapter provides an overview of airspace control activities performed during execution. These activities are interrelated. Near-real-time execution requires constant monitoring, evaluating, and assessing the situation and then taking action or making recommendations.

EXECUTION

4-1. *Execution* is putting a plan into action by applying combat power to accomplish the mission (ADP 5-0). Execution uses situational understanding to assess progress and make execution and adjustment decisions. However, few plans are executed precisely as envisioned. Operations the commander envisioned in the plan may bear little resemblance to actual events in execution. Subordinate commanders need maximum latitude to take advantage of situations and meet the higher commander's intent when the original order no longer applies. Leaders must be trained in independent decisionmaking, aggressiveness, and risk taking for effective execution.

4-2. By exercising mission command, commanders empower their subordinate leaders to develop the situation, adapt, and act decisively to changes during execution. Army commanders have the authority to direct (control) the maneuver of all Army airspace users within their designated areas of operations (AOs), so they can make the best use of airspace. If assigned airspace control responsibility for a volume of airspace by the airspace control authority in the airspace control plan or airspace control order, Army commanders exercise airspace control over all airspace users. This authority to exercise airspace control for an assigned volume of airspace does not include the authority to approve, disapprove, or deny joint combat operations. Army commanders are the supported commander within their designated AO and as such, other commanders coordinate their airspace use with Army commanders to avoid adverse effects and fratricide.

4-3. Army commanders and staffs utilize positive control methods, procedural control methods, or a combination of both methods. When a division is delegated control of airspace, the JAGIC will control division assigned airspace using procedural control. The Airmen in the JAGIC will normally provide procedural control for JFACC aircraft operating within division-assigned airspace. Control for division aircraft will be specified in the airspace control appendix (paragraph 3a of appendix 10 to Annex C Operations. see appendix F) Normally the JAGIC will rely on the BCTs to integrate division aviation operating below the coordination level in their AO while the JAGIC airspace Soldiers will integrate division aircraft operating above the coordination level and any division aircraft operating in parts of the division AO not further assigned as a brigade AO. For example, the JAGIC would be the airspace control agency for Shadow or Gray Eagle unmanned aircraft within division assigned airspace as well as for aircraft operating forward of the BCTs AO during a deep operation. Division positive control will be limited to areas controlled by Army or joint air traffic control elements. See paragraph 1-22 and 1-23 for further discussion.

4-4. Army airspace elements coordinate airspace use with airspace control agencies provided by unified action partners (tasked by the airspace control authority to control airspace). These elements can include elements of the Air Force theater air control system (for example, CRC or AWACS), the Marine air command and control system (for example, DASC or tactical air operations center), the Navy tactical air control system, or similar multinational or civil air traffic control organizations. See ATP 3-52.2 for additional information. The Division JAGIC is normally the division element that coordinates with other unified action partner airspace elements. The JAGIC must establish a working relationship with the airspace element controlling airspace above division-assigned airspace in order to rapidly coordinate both high altitude fires and dynamic re tasking of division Gray Eagles operating above the coordinating altitude. The JAGIC must also coordinate with airspace elements controlling airspace beyond the FSCL or over adjacent units to enable responsive counterfires and interdiction fires. Normally, brigades will coordinate with unified action

airspace elements through the JAGIC but brigades can be delegated the authority to directly coordinate by the division.

4-5. In large portions of a unit's AO, airspace element personnel communicate with airspace users and have digital situational awareness of airspace user locations. This communication and awareness enable a form of near-real-time procedural control. By collaborating with cooperative airspace users, airspace element personnel can create focused (minimal time and area) airspace coordinating measures and exchange this data with all local airspace users. Using near-real-time procedural control, airspace element personnel can direct Army airspace users to shift airspace use to a different route, altitude, or volume of airspace. The airspace user still retains the responsibility for safely maneuvering to the new airspace. The collocation of functionally aligned theater air control system elements can expand this near-real-time control to joint airspace users.

4-6. During execution, near-real-time airspace procedural control requires airspace elements and users to continually monitor and assess the operations of all airspace users. The airspace elements monitor and assess in support of their operations as well as those transiting through the air over their ground AO. This continuous assessment contributes to the commander's situational understanding and enables units to react to situations requiring immediate use of airspace.

4-7. During execution, the airspace element's running estimate, along with other staff section's running estimates, supplements the common operational picture (COP) based on digital feeds from various information systems such as Army, joint, interagency, multinational, and so on. The combined running estimates and COP depict key information from each functional area or warfighting function. This information directly supports the commander's ability to understand, visualize, describe, direct, lead, and assess operations and enables units to react to situations requiring immediate use of airspace. For example, information provides details of airspace use for immediate fires, close air support missions, unplanned unmanned aircraft system launch, or diversion of aviation assets in near-real-time.

4-8. Situational understanding of airspace users within the unit's AO is a critical element in enabling the commander to make rapid decisions and capitalize on opportunities by taking prudent risk. Commanders rely on their understanding of an operational environment to make informed risk decisions. This understanding results from many factors but heavily relies on situational understanding developed from the COP. The airspace elements perform the critical task of developing and interpreting the air COP for the commander and staff. The air COP enables the commander to visualize all airspace users' identification, location, flight paths, trajectories and other information critical to rapid decisionmaking and risk mitigation. Commanders can integrate airspace use in near-real-time by knowing who is in the airspace, where they are going, and what their mission is.

4-9. As in planning, the airspace elements maintain constant communication with the fires cell, air liaison officer, tactical air control party, intelligence sections, unmanned aircraft system operators, and all other staff elements that represent airspace users. Airspace elements track and establish communication links with all manned and unmanned airspace users. This communication enables the airspace elements to build complete situational understanding and to synchronize ongoing airspace operations. By establishing these communication links, airspace element personnel can solve airspace user conflicts in near-real-time by recommending adjustments to timing, trajectories, or flight paths to the staff elements and subordinate headquarters that control the conflicting users. This process is continuous and requires the airspace elements to monitor not only the current operations but also to project airspace usage for planned operations.

ASSESSMENT

4-10. Assessment which is the continuous monitoring and evaluation of the current situation, precedes and guides every operations process activity and concludes each operation or phase of an operation. Staffs monitor the current situation for unanticipated successes, failures, or enemy actions. Commanders and staffs look for opportunities, threats, and acceptable progress as they assess the operation. They accept risks, seize opportunities, and mitigate threats.

4-11. Assessment activities help commanders visualize, describe, and direct changes to the operation. Airspace elements assist commanders in assessing airspace operations. Assessment consists of, but is not limited to the following activities:

- Monitoring the current situation to collect relevant information.

- Evaluating progress toward establishing end state conditions, accomplishing objectives, and performing tasks.
- Recommending or directing action for improvement.

4-12. Staffs use several tools to assess progress. Running estimates and the COP are the two most prevalent. Running estimates provide information, conclusions, and recommendations from the perspective of each staff section. The Joint Air Ground Integration Center is a technique to utilize in the current operations cell of an Army division to quickly assess and make recommendations for changes to airspace control of division allocated airspace. See ATP 3-91.1 for additional information on this. Running estimates help refine the COP and supplement it with information not readily displayed. The COP provides an integrated visualization of the operations. See paragraph D-14 through paragraph D-16.

4-13. Airspace elements or the JAGIC within Army divisions, continually monitor and assess operations, airspace use, and future airspace use as part of their running estimate. These running estimates provide the analytical basis for airspace use recommendations. These recommendations are focused on near-real-time airspace control or on posturing for future use of airspace. Examples of monitoring airspace use include the following:

- Verifying planned aviation missions conform to actual airspace use.
- Anticipating potential manned and unmanned aircraft missions generated to support adjustments to current operations (casualty evacuation, unmanned aircraft system re-tasking).
- Identifying airspace users entering the AO without prior coordination.
- Understanding airspace not in use (situational understanding of unused airspace provides flexibility since it is essentially pre-cleared for immediate use if needed).
- Maintaining situational understanding during current operations and anticipating potential fire missions (surface-to-surface, surface-to-air, and air-to-surface) that may result in an airspace conflict.

4-14. Continuous assessment enables learning and adaptability. Airspace elements continuously assess operations enabling the staffs to identify shortcomings in key airspace planning documents, most notably the joint air operations plan, the airspace control plan, the area air defense plan, and higher headquarters operation orders, associated airspace appendices. Based on these shortcomings, airspace elements recommend needed adjustments to establish the conditions for future operations. In doing so, these key airspace planning documents remain relevant and help commanders reduce uncertainty and risk, and providing flexibility during mission accomplishment.

AIRSPACE CONTROL—EXECUTION AND ASSESSMENT COLLECTIVE TASKS

4-15. Airspace elements perform a series of collective tasks to integrate airspace use in near-real-time. Executing collective tasks enables commanders to make informed decisions of when and where to shoot or fly, thereby minimizing the risk. Airspace elements work alone to perform collective tasks. An airspace element will not always perform all the tasks listed below, however, the element must be prepared to perform any or all of them.

PROCESS OF AIRSPACE ORDERS AND DIRECTIVES

4-16. The airspace element processes airspace orders and directives. It uses information systems to receive and disseminate airspace orders and directives to or from the airspace control authority and subordinate airspace elements. The element builds and maintains the airspace control overlay consisting of the joint airspace control order, any local airspace coordinating measures the airspace control authority does not publish on the airspace control order, and near-real-time airspace coordinating measures too transient to be published in an airspace control order change. The airspace element establishes near-real-time, jam-resistant, and long-range voice communications with higher, adjacent, and subordinate systems. The airspace element promulgates procedures for receiving and disseminating airspace information in Appendix 10 (Airspace Control) to Annex C (Operations). These procedures address communicating with units equipped with different information systems, operating in a degraded environment (no communication lines and no radar

feeds for example), as well as addressing reliability, speed, and risk issues associated with operating in degraded environments. See appendix C for a detailed discussion on information systems.

MANAGE AIRSPACE CONTROL INFORMATION DISPLAYS

4-17. Airspace elements maintain accurate information displays. Information displays consist of overlays, maps, and databases in near-real-time. This information includes computer hardware and software and communications as well as policies and procedures. Once developed, the airspace element updates information and disseminates it to other staff elements and subordinate airspace elements and users.

DETERMINE TRACK IDENTIFICATION FOR AIRSPACE USERS

4-18. The air and missile defense (AMD) element, in coordination with the airspace element, uses combat identification criteria to determine track identification for airspace users. The AMD element, supported by airspace elements, continuously monitor the air picture. The AMD element tracks and identifies airspace users as friend, neutral, hostile, or unknown. Once identified, the element assigns combat identification. The air and missile defense element confirms that all tracks are processed for identification. This element monitors and verifies that all subordinate airspace nodes process all organic tracks for identification. The AMD element coordinates with the area air defense commander for appropriate actions on hostile tracks within the AO. The combination of the AMD element's air tracks and the airspace element's airspace control overlay displayed on airspace element system screens and in the current operations, provides the echelon commander a tactical air picture and situational awareness of ongoing airspace use. The airspace element maintains situational awareness and situational understanding of all unified action partners and neutral airspace users in the AO.

MONITOR ASSIGNED AIRSPACE AND AIRSPACE USERS WITHIN ASSIGNED AREA OF OPERATIONS

4-19. Airspace elements continually monitor the operations of all airspace users to support their mission as well as those transiting through the air over their ground AO. Airspace elements can develop and maintain running estimates that provide the basis for the air COP by monitoring airspace users' identification, location, flight paths, trajectories, and other critical information. Further, by continuously monitoring and assessing airspace use and airspace coordinating measures for conflicts, airspace elements can provide direction to deconflict, coordinate, and integrate the use of airspace within the AO. Airspace elements monitor with a near-real-time, jam-resistant, and secure communications network as well as digital connectivity. Airspace elements use several means to communicate with higher, adjacent, and subordinate airspace elements within the AO. First, elements determine the dimensions of the unit airspace. Next, they determine the level of authorization for airspace control delegated to the unit. Once the communication with the assigned AO is determined, airspace elements maintain and update all joint airspace control documents to ensure compliance with established monitoring procedures. Activities include the following:

- Airspace control utilizing the low-level air picture.
- Airspace control utilizing manual reporting.
- Monitoring air track actions.
- Maintaining an up-to-date airspace control order.
- Assigning combat identification to support air and missile defense.
- Defensive counterair operations to support air and missile defense.
- Airspace control liaison with higher controlling authorities such as airborne warning and control system, control and reporting center, tactical air operations center, or direct air support center.

RESOLVE REAL-TIME CONFLICTS FOR AIRSPACE USERS WITHIN THE AREA OF OPERATIONS

4-20. Airspace elements need to resolve real-time conflicts for airspace users within the area of operations regardless of the thoroughness of planning. These situations require immediate use of airspace. Continuously monitoring and assessing current and projected airspace use enables airspace elements to either coordinate

or recommend airspace use for immediate fires, close air support, unplanned unmanned aircraft systems employment, aircraft redirection and numerous other missions. Airspace elements resolve airspace conflicts by changing the time, altitude, or location of one or more airspace users by restricting operations of one or more airspace users or by accepting prudent risk to accomplish both missions in the same airspace. Airspace elements do not routinely manage the flight path or trajectory of individual airspace users, rather they integrate airspace use both in planning and execution to manage risk. Only when two or more airspace users are in conflict do airspace elements direct changes in flight paths or, in the case of fires, coordinate with the fires cell to alter the trajectory. Airspace elements base these changes on the commanders' mission priorities and risk guidance. Pilots, unmanned aircraft system operators, and weapon system controllers still maintain the responsibility to make the directed changes to their flight path or trajectory. The unit makes every attempt to coordinate a satisfactory solution if the risk involves airspace coordination with other joint airspace controlling agencies. However, the commander has the authority to accept prudent risk if necessary to accomplish an immediate combat mission unless specifically prohibited by higher headquarters constraints. At the division level, JAGIC is a technique to resolve real-time airspace conflicts within the division assigned airspace. See ATP 3-91.1 for additional information about the JAGIC.

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Appendix A

Risk

This appendix discusses risk and airspace control. First, it discusses risk collaboration in airspace. Then, it discusses the two types of risk. The appendix then discusses the effects risks have on airspace operations. Next, it addresses the condition of risk in airspace control. The appendix concludes with a discussion of the steps that airspace element personnel use to manage risk.

COLLABORATION IN RISK

A-1. Airspace use over an Army area of operations (AO) is always joint, and often coalition and interagency, so decisions require collaboration with many organizations. While the owner of an AO is the primary supported commander, other airspace users still require access to the area. For example, the joint force air component commander must have access to that airspace to accomplish missions supporting the ground commander and to accomplish theater-wide missions supporting the joint force commander. Further, other military and civil airspace elements at times control some or all of the airspace over a unit AO. These organizations often have differing views of mission priorities and acceptable risk to their airspace users.

A-2. Joint airspace doctrine allows commanders to make risk decisions in combat situations. However, the commander making the decision, accepts responsibility for the decision. Just as airspace use within and above an Army AO is joint, the risk accepted by the commander may also involve joint forces. Therefore, airspace control personnel should notify affected joint forces of the risk so that the forces can properly mitigate it and remain within the joint force commander's acceptable level of risk for all airspace users (including fires) as delineated in the airspace control plan.

A-3. To set brigade commanders up for success, the operational Army force airspace element actively collaborates with the joint force commander while developing and refining acceptable airspace risk guidance and any associated decision support tools such as risk assessment matrixes. This collaboration necessitates early and continuous component participation in producing, and subsequently changing, the joint air operations plan, the area air defense plan, the airspace control plan, and airspace control orders. Once these higher echelon commanders have agreed to acceptable risk, the joint air force component commander publishes this guidance (including any constraints) in the joint air operations plan and the airspace control plan. Additionally, the joint force air component commander disseminates this guidance using the air operations directive. The Army disseminates the guidance in Appendix 10 (Airspace Control) to Annex C (Operations) of Army plans and orders. As military operations progress, participants readdress this risk guidance.

TYPES OF RISK

A-4. Airspace risk consists of real risks and perceived risks. Real risk is the actual probability of a collision between airspace users. Perceived risk is the risk of collision that airspace users and their commanders assess to incur by operating in the area. Historically, the real risk of a collision between airspace users is statistically small. For example, from 2003 to 2015, small, unmanned aircraft systems flew approximately 600,000 hours with only two incidents of collision with other airspace users. During that same period, the perception of the risk posed by small, unmanned aircraft systems was much greater. A risk mitigation strategy that only addresses perceived risk can fail by being too cautious and hindering operations. Airspace element personnel can reduce perceived risk by establishing a relationship of trust with adjacent joint and unified action partner airspace agencies such as combat reporting centers, airborne warning and control systems, and direct air support centers. An effective airspace control plan targets both real risk and perceived risk.

CONDITIONS OF RISK MITIGATION

A-5. Conditions of risk mitigation for airspace differ from conditions of risk mitigation for ground operations. Aircraft reporting based on planning or periodic voice reports have a greater degree of position uncertainty and greater risk due to the speed in which aircraft travel. Tactical jet aircraft move so quickly that they cause risk situations that require rapid decisions based on estimated locations. The current location of an aircraft is always an estimate. In 30 seconds, an aircraft traveling at 500 knots per hour has travelled seven kilometers, hence, electronic displays do not show where an aircraft actually *is*, instead they show where the aircraft *was* when it reported its position. Airspace element personnel facilitate risk reduction by maintaining a running estimate of the possible locations of an aircraft based on its last report. A rapidly updated position report (such as radar or aircraft automatic self-reporting) facilitates risk reduction since the airspace that the aircraft occupies likely consists of a small volume of airspace. Without near-real-time situational awareness, airspace element personnel facilitate risk reduction by requiring airspace users to use preplanned coordination measures and by reserving large volumes of airspace for possible use.

A-6. To preclude an airspace mishap, commanders establish control measures to mitigate risk. For example, commanders may consider certain risks, such as counterbattery fire, unacceptable for manned aircraft ACMs, but acceptable for unmanned aircraft ACMs. How this guidance is relayed will affect how airspace coordinating measures are planned. However, if excessive, these control measures can degrade unit operations. Understanding the nature of airspace risk, tools to mitigate risk, and the effects (both positive and negative) of risk mitigation strategies is a key responsibility of airspace element personnel.

EFFECTS OF RISK

A-7. Usually mitigating risk has one of two influencing effects. The first effect is the risk of a collision between airspace users. The second effect is the risk to mission success if a mission is cancelled or delayed to reduce the collision risk. Ideally, if a risk of collision exists, airspace element personnel adjust airspace use, reducing risk and allowing both missions to proceed without degrading either mission. However in some cases, one or both of the airspace users have their mission degraded to reduce risk to acceptable levels. In this case only, commanders or designated representatives direct an airspace adjustment that degrades a mission or exceeds risk guidance. For example, a troops-in-contact fire mission must shoot through an airspace coordinating measure currently occupied by an aircraft. The commander decides to reduce platform risk by moving the aircraft and accepting degradation of the platform's mission, to reduce platform risk by cancelling the fire mission and accepting risk to Soldiers who need the fires, or to accept risk to the platform and shoot while the aircraft remains on station.

A-8. Risk management associated with airspace control increases combat effectiveness by promoting the safe, efficient, and flexible use of airspace with minimum restraint on airspace users. A successful airspace risk mitigation plan and timely actions are both force multipliers that assist in accomplishing the mission, protecting friendly forces and noncombatants, and preserving aircraft while also adhering to commander's intent, guidance, and risk acceptance criteria.

RISK MANAGEMENT PROCESS

A-9. The Army utilizes a risk management process, referred to in ATP 5-19. The five risk management steps (identify hazards, assess hazards to determine risk, develop control measures and make risk decisions, implement control measures, and supervise and evaluate) of this process also facilitates airspace risk management. The five steps align with the activities of the operations process (plan, prepare, and execute supported by continuous assessment). The aviation safety officer at each echelon assists the staff, ensuring each section or planner uses the risk management process. See Figure A-1.

Risk management steps	*Operations process activities*	
Step 1-Identify the hazards	Planning	Assessing
Step 1-Assess the hazards	Planning	
Step 1-Develop controls and make risk decisions	Planning and preparing	
Step 1-Implement controls	Planning, preparing, and executing	
Step 1-Supervise and evaluate	Planning and executing	

Figure A-1. Risk management aligned with the operations process

PLAN

A-10. In the planning phase, steps one and two of the risk management process provide the structure and situational awareness necessary to develop a sound course of action and plans. Only then can a stated mission or purpose be accomplished within a predetermined level of risk. When planning operations, commanders' efforts involve risk management tools and processes to assess and mitigate risk. If no airspace users risked interfering with other airspace users, no requirement for airspace control would exist.

A-11. In step one, airspace control working group personnel identify potential hazards by using the standard mission, enemy, terrain and weather, troops and support available, time available and civil considerations (known as METT-TC) format. Personnel identify the potential hazards in the airspace above the AO that they could encounter while accomplishing a mission, event, or operation. For example, hazards they identify include physical hazards (such as wires or structures), firing unit locations and procedures, air defense unit locations and procedures, or misapplication of appropriate airspace coordinating measures. Poor choices and decisions on using the available airspace preclude its efficient utilization by airspace users and jeopardize mission accomplishment.

A-12. In step two, airspace control working group personnel assess potential hazards and assign risks in terms of probability and severity of adverse impact on an event or occurrence. This step considers the risk or likelihood of an event or incident adversely influencing a mission, capabilities, people, equipment, or property. Commanders ask what the odds or probability are of something going wrong and what effects (severity) follow the incident if it does occur. When considering severity, consider the use of unmanned systems and the commander's acceptance of risk to valuable equipment in order to mitigate risks to manned platforms or targets. As an example, the commander must clarify their authority and willingness to provide timely fires through a UAS ROZ in support of friendly troops in contact.

A-13. In these first two steps, airspace element personnel identify and assess hazards. They also analyze the plan's complexity using the density, diversity, duration, and promptness categories. Density refers to the number of airspace users a unit will control or will integrate in the airspace over the AO. Diversity accounts for the different types of airspace users (manned/unmanned aircraft systems, artillery, and air and missile defense) and organizations (joint forces, coalition forces, or civil airspace users) that use the airspace. Duration accounts for how long users will require the level of airspace control. For example, will it require augmentation of airspace element personnel for a long duration high-density airspace control zone. Promptness is the amount of time needed to integrate a new airspace user safely into the airspace.

A-14. Density, diversity, duration, and promptness provide a tool for looking at a unit's mission and determining the complexity of the airspace control. Commanders and staffs assess information derived from the density, diversity, duration, and promptness (along with hazards and associated risks) during mission analysis, course of action development, and course of action analysis. Commanders and staffs consider mission- and non-mission- related aspects that may have an impact. This assessment results in an initial estimate of risk for each identified hazard expressed in four terms. Airspace users rate the risk with extremely high, high, moderate, or low as determined from the standardized application of the risk assessment matrix. See Figure A-2 on page A-4.

		Probability (expected frequency)				
		Frequent: Continuous, regular, or inevitable occurrences	**Likely:** Several or numerous occurrences	**Occasional:** Sporadic or intermittent occurrences	**Seldom:** Infrequent occurrences	**Unlikely:** Possible occurrences but improbable
Severity (expected consequence)		A	B	C	D	E
Catastrophic: Death, unacceptable loss or damage, mission failure, or unit readiness eliminated	I	EH	EH	H	H	M
Critical: Severe injury, illness, loss, or damage; significantly degraded unit readiness or mission capability	II	EH	H	H	M	L
Moderate: Minor injury, illness, loss, or damage; degraded unit readiness or mission capability	III	H	M	M	L	L
Negligible: Minimal injury, loss, or damage; little or no impact to unit readiness or mission capability	IV	M	L	L	L	L
Legend EH – extremely high risk H – high risk M – medium risk L – low risk						

Figure A-2. Sample risk assessment matrix

PREPARE

A-15. In the preparation phase, leaders develop control measures and make decisions to eliminate unnecessary risks. Based on the identification and assessment of potential hazards by airspace personnel, leaders balance the risks (readiness, political, economic, and environmental) against the costs of each course of action as they develop control measures.

A-16. In step three, after airspace control working group personnel have assessed related hazards and made appropriate recommendations, leaders develop one or more control measures. These control measures either eliminate the hazard or reduce the risk (probability or severity) of a hazardous incident occurring. In developing control measures, leaders consider the reason for the hazard, not just the hazard itself.

A-17. To be effective, each control developed must meet the following criteria:

- Feasibility. The unit has the capability to implement the control.
- Acceptability. The benefit gained by implementing the control justifies the cost in resources and time. The assessment of acceptability is largely subjective. Past experience, the commander's guidance, or other external restrictions influence the assessment.
- Suitability. The control removes the hazard or mitigates (reduces) the residual risk to an acceptable level (determined by the responsible individual).

- Support. Adequate personnel, equipment, supplies, and facilities necessary to implement the control are available.
- Explicitness. The control clearly specifies who, what, where, when, why, and how each control will be used.
- Standards. Guidance and procedures for implementing the control are clear, practical, and specific.
- Training. Knowledge and skills of personnel are adequate to implement the control.
- Leadership. Army leaders are ready, willing, and able to enforce standards necessary to implement the control.
- The individual. Individual personnel are sufficiently self-disciplined and capable of implementing the control.

A-18. Commanders and staff develop and rehearse procedures for making risk decisions. Commanders ensure that the level of authority accepting the consequences of a given hazard is determined by the level of residual risk associated with that hazard. The greater the residual risk, the higher the authority that evaluates and decides to accept the risk.

EXECUTE

A-19. In the execution phase, risk management involves the implementation of the identified control measures. In step four, leaders and airspace element personnel ensure that control measures are integrated into Appendix 10 (Airspace Control) to Annex C (Operations) of the Army plans and orders, standard operating procedures, written and verbal orders, mission briefings, and running estimates. The critical check for this step is to ensure that staffs convert control measures into clear and simple execution orders. When division commanders utilize the JAGIC technique, the level of with whom decision making authority lies must be carefully considered. An improper decision may result in unresponsive fires and missed opportunities or allocation of limited resources prior to the decisive point in the operation.

ASSESS

A-20. Leaders continuously assess effectiveness of control measures, adjusting as necessary for changing or unexpected situations or events, and evaluate their effectiveness to maintain an acceptable level of risk for the operation. In step five, leaders and airspace element personnel ensure that risk control measures are enforced to standard. This step also encompasses airspace element personnel validating the adequacy of the selected control measures in supporting the unit's mission. Timeliness or promptness is a key aspect of determining adequacy due to the dynamic nature of events during mission accomplishment. A unit's reputation of compliance to standards helps reduce other airspace user's perception of risk when operating in the units AO.

A-21. Supervision is an integral part of the process. Supervision ensures subordinates understand how, when, and where to implement control measures. It also ensures that control measures are implemented, monitored, and remain in place. Situational awareness is a critical component of the risk management process when identifying hazards. Situational awareness is equally important in supervision. It ensures that complacency and deviation from standards or violations of policies and risk control measures do not threaten success. Airspace element personnel monitor factors such as fatigue, equipment serviceability, or availability, and the weather and environment. The personnel can then mitigate the hazards such factors present. Supervision and oversight provides commanders and leaders with the situational awareness necessary to anticipate, identify, and assess any new hazards and to develop or modify control measures as necessary.

A-22. Evaluation occurs during all phases of an operation and is included as part of every after action review. During evaluation, airspace element personnel identify and assess hazards and well as endure compliance. Airspace element personnel identify any hazards not identified as part of the initial assessment or identify new hazards that evolved during the operation or activity. For example, any time that personnel, equipment, environment, or mission changes the initial risk management analysis, airspace element personnel re-evaluate the control measures. Airspace element personnel assess effectiveness in supporting operational goals and objectives. They check if the control measures positively or negatively impact training or mission accomplishment. They check if the control measures support existing doctrine, techniques, tactics, and procedures. Airspace element personnel assess the implementation, execution, and communication of the

control measures. Airspace element personnel also assess accuracy of residual risk and effectiveness of control measures in eliminating hazards and controlling risks and they ensure compliance with the guiding principles of risk management. They check that they integrated the process throughout all phases of the operation. They check the accuracy and decision levels of risk decisions, the necessity of risks, verifying that the benefits outweigh the cost in terms of dollars, training benefit, time, and that the process was cyclic and continuous throughout the operation. Airspace element personnel track risk management in a standardized manner according to ATP 5-19.

Appendix B

Airspace Coordinating Measures

This appendix discusses airspace coordinating measures. First, it discusses the overview. Then, it discusses the types and usages of airspace coordinating measures. Lastly, this appendix discusses common reference systems for airspace coordinating measures.

OVERVIEW

B-1. Army commanders use airspace coordinating measures (ACMs) to facilitate the efficient use of airspace and simultaneously provide safeguards for friendly forces. The Army's airspace control methodology emphasizes procedural control of airspace. ACMs are organized into a set of seven broad categories called types. The seven categories are: airspace coordinating measures, fire support coordination measures, maneuver control measures, air reference measures, air defense measures, marine defense measures, and air traffic control measures. Each type includes a subset of control measures called usages.

B-2. Doctrinal ACMs are implemented by digital messages—United States message text format (USMTF) standard. See appendix D for USMTF details.

B-3. Ideally, the airspace staff plans and requests ACMs prior to the publication of the current ACO. Once a commander approves ACMs, they are then added to the UAP for addition to the daily ACO. This does not preclude a component from immediately establishing and executing an ACM after considering risk. See appendix A for a discussion of the risk associated with ACMs. However, near-real-time airspace coordination requirements dictate that some ACMs be requested outside the planning phase. Near-real-time ACMs are expedited and once they are approved, should appear in ACO changes as historical data.

B-4. Airspace elements request ACMs using airspace coordinating measure requests (ACMREQs). Airspace elements use ACMREQs for planning, requesting a change, and coordinating. Airspace elements use planned ACMREQs to develop the unit airspace plan (UAP) and nominate planned ACMs to higher headquarters as part of a future ACO. Airspace elements use ACMREQs submitted within the current ACO cycle to integrate and disseminate the change into the current ACO. Lastly, airspace elements use near-real-time ACMREQs for near-real-time coordination with external airspace agencies. These agencies include an Air Force CRC or Marines Corps DASC.

TYPES AND USAGES

B-5. The types and usages of ACMs are identified in table B-1a and B-1b on pages B-2 and B-3. This table lists the types of coordinating measures and their corresponding USMTF ACMs. The bolded ACMs reflect the most frequently used ACMs or ACMs of particularly importance to the Army. Special use airspace is denoted by an asterisk (*). Tables B-2 through B-10 (beginning on page B-4) provide additional details for the most frequently used ACMs.

Table B-1a. Types of airspace coordinating measures and their corresponding usage

ACM AIRCOR (7)	*ACM Stand Alone (4)*	*ACM ROZ (14)*		*FSCM (9)*	*MAN(7)*	*AIRREF(7)*
LLTR	**CA**	**AAR**	**PZ**	**ACA**	AOA	**ACP (USMTF)**
MRR	**CL**	**ABC**	**RECCE**	**CFL**	**BNDRY**	**BULL**
SAAFR	**HIDACZ**	**AEW**		**FFA**	**FLOT**	**BZ**
SC	**NOFLY**	**CAP**		**FSCL**	FSA	**CP**
TC		**CAS**	**SOF**	**KILLBX**	**JOA**	**IFFOFF**
TMMR		**DZ**	**SSM**	**NFA**	JSOA	**IFFON**
TR		**EC**	**SSMS**	**RFA**	**PL**	**SARDOT**
		LZ	**UA**	**RFL**		
				ZF		

Legend

AAR	air-to-air refueling area	IFFON	identification, friend, or foe (IFF) switch on line
ABC	airborne command and control area	JOA	joint operations area
ACA	airspace coordination area	JSOA	Joint special operations area
ACM	airspace coordinating measure	KILLBX	kill box
ACP	air control point (USMTF)	LZ	landing zone
AEW	airborne early warning area	LLTR	low-level transit route
AIRCOR	Airspace coordinating measures (air corridor)	MAN	maneuver control measures
AIRREF	air reference measures	MRR	minimum-risk route
AOA	amphibious objective area	NFA	no fire area
BNDRY	boundary	NOFLY	no fly area
BULL	bulls-eye	PL	phase line
BZ	buffer zone	PZ	pickup zone
CA	coordinating altitude	RFA	restrictive fire area
CAP	combat air patrol	RFL	restrictive fire line
CAS	close air support area	ROZ	Airspace coordinating measure (restricted operations zone)
CFL	coordinated fire line	RECCE	reconnaissance area
CL	coordination level	SAAFR	standard use Army aircraft flight route
CP	contact point	SARDOT	search and rescue point
DZ	drop zone	SC	special corridor
EC	electronic combat	SOF	special operations forces area
FFA	free-fire area	SSM	surface to surface munitions
FLOT	forward line of own troops	SSMS	surface-to-surface missile system
FSA	fire support area	TC	transit corridor
FSCL	fire support coordination line	TMMR	temporary minimum risk route
FSCM	Fire Support Coordination Measures	TR	transit route
HIDACZ	high-density airspace control zone	UA	unmanned aircraft area(USMTF uses UAV [unmanned aerial vehicle])
IFFOFF	identification, friend, or foe (IFF) switch off line	ZF	zone of fire

Table B-1b. Types of airspace coordinating measures and their corresponding usage

ADMEAS(14)		*MARDEF(11)*		ATC (20)	
ADIZ	**LOMEZ**	ADZ	FIRUB	ADVRTE	**CLSE**
BDZ	MEZ	**APPCOR**	ISP	**ALERTA***	**CLSF**
CADA	MISARC	CCZONE	ISR	ALTRV	**CLSG**
CONTZN	**SHORADEZ**	COZ	RTF	**ARWY**	DA
FEZ	SL	FADIZ	SAFES	**CDR**	FIR
HIMEZ	TL		SCZ	CFA	**MOA***
JEZ	**WFZ**			**CLSA**	**PROHIB***
				CLSB	**RA***
				CLSC	TFR*
				CLSD	WARN*

Legend

ADIZ	air defense identification zone	FIRUB	fire power umbrella
ADMEAS	air defense measures	HIMEZ	high-altitude missile engagement zone
ADVRTE	advisory route	ISP	identification safety point
ADZ	amphibious defense zone	ISR	identification safety range
ALERTA	alert area	JEZ	joint engagement zone
ALTRV	altitude reservation	LOMEZ	low-altitude missile engagement zone
APPCOR	approach corridor	MARDEF	marine defense measures
ARWY	airway	MEZ	missile engagement zone
ATC	air traffic control measures	MISARC	missile arc
BDZ	base defense zone	MOA	military operations area
CADA	coordinated air defense area	PROHIB	prohibited area
CCZONE	carrier control zone	RA	restricted area
CDR	conditional route	RTF	return to force
CLSA	class-A airspace	SAFES	safety sector (USMTF)
CLSB	class-B airspace	SCZ	ship control zone
CLSC	class-C airspace	SHORADEZ	short-range air defense engagement zone
CLSD	class-D airspace	SL	safe lane
CLSE	class-E airspace	TFR	temporary flight restriction
CLSF	class-F airspace	TL	traverse level
CLSG	class-G airspace	WARN	warning area
CONTZN	control zone	WFZ	weapons free zone
COZ	crossover zone	*	denotes special use airspace
CFA	controlled firing area		
DA	danger area		
FADIZ	fleet air defense identification zone		
FEZ	fighter engagement zone		
FIR	flight information region		

Table B-2. Airspace coordinating measures(Air Corridor(AIRCOR))

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Air Corridor (AIRCOR)	A restricted air route of travel specified for use by friendly aircraft established for the purpose of preventing friendly aircraft from being fired upon by friendly forces. (JP 3-52)	AIRCOR procedures are used to route aviation combat elements between such areas as forward arming and refueling points, holding areas, and battle positions. Altitudes of an AIRCOR do not exceed the coordinating altitude, if established.	If a coordinating altitude has been established, an AIRCOR is implemented by the using authority. If a coordinating altitude has not been established, an AIRCOR is established by the ACA at the request of the appropriate ground commander.
Low-Level Transit Route (LLTR)	A temporary corridor of defined dimensions established in the forward area to minimize risk to friendly aircraft from friendly air defenses or surface forces. (JP 3-52)	LLTRs are bi-directional routes through areas of forward-deployed friendly forces. LLTRs should avoid weapons-free zones and base defense zones. Coordinate with intelligence and use planning tools to ensure the route minimizes exposure to surface air defense threats.	ACM initiated by ADAM/BAE and or airspace elements. Established by the ACA. NATO often uses the LLTR.
Minimum-risk route (MRR)	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)	MRRs are used primarily for cross-forward line of own troops operations. Close air support aircraft usually do not use MRRs in the vicinity of the target area. MRRs are established based on known threats. Air defense weapons control status is normally “tight” in MRRs. (ATP 3-52.1)	ACM initiated by ADAM/BAE and or airspace elements. Established by the ACA.
Standard use Army aircraft flight route (SAAFR)	Route established below the coordination level to facilitate the movement of Army aviation assets. It is normally located in the corps through brigade rear areas of operation and do not require approval by the airspace control authority. (JP 3-52)	SAAFRs are generally used by Army aircraft for administrative and logistic purposes. If a coordination level is established, the using authority implements them. If a coordination level has not been established, the airspace control authority establishes it at the ground commander’s request. (ATP 3-52.1)	ACM initiated by ADAM/BAE and or airspace elements. Established by the ACA if above the CL, does not require ACA approval if established below an existing CL.

Table B-2. Airspace coordinating measures(Air Corridor(AIRCOR)) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Special corridor (SC)	An air corridor used to accommodate the special routing requirements of specific missions. (JP 3-52)	Requests for activation of SCs are to be submitted to the airspace control authority. Activated SCs will be published in the ACO. Promulgation of such corridors should include: route designators or easily identified references, vertical and horizontal dimensions activation period(s) and users where applicable. (JP 3-52) SCs are often used for special operations aircraft.	ACM initiated by ADAM/BAE, airspace elements or AMD cell. Established by the ACA.
Transit corridor (TC)	A bi-directional corridor established in the rear area and normally is not provided air traffic services. (ATP 3-52.1)	TCs are established to route aircraft through air defenses in the rear, where appropriate. (ATP 3-52.1)	ACM initiated by ADAM/BAE and or airspace elements. Established by the ACA.
Temporary minimum risk route (TMRR)	A temporary route established to route air traffic between transit routes or the rear boundary of the forward area and their operations area in direct support of ground operations. (JP 3-52)	Coordination is necessary between airspace elements and CRC/AWACS or ASOC/TACP. (JP 3-52)	ACM initiated by ADAM/BAE and or airspace elements. Established by the ACA.
Transit route (TR)	A temporary air corridor of defined dimensions established in the forward area to minimize the risks to friendly aircraft from friendly air defenses or surface forces. (JP 3-52)	Consider the overall master air attack plan, air tasking order, and ACO to ensure most efficient routes are used and consider timing, altitude, and horizontal integration and deconfliction. (ATP 3-52.1)	ACM initiated by ADAM/BAE and or airspace elements. Established by the ACA.

Legend

ACA	airspace control authority	ATP	Army Techniques Publication
ACM	airspace coordinating measure	CL	coordinating level
ACO	airspace control order	CRC	control and reporting center
ADAM/BAE	air defense airspace management/brigade aviation element	JP	joint publication
AMD	air and missile defense	NATO	North Atlantic Treaty Organization
ASOC	air support operations center	TACP	tactical air control party

Table B-3. Airspace coordinating measure (ACM) (Stand Alone)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Coordinating altitude (CA)	An airspace coordinating measure that uses altitude to separate users and defines the transition between airspace control elements. A coordinating altitude allows the airspace control authority or airspace control entity to assign a volume of airspace to another control organization. (a) This delegation occurs as a result of a request from supported commanders to control airspace over their area of operations (AO). (b) In recent operations this delegation commonly occurred when the airspace control authority assigned airspace control authority to a ground commander's airspace control element below the coordinating altitude. (c) Maritime commanders may choose to use a coordinating altitude over a maritime AO. (d) Once the airspace is assigned, the requesting commander is responsible for controlling all airspace users and deconflicting fires within the assigned volume of airspace, according to the JFC's airspace control plan and ACO. (ATP 3-52.1)	Commanders should consider the following when establishing a coordinating altitude: (a) The commander's airspace control elements must be capable of controlling all airspace users (including nonmilitary users) within their assigned volume of airspace. (b) Airspace control below the coordinating altitude is conducted according the airspace control plan and the ACO. (c) The coordinating altitude should be measured in mean sea level (MSL) and balance the altitude needed to conduct airspace control and joint fires employment over a supported commander's AO. (d) Differences in airspace control capability will allow some units to control more airspace than others. Therefore, the coordinating altitude may not be the same across the JFC's joint operations area. (e) Normally, there will not be a coordinating altitude beyond a fire support coordination line (FSCL) or inside an active kill box. (f) The commander should build transition airspace or control points above or below the coordinating altitude to facilitate aircraft transition between the different controlling entities. (ATP 3-52.1) (g) Consideration for the height of the CA depends on a number of factors both JFLCC and JFACC. - Max Ordinance altitude of key fires systems. These can be put in bands: mortars, low angle cannon artillery, high angle cannon artillery and rockets/missiles - Operating altitude of UAS. This can be looked at in bands: Small UAS – Raven, Tactical UAS – Shadow, Large UAS – Gray Eagle. - CAS. Does the supporting ASOC want CAS ACMs below or above the CA? - Air Defense. A significant counter air threat in the AO will result in a lower CA in order to provide vertical maneuver room for the control of defensive counter air. Location of the CA should not affect Army fires for air defense as beyond line of sight systems will be linked to the joint kill chain and decentralized line of sight systems will follow weapons control status and rules of engagement procedures; the CA does not affect those procedures. [***Note:*** this is a new definition. Currently this ACM cannot be implemented in digital systems. The definition of CA does not contain boundaries. Those must be provided either by text or by the use of unit boundaries.]	ACM initiated by division, corps or theater army airspace element. Normally, as part of the process of establishing division assigned airspace. Established by the airspace control authority. The Marine Corps uses the Marine air command and control system (MACCS) to deconflict within its assigned airspace and does not use coordinating altitude to segregate aircraft.

Table B-3. Airspace coordinating measure (ACM) (Stand Alone) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Coordination level (CL)	A procedural method to separate fixed- and rotary-wing aircraft by determining an altitude below which fixed-wing aircraft normally will not fly. Prior to transitioning through the coordination level, the aircraft should coordinate with the appropriate command and control (C2) agency listed in the airspace control plan or ACO. A coordination level allows airspace planners to deconflict low-level routes for rotary-wing aircraft and certain unmanned aircraft systems (UAS). (ATP 3-52.1)	Commanders should consider the following when establishing a coordination level. (a) The coordination level is requested and initiated by component airspace elements and approved by the airspace control authority for inclusion in the airspace control plan and ACO. (b) The coordination level can be used for procedural separation of fixed- and rotary-wing aircraft, with or without a coordinating altitude. (c) The coordination level is measured in altitude above ground level (AGL)	ACM initiated by ADAM/BAE, JAGIC, and or airspace element. Established by the airspace control authority. The Marine Corps uses the MACCS to deconflict within its assigned airspace and does not use coordination level to segregate fixed and rotary winged aircraft.

Table B-3. Airspace coordinating measure (ACM) (Stand Alone) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
High-density airspace control zone (HIDACZ)	Airspace in which there is a concentrated employment of numerous and varied airspace users. A HIDACZ has defined dimensions, which usually coincide with geographical features or navigational aids. HIDACZ access is normally controlled by the maneuver commander. The maneuver commander can also direct a more restrictive weapons status within the HIDACZ than the weapons status outside the HIDACZ. (ATP 3-52.1) (NATO)Airspace of defined dimensions, designated by the airspace control authority, in which there is a concentrated employment of numerous and varied weapons/airspace users. (AAP-06)	A HIDACZ allows ground and Marine air-ground task force commanders and the Navy tactical air control center to restrict a volume of airspace from users not involved with ongoing operations. The operational commander nominates the HIDACZ in accordance with the airspace control plan. It restricts airspace use because of the large volume and density of fires supporting ground operations within the described geographic area. The volume of air traffic demands careful coordination to limit the potential conflict among aircraft needed for mission-essential operations within the HIDACZ and other airspace users. When establishing a HIDACZ, consider the following: (a) Minimum-risk routes into and out of the HIDACZ and to the target area. (b) Air traffic advisory as required. (c) Air traffic control service during instrument meteorological conditions. (d) Procedures for expeditious movement of aircraft into and out of the HIDACZ. (e) Coordinating fire support and air defense weapons control orders or status within and in the vicinity of the HIDACZ. (f) Enemy forces' locations inside and in close proximity to the HIDACZ. A HIDACZ has a single command authority with communications with all airspace users. Inability to communicate with the command authority or designated C2 agency prevents entry into HIDACZ. The HIDACZ command authority controls all airspace users (including fires) within the HIDACZ using positive, procedural, or a combination of controls (ATP 3-52.1)	ACM initiated by ADAM/BAE or airspace element. Established by the ACA.
No fly area (NOFLY)	Airspace of specific dimensions set aside for a specific purpose in which no aircraft operations are permitted, except as authorized by the appropriate commander and controlling agency. (JP 3-52)	Planners should verify operational requirements and the appropriate airspace volume size and shape prior to establishing a NOFLY. (ATP 3-52.1)	ACM initiated by ADAM/BAE and or airspace element. Established by the ACA.

Table B-3. Airspace coordinating measure (ACM) (Stand Alone) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*

Legend

AAP	allied administrative publication	C2	command and control
ACM	airspace coordinating measure	KILLBOX	kill box
ADAM/BAE	air defense airspace management/brigade aviation element	JAGIC	joint air ground integration center
		JFACC	Joint Force Air Component Commander
AGL	above ground level	JFLCC	Joint Force Land Component Commander
AO	area of operations	JP	joint publication
ASOC	air support operations center	MACCS	Marine air command and control system
ATP	army techniques publication	MSL	mean sea level
CA	coordinating altitude	NATO	North Atlantic Treaty Organization
CAS	close air support	UAS	unmanned aircraft system

Table B-4. Airspace coordinating measure (Restricted Operations Zone (ROZ))

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Air-to-air refueling area (AAR)	Airspace of defined dimensions set aside for aerial refueling operations. (ATP 3-52.1)	AAR tracks are typically set up in a racetrack configuration. Consider using long, straight legs with sufficient altitude to stack tankers and receivers. Coordinate with mission planners to ensure locations, orientations, and altitudes meet the user's needs. Depending on the tactical situation, planners should consider creating contingency AAR ROZs, in case it becomes necessary to retrograde the refueling asset	
Airborne command and control area (ABC)	Airspace of defined dimensions established specifically for aircraft conducting battlefield command and control. A United States Marine Corps airborne C2 aircraft or a Joint Surveillance Target Attack Radar System E-8 aircraft could use an ABC ROZ. (ATP 3-52.1)	Depending on the tactical situation, planners should consider creating contingency ABC ROZs, in case it becomes necessary to retrograde the C2 asset. This type of planning increases flexibility and reduces real-time airspace coordination requirements during mission execution. (ATP 3-52.1)	Established by the ACA.
Airborne early warning area (AEW)	Airspace of defined dimensions established for airborne platforms conducting airborne early warning missions. Generally, it is designed for aircraft such as the Airborne Warning and Control System (AWACS) and E-2C.	Airspace planners should coordinate with mission planners to ensure locations, orientations, and altitudes meet the user's needs. Depending on the tactical situation, planners should consider creating contingency AEW ROZs, in case it becomes necessary to retrograde the asset.	Established by the ACA.
Combat air patrol (CAP)	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 3-01)	Established as part of a fighter or joint engagement zone planning for defensive counterair operations. Depending on the tactical situation, planners should consider creating contingency CAP ROZs in case it becomes necessary to respond to enemy maneuver.	Established by the ACA.

Table B-4. Airspace coordinating measure (Restricted Operations Zone (ROZ)) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Close air support (CAS)	Airspace designated for holding orbits and used by rotary- and fixed-wing aircraft in proximity to friendly forces. (ATP 3-52.1)	Requires detailed integration of each air mission with the fire and movement of supported ground forces. Consider the appropriate ROZ size based on the type of aircraft capabilities (i.e., speed, turn radius, and targeting systems) and altitude limits based on other airspace requirements.	ACM initiated by ADAM/BAE and or airspace element. Established by the ACA. The United States Maine Corps does not typically use the CAS ROZ. The Marine Corps prefers to use the MACCS to procedurally deconflict and integrate airspace users with CAS aircraft using CAS holding areas or CAS stack techniques.
Drop zone (DZ)	A specific area upon which airborne troops, equipment, or supplies are airdropped. (JP 3-17)	Planners should plan locations to meet all tactical mission objectives (ATP 3-52-1).	ACM initiated by ADAM/BAE and or airspace element. Established by the ACA.
Electronic combat (EC)	Airspace established specifically for aircraft engaging in electronic combat. (JP 3-52)	Planners should coordinate with the operational lead to verify the type of EC mission, airspace size requirements, and potential effects on other coordination measures.	Established by the ACA.
Landing zone (LZ)	Any specified zone used for the landing of aircraft. (JP 3-17)	Coordinate size and suitability (such as surface conditions) prior to selecting locations. Altitudes will be in reference to AGL.	ACM initiated by ADAM/BAE and or airspace element. Established by the ACA.
Pickup zone (PZ)	A specified zone used for landing aircraft to pick-up troops, equipment, or supplies. (ATP 3-52.1)	Planners should evaluate the PZ size and suitability (such as surface conditions) prior to selecting the location. Altitudes will be in reference to AGL.	ACM initiated by ADAM/BAE and or airspace element. Established by the ACA.

Table B-4. Airspace coordinating measure (Restricted Operations Zone (ROZ)) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Reconnaissance area (RECCE)	Airspace established specifically for aircraft conducting reconnaissance. (JP 3-52)	Planners should consider size and optimal sensor altitudes prior to selecting locations. (ATP 3-52.1)	Established by the ACA. Although UAS can perform reconnaissance, this ROZ usage is designed for manned aircraft performing airborne reconnaissance.
Special operations forces (SOF)	Airspace of defined dimensions, potentially covering the entire area of a joint special operations area and created specifically for SOF missions. It can be of any shape. (ATP 3-52.1)	A special operations forces airspace volume may be limited in size to accommodate a discrete direct action mission or extensive enough to allow a continuing broad range of SOF operations.	ACM initiated by SOF units. Established by the ACA.
Surface-to-surface munition (SSM)	Airspace of defined dimensions established specifically for surface-to-surface munitions route of flight and launch and impact points. (ATP 3 52.1)	Planners should consider the required size and dimensions when integrating with joint fires. The SSM ROZ is not required to deconflict and integrate fires. It is only a procedural control deconfliction and integration technique. It is best used to restrict aircraft from flying directly over firing surface-to-surface fires batteries.	ACM initiated by ADAM/BAE and or airspace element. Established by the ACA.
Surface-to-surface missile system (SSMS)	Air Airspace of defined dimensions established specifically for surface-to-surface munitions route of flight and launch and impact points. (ATP 3 52.1) space of defined dimensions designed specifically ATACMS, GMLRS, and Tomahawk land-attack missile launch point, route of flight and impact points. (ATP 3-52.1)	Planners should establish standard SSMS ROZ dimensions or templates for planning. A SSMS ROZ is used for Patriot firing positions. (ATP 3-52.1)	ACM initiated by ADAM/BAE and or airspace element. Established by the ACA.
Unmanned aircraft area (UA)	Airspace of defined dimensions created specifically for UAS operations. Generally, this airspace defines where UAS operations are conducted, and does not include en route airspace. (ATP 3-52.1)	Planners should request sufficient airspace to facilitate the unique platform requirements (i.e., sensor and turn radius requirements). Integrate and coordinate with manned assets for optimal use of airspace.	ACM initiated by ADAM/BAE and or airspace element. Established by the ACA.

Table B-4. Airspace coordinating measure (Restricted Operations Zone (ROZ)) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Legend			
ACA	airspace control authority	C2	command and control
ACM	airspace coordinating measure	CAS	close air support
ADAM/BAE	air defense airspace management/brigade aviation element	GMLRS	Guided Multiple Launch Rocket System
		MACCS	Marine air command and control system
AGL	above ground level	JP	Joint publication
ATACMS	Army Tactical Missile System	ROZ	restricted operations zone
ATP	Army techniques publication	UAS	unmanned aircraft system
AWACS	Airborne Warning And Control System		

Table B-5. Fire Support Coordination Measure (FSCM)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Airspace coordination area (ACA)	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 3-09.3)	An ACA is used primarily in close air support situations for high volume fire. Friendly aircraft are reasonably free from friendly surface fires, with artillery, helicopters, and fixed-winged aircraft given specific lateral or vertical airspace within which to operate. Timely implementation of the area depends on the ground situation. Burden of deconfliction rests with the ground commander. It is established by the appropriate ground commander. (JP 3-52) Requires coordination between airspace elements and the fires cell. Informal ACAs can be established (digitally or none digitally) at unit level for near-real-time protection of aircraft.	FSCM initiated by fires cell and or airspace element after coordination with the fires cell. Established by the ground commander.
Coordinated fire line (CFL)	A line beyond which conventional surface to surface direct fire and indirect fire support means may fire at any time within the boundaries of the establishing headquarters without additional coordination. (JP 3-09) A line beyond which conventional or improved indirect fire means, such as mortars, field artillery, and naval surface fire may fire without additional coordination. (AJP-3.3.5)	A CFL is a permissive measure. The purpose of the CFL is to expedite the surface-to-surface engagement of targets beyond the CFL without coordination with the land commander in whose area of operations the targets are located.	Refer to JP 3-09 for additional details.

Table B-5. Fire Support Coordination Measure (FSCM) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Free-fire area (FFA)	A specific area into which any weapon system may fire without additional coordination with the establishing headquarters. (JP 3-09)	A FFA is a permissive measure. It is used to expedite joint fires and to facilitate the jettisoning of aircraft munitions.	FSCM initiated by the fires cell. Established by division of higher commander with responsibility for the area of operations the FFA is in.
Fire support coordination line (FSCL)	A fire support coordination measure established by the land or amphibious force commander to support common objectives within an area of operations; beyond which all fires must be coordinated with affected commanders prior to engagement, and short of the line, all fires must be coordinated with the establishing commander prior to engagement. (JP 3-09)	A FSCL is established and adjusted by appropriate land or amphibious force commanders within their boundaries in consultation with superior, subordinate, supporting, and affected commanders. FSCL use is oriented to air-land operations and is normally located only on land. However, in certain situations, such as littoral areas, it may affect both land and sea areas. Changes to the FSCL require notification of all affected forces within the area of operations and must allow sufficient time for these forces or components to incorporate the change. Whenever possible, restrictive measures are employed by commanders to enhance the protection of friendly forces operating beyond the FSCL. Forces attacking targets beyond the FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid friendly fire incidents. Coordination of attacks beyond the FSCL is especially critical to commanders of air, land, and special operations forces operating beyond the FSCL. 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 friendly fire incidents and waste resources. Supporting elements attacking targets beyond the FSCL must ensure the attack will not produce effects on or to the rear of the FSCL. Short of a FSCL, all air-to-ground and surface-to-surface attack operations are controlled by the appropriate land or amphibious force commander.	FSCM initiated by the fires cell. Established by land component commander. [***Note:*** In the context of this definition the term “surface targets” applies to those in littoral or inland waters within the designated area of operations. (AAP-6) Boundary used to coordinate fires of air, ground, or sea weapon systems against surface targets. (AJP-3.3.5)] ***NOTE***: BCD may task the establishing HQs to send the FSCL as both an FSCM and as an ACM. The airspace element can convert the FSCM to an ACM.

Table B-5. Fire Support Coordination Measure (FSCM) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Kill box (KILLBX)	A three-dimensional permissive fire support coordination measure with an associated airspace coordination measure used to facilitate the integration of joint fires. (JP 3-09)	The primary purpose of a kill box is to allow lethal attack against surface targets without further coordination with the establishing commander and without terminal attack control. When used to integrate air-to-surface and surface-to-surface indirect fires, the kill box will have appropriate restrictions.	FSCM initiated by fires cell. Established by the ACA.
No-fire area (NFA)	An area designated by the appropriate commander into which fires or their effects are prohibited. (JP 3-09.3).	Use to prohibit joint fires or their effects into an area. There are two exceptions: (a) When the establishing headquarters approves joint fires within the NFA on a mission-by-mission basis. (b) When an enemy force within the NFA engages a friendly force and the engaged commander determines there is a requirement for immediate protection and responds with the minimal force needed to defend the force.	FSCM initiated by fires cell. Established by the airspace control authority.
Restrictive fire area (RFA)	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. (JP 3-09).	The purpose of an RFA is to regulate joint fires into an area according to the stated restrictions set by the establishing headquarters.	FSCM initiated by fires cell. Established by the land commander who is responsible for the area of operations in which the RFA will be located.
Restrictive fire line (RFL)	A line established between converging friendly surface forces that prohibits fires or their effects across that line. (JP 3-09).	The purpose of an RFL is to prevent friendly fire incidents and duplication of engagements by converging friendly forces.	FSCM initiated by fires cell. Established by the land commander common to the converging forces.

Legend

AAP allied administrative publication
ACA airspace control authority
ACM airspace coordinating measure
ADAM/BAE air defense airspace management/brigade aviation element
AJP allied joint publication
FSCM fire support coordination measure

Table B-6. Maneuver Control Measures (MAN)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Boundary (BNDRY)	A line that delineates surface areas for the purpose of facilitating coordination and deconfliction of operations between adjacent units, formations, or areas. (JP 3-0) In land warfare, a line by which areas of responsibility between adjacent units and/or formations are defined. (AAP-6)	Army airspace users will coordinate with BCTs and brigades when crossing into a BCT or brigade boundary. Division boundaries (along with the fire support coordination line, if established) may also be used by the airspace control authority to designate the lateral dimensions of division assigned airspace. (See the discussion for coordinating altitude earlier in this appendix for information on the upper boundary for division assigned airspace).	Established by the JFC or land component commander BCT and higher airspace elements should include boundaries in their unit airspace plan. The boundaries within the unit airspace plan, should be adjusted as changes to boundaries are directed. Division and higher airspace control elements when integrating the unit airspace plan will send forward only those boundaries as directed by their higher headquarters' airspace control appendix. The airspace control SOP should specify what altitude should be used for boundaries. Care must be taken to carefully review and ensure submitted boundaries do not cause unintended conflicts to responsive fires.
Forward Line of Own Troops (FLOT)	A line that indicates the most forward positions of friendly forces during linear operations at a specific time. (JP 3-52)	The FLOT normally includes the forward location of covering screening forces. The zone between the FLOT and fire support coordination line is typically the area over which friendly ground forces intend to maneuver in the near future and is also the area where joint air interdiction operations are normally executed through the air support operations center or direct air support center.	

Table B-6. Maneuver Control Measures (MAN) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Joint Operations Area (JOA)	An area of land, sea, and airspace, defined by a geographic combatant commander or subordinate unified commander, in which a joint force commander (usually a joint task force commander) conducts military operations to accomplish a specific mission. (JP 3-52)		
Phase Line (PL)	A line utilized for control and coordination of military operations, usually an easily identified feature in the operational area. (JP 3-52)		

Legend

ACM	airspace coordinating measure	JFC	joint force commander
AAP	allied administrative publication	JP	joint publication
BCT	brigade combat team		

Table B-7. Air reference measures (AIRREF)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Air control point (ACP)	A point that is defined and used for navigation, command and control, and communication. (JP 3-52)	Most common Army reference point. May be used to dynamically build routes for participating aircraft. Unmanned aircraft system routing is normally accomplished through existing air control points. (JP 3-52)	ACM initiated by ADAM/BAE and or airspace element. Established by the ACA.
Bulls-eye (BULL)	An established reference point from which the position of an object can be referenced. (JP 3-52)	The BULL reference system is normally used during counterair engagements for situational awareness on targeted and untargeted airborne threats and for other coordination. Normally, theaters will only establish a few BULL reference points to ensure effectiveness. BULLs are not meant to provide detailed target guidance, but general reference information. Standard JFACC reference. Airspace elements should note location as JFACC controllers and aircraft will commonly use BULL as a reference point.	Established by the AADC.

Table B-7. Air reference measures (AIRREF) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Buffer zone (BZ)	Airspace designed specifically to provide a buffer between various airspace coordinating measures. (JP 3-52)		Established by the ACA.
Contact point (CP)	In air operations, the position at which a mission leader makes radio contact with an air control agency. (JP 3-09.3)		Established by the ACA.
Identification, Friend or Foe Switch Off Line (IFFOFF)	The line demarking where friendly aircraft stop emitting an identification, friend or foe signal.		Established by the AADC.
Identification, Friend or Foe Switch On Line (IFFON)	The line demarking where friendly aircraft start emitting an IFF signal.		Established by the AADC.
Search and rescue point (SARDOT)	A predesignated specific location, relative to which isolated personnel provide their position to recovery forces. (JP 3-50)	SARDOTs, like bulls-eyes, are very few in number and provide general area reference for search and rescue operations. Established by the joint personnel recovery center.	ACM initiated by ADAM/BAE and or airspace element. Established by the joint personnel recovery center.

Legend

ACA	airspace control authority	IFF	Identification friend or foe
ACM	airspace coordinating measure	JFACC	joint force air component commander
AADC	area air defense commander	JP	joint publication
ADAM/BAE	air defense airspace management/brigade aviation element		

Table B-8. Air defense measures (ADMEAS)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Base defense zone (BDZ)	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)	A BDZ provides airspace users with location of the engagement zone for the air defense systems defending a base for planning purposes. (ATP 3-52.1) Primarily used for forward operating bases protected by counterfire systems.	ACM initiated by the AMD element. Established by the ACA.

Table B-8. Air defense measures (ADMEAS) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Coordinated air defense area (CADA)	A mutually defined block of airspace between land-based air commander and a naval commander when their forces are operating in close proximity to one another. (JP 3-52)		Established by the AADC. Refer to AJP-3.3.5
High-altitude missile engagement zone (HIMEZ)	Airspace of defined dimensions within which the responsibility for engagement of air threats normally rests with high-altitude surface-to-air missiles. (ATP 3-52.1)	Normally, HIMEZs are used when a high-altitude missile system has a clear operational advantage over aircraft in a particular zone. Advantages could include range, command and control, rules of engagement, or response time. Design of the HIMEZ is contingent upon specific weapon system capabilities. (ATP 3-52.1) A HIMEZ is a type of weapon engagement zone utilized in AMD operations.	ACM initiated by AMD element. Established by the AADC.
Joint engagement zone (JEZ)	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)	JEZs depend on correct differentiation between friendly, neutral, and enemy aircraft. (ATP 3-52.1) A JEZ is a type of weapon engagement zone utilized in AMD operations.	ACM initiated by AMD element. Established by the AADC.
Low-altitude missile engagement zone (LOMEZ)	Airspace of defined dimensions within which the responsibility for air threat engagement normally rests with low-to-medium altitude surface-to-air missiles. (ATP 3-52.1)	A LOMEZ is a type of weapon engagement zone utilized in AMD operations	ACM initiated by AMD element. Established by the AADC.
Short-range air defense engagement zone (SHORADEZ)	Airspace of defined dimensions within which the responsibility for engaging air threats normally rests with short-range air defense weapons. It may be established within a low- or high-altitude missile engagement zone. (ATP 3-52.1)	A SHORADEZ is normally established for the local air defense of high-value assets. Commanders should plan to employ decentralized control of short-range, air defense weapons within the SHORADEZ. (ATP 3-52.1)	ACM initiated by AMD element. Established by the AADC.
Weapons free zone (WFZ)	An air defense zone established for the protection of key assets or facilities, other than air bases, where weapons systems may be fired at any target not positively recognized as friendly. (JP 3-52)	Normally, a WFZ is used for high-value asset defense in areas with limited command and control authority. The AADC declares the weapons free zone with the airspace control authority establishing the zone. (ATP 3-52.1)	ACM initiated by AMD element. Established by the ACA.

Table B-8. Air defense measures (ADMEAS) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Legend AADC area air defense commander ACA airspace control authority ACM airspace coordinating measure AJP allied joint publication AMD air and missile defense ATP Army techniques publication JP joint publication			

Table B-9. Marine defense measures (MARDEF)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Approach corridor (APPCOR)	Airspace established for the safe passage of land-based aircraft joining or departing a maritime force. (JP 3-52)	All Army aviation units should become and remain intimately aware of APPCORs and their associated procedures when operating with maritime forces. Used in Army helicopter operations that may include transporting patients to and from naval medical facilities, Army amphibious operations, special operations, personnel recovery operations, or logistic and administrative flights to naval assets.	Established by the ACA. ACM initiated by the Maritime Commander. Established by the ACA.
Legend ACA airspace control authority ACM airspace coordinating measure JP joint publication			

Table B-10. Air traffic control measures (ATC)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Alert area (ALERTA)	Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft. (ATP 3-52.1)		.

Table B-10. Air traffic control measures (ATC) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Airway (ARWY)	A control area or portion thereof established in the form of a corridor equipped with radio navigational aids. (JP 3-52)		Established by the ACA.
Conditional route (CDR)	A non-permanent air traffic service route or portion thereof that can be planned and used only under certain conditions. (JP 3-52)		ACM initiated by ATS elements. Established by the ACA.
Class-A airspace (CLSA)	Generally, airspace from 18,000 feet MSL up to and including flight level 600, including airspace overlying the waters within12 nautical miles of the contiguous states and Alaska. VFR operations are not permitted in Class A airspace. (JP 3-52)	This definition is based on classification of airspace within the United States. Airspace classification may vary by specific location. Airmen and airspace planners should refer to the appropriate FLIP and NOTAMs, for detailed information and international airspace requirements. (JP 3-52)	ACM initiated by ATS units. Established by the ACA.
Class-B airspace (CLSB)	Generally, airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of airport operations or passenger enplanements. ATC provides clearance into and separation between all aircraft inside Class B airspace. (ATP 3-52.1)	This definition is based on classification of airspace within the United States. Airspace classification may vary by exact location. Airmen and airspace planners should refer to the appropriate FLIP and NOTAMs, for detailed information and international airspace requirements. (JP3-52)	ACM initiated by ATS units. Established by the ACA.
Class-C airspace (CLSC)	Generally, airspace from the surface to 4,000 feet MSL above the airport elevation, surrounding airports with an operational control tower, serviced by radar approach control, and have a certain number of IFR operations or passenger enplanements. ATC provides separation between VFR and IFR inside Class C airspace. (ATP 3-52.1)	This definition is based on classification of airspace within the United States. Airspace classification may vary by exact location. Airmen and airspace planners should refer to the appropriate FLIP and NOTAMs, for detailed information and international airspace requirements. (JP 3-52)	ACM initiated by ATS units. Established by the ACA.

Table B-10. Air traffic control measures (ATC) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Class-D airspace (CLSD)	Generally, airspace from the surface to 2,500 feet MSL above the airport elevation, surrounding airports with an operational control tower. Class D airspace configurations are individually tailored. Normally, when instrument procedures are published, the airspace will normally be designated to contain the procedures. No aircraft separation services are provided to aircraft. (ATP 3-52.1)	This definition is based on classification of airspace within the United States. Airspace classification may vary by exact location. Airmen and airspace planners should refer to the appropriate FLIP and NOTAMs, for detailed information and international airspace requirements.	ACM initiated by ATS units. Established by the ACA.
Class-E airspace (CLSE)	Generally, if the airspace is not Classes A, B, C, or D, and it is controlled airspace, it is Class E airspace. (JP 3-52)	This definition is based on classification of airspace within the United States. Airspace classification may vary by exact location. Airmen and airspace planners should refer to the appropriate FLIP and NOTAMs for detailed information and international airspace requirements.	Established by the ACA.
Class-F airspace (CLSF)	ICAO airspace class in which IFR and VFR flights are permitted. All participating IFR flights receive an air traffic advisory service, and all flights receive flight information service if requested. Class F airspace is not used by the Federal Aviation Administration. (ATP 3-52.1)	Airspace classification may vary by exact location. Airmen and airspace planners should refer to the appropriate FLIP and NOTAMs for detailed information and international airspace requirements.	Established by the ACA.
Class-G airspace (CLSG)	Airspace not assigned as A, B, C, D, or E is uncontrolled airspace and is designated as Class G airspace. (JP 3-52)	This definition is based on classification of airspace within the United States. Airspace classification may vary by exact location. Airmen and airspace planners should refer to the appropriate FLIP and NOTAMs for detailed information and international airspace requirements.	Established by the ACA.

Table B-10. Air traffic control measures (ATC) (continued)

Usage Name/USMTF Abbreviation	*Joint Definition*	*Joint/Army Planning Considerations*	*Remarks*
Military operations area (MOA)	Airspace designated outside Class A airspace area to separate or segregate certain non-hazardous military aircraft from IFR traffic; and identify for VFR traffic, where military flight training flights are conducted. (ATP 3-52.1)		Established by the ACA.
Prohibited area (PROHIB)	A specified area within the land areas of a state or its internal waters, archipelagic waters, or territorial sea adjacent thereto over which the flight of aircraft is prohibited. The Federal Aviation Administration defines a prohibited area as airspace designated under 14 Code of Federal Regulations Part 73 within which no person may operate an aircraft without the permission of the using agency. (ATP 3-52.1)	May also refer to land or sea areas to which access is prohibited.	
Restricted area (RA)	A designated area, established by appropriate authority, over which flight of aircraft is restricted. (ATP 3-52.1)	RAs are shown on aeronautical charts, published in notices to airmen, and provided in publications of aids to air navigation.	

Legend

ACA	airspace control authority	ICAO	International civil aviation organization
ACM	airspace coordinating measure	IFR	instrument flight rules
ATC	air traffic control	JP	joint publication
ATP	Army techniques publication	MSL	mean sea level
ATS	air traffic service	NOTAM	notice to airmen
FAAO	Federal Aviation Administration Order	VFR	visual flight rules
FLIP	flight information publication		

Note: NATO ACMs per standardization agreement (STANAG) are slightly different. See AJP-3.3.5 for details on NATO ACMs.

COMMON REFERENCE SYSTEMS

B-6. Airspace element personnel work with several references systems such as military grid, latitude and longitude, area grid reference systems, and several altitude reference systems. For planning and immediate execution, these common reference systems require simple, widely distributed, and integrated platforms and weapons systems. Common reference systems are also a means to "digitize" operational environments and provide a two-dimensional construct from which three-dimensional control and coordination measures can be constructed at the operational level.

POINT REFERENCE SYSTEMS

B-7. Airspace element personnel use the World Geodetic System 1984, Military Grid Reference System, and geographic coordinates as point reference systems.

World Geodetic System 1984

B-8. The World Geodetic System 1984 (WGS 84) is the official Department of Defense positional reference system. The earth is an ellipsoid, not a sphere. It's flattened slightly at the poles and bulging somewhat at the equator. Datums are reference surfaces that consider the curvature of the earth for the mathematical creation of geodetic and cartographic data. Numerous datum exists. In unilateral and joint operations, U.S. military forces use the WGS 84 horizontal coordinates and height (height above ellipsoid) unless the commander determines that the use of other position reference systems (such as horizontal, vertical, or both datum) is mission critical. Universal use of the WGS 84 positional reference system (datum) eliminates confusion regarding which system to use in reporting positions.

Military Grid Reference System

B-9. The Military Grid Reference System (MGRS) is an alpha-numeric system for expressing Universal Transverse Mercator (UTM) universal polar stereographic coordinates. A single alpha-numeric value references an area unique for the entire earth. The number 15SWC8081751205 illustrates a MGRS coordinate. The first two characters represent the 6-degree wide UTM zone. The third character is a letter designating the band of latitude. The fourth and fifth characters are a pair of letters designating one of the 100,000-meter grid squares within the grid zone. The remaining characters consist of the numeric easting and northing values within the 100,000-meter grid square. Ten numeric characters equal a one meter refinement. Eight numeric characters equal a 10-meter refinement. Six numeric characters equal a 100 meter refinement. Four numeric characters equal a 1,000 meter refinement. The MGRS is the most commonly used point reference system by Soldiers.

Geographic Coordinates

B-10. The use of geographic coordinates as a system of reference is accepted worldwide. It is based on the expression of position by latitude (parallels) and longitude (meridians) in relation to the equator (north and south) and a prime meridian (east and west). The map scale and the accuracy requirements for plotting and scaling influence the degree of accuracy of a geographic reference. The U.S. military uses two formats to show location that sometimes leads to confusion for airspace element personnel. The Army generally expresses position in degrees, minutes (60 to a degree), and seconds (60 to a minute). An example of a geographic reference referenced to degrees, minutes, and seconds of latitude and longitude found in an operation order is: 40°21'12" N 132°14'18" E. Joint and civil aviation express geographic reference position using the sexagesimal system using degrees, minutes, and decimal minutes (DDMM.mmmm). The same location given in the previous example is found in air tasking order or ACO expressed as 40°21.2000 N 132°14.3000 E. Army digital airspace systems translate between methods automatically. For manual data entry into a digital system, the operator just needs to select the correct format. If an airspace Soldier needs to convert locations manually from one format to another, the conversion is simple. There is no change to the degrees or whole minutes, only the seconds or decimal portion of the decimal minute are converted. To convert seconds to decimal minutes divide the seconds by 60 (for example, 12/60=.2). The product is the

decimal. To convert from decimal minutes to seconds multiply the decimal portion by 60. The product is the seconds (for example, .2 X 60= 12).

AREA REFERENCE SYSTEMS

B-11. Airspace element personnel use the Global Area Reference System and common geographic reference system as area reference systems.

Global Area Reference System

B-12. The Global Area Reference System (GARS) is the standardized area reference system across the Department of Defense. It is based on lines of longitude (long) and latitude (lat) to provide an integrated common frame of reference for joint force situational awareness to facilitate air-to-ground coordination, deconfliction, integration, and synchronization. This area reference system provides a common language between the components and simplifies communications. The point of origin for this system is 90 degrees south and 180 degrees east/west. The areas GARS describes coincide with even numbered WGS-84 degree and minute lines. GARS airspace is divided into cells, further divided into quadrants, and subdivided into keypads.

Common Geographic Reference System

B-13. The common geographic reference system (CGRS) is an early, theater specific system that may still be in use. CGRS uses a theater determined origin or starting point. CGRS airspace is divided into cells, further divided into nine keypads, and may be subdivided into quadrants.

B-14. Since GARS and CGRS use common terms (such as keypads and quadrants), a risk of confusion exists since these common terms have different meanings in the individual reference systems. For example, a GARS cell (~30nm x 30nm) is divided first into four quadrants (~15nm x 15nm) then into nine keypads (~5nm x 5nm), while a CGRS cell (~30nm x 30nm) is divided into nine keypads (~10nm x 10nm), which may be further subdivided into four quadrants (~5nm x 5nm). The risk in confusion is that a GARS keypad is ~5nm x 5nm while a CGRS keypad is ~10nm x 10nm.

ALTITUDE MEASURING SYSTEMS

B-15. Airspace element personnel use the mean sea level, above mean sea level, above ground level, height above ellipsoid, and flight level as altitude measuring systems.

Mean Sea Level

B-16. The MSL is determined by continuously measuring the rise and fall of the ocean at "tide gauge stations" on seacoasts for a period of about 19 years. This averages out the highs and lows of the tides caused by the changing effects of the gravitational forces from the sun and moon which produce the tides. The MSL then is defined as the zero elevation for a local or regional area. The MSL is elevation used for military maps, digital terrain elevation data (DTED) and by artillery airspace users. Some aircraft systems using Global Positioning System (GPS) data convert height above ellipsoid (see paragraph B-19) to MSL data before reporting.

Above Mean Sea Level

B-17. The above mean sea level (AMSL) refers to the elevation (on the ground) or altitude (in the air) of any object, relative to the average sea level datum. It is also used in aviation, where all heights are recorded and reported with respect to AMSL. Manned aircraft determine AMSL with a barometric altimeter corrected for local air pressure.

Above Ground Level

B-18. An altitude above ground level (AGL) is measured with respect to the underlying ground surface. AGL altitude varies constantly as the aircraft proceeds on course. Therefore, the only constant is the MSL. When

working in and around controlled airspace or providing traffic separation clearance enroute, airspace element personnel must consider that the AGL varies while the MSL does not. Manned aircraft determine AGL with a radar altimeter.

Height Above Ellipsoid

B-19. Sometimes referred to as Global Positioning System GPS altitude, height above ellipsoid (HAE) uses GPS for altitude data use. For global applications, the geodetic reference (datum) used for GPS is the WGS-84. When the HAE is used, the height above the ellipsoid differs from the MSL. Direct elevation readings for most locations can differ up to hundreds of feet. This variation is caused, in part, because the GPS definition of altitude does not refer to MSL, but rather to a gravitational surface called the reference ellipsoid. Some aircraft self-reporting systems (see Appendix C) report GPS altitude as an HAE altitude, but some systems convert the GPS altitude to an MSL altitude prior to reporting. Munitions maneuvering with GPS data generally use HAE.

B-20. Current digital systems use the USMTF standard for ACMs, and USMTF currently does not have an HAE option. Airspace personnel have to use MSL as a substitute. These personnel must know any significant differences between MSL, AMSL, AGL, and HAE for their AO and consider these differences when integrating airspace users.

Flight Level

B-21. A flight level (FL) is a standard nominal altitude of an aircraft in hundreds of feet (such as FL 250 is 25,000 feet). This altitude is calculated from an international standard datum pressure of 29.92 inches of mercury (inHg), the average sea-level pressure, and therefore is not necessarily the same as the aircraft's true altitude either above MSL or AGL. Airspace personnel normally use FL for flights above the transition altitude of 18,000 feet in the United States and Canada. The altitude that aircraft transition to FLs is called the transition altitude. Transition altitudes are local, regional, or national and vary considerably between about 3,000ft and 18,000ft. Regardless of altitude, Identification Friend Foe Mode C altitudes will be based on the standard datum pressure of 29.92 inHg.

Appendix C

Airspace Control Connectivity

This appendix discusses connectivity of airspace control systems. This appendix first discusses airspace control in a mission command system. Then it discusses equipment used for communications systems. The appendix then discusses networks and applications. It concludes with a discussion of airspace control in a degraded network environment.

AIRSPACE CONTROL IN A MISSION COMMAND SYSTEM

C-1. As a component of the mission command system, airspace control systems enable commanders to have a near-real-time situational awareness of airspace users, communicate information between airspace elements and airspace users, and execute airspace control of airspace users in near-real-time. The airspace control set of mission command systems consists of networks, applications that process air track data for situational awareness, and airspace control-related applications supporting the operations process. They include joint, Army, and civil networks; systems and applications; and airspace control-related applications. Joint, Army, and civil networks enable the rapid low-latent exchange of precise participant location and identification and communications with airspace users and control elements as well as communication of other mission command systems. These latter networks include the command post's mission command network (with external connectivity) and other networks (see paragraphs C-4 through C-23). Systems and applications receive aircraft location data from a variety of sources such as sensors (radar for example) and self-reporting systems (blue force tracking for example). These systems combine the air track data and pass data to mission command systems for display on visual displays and for use in airspace control running estimates. Airspace control-related applications use data for integrating airspace use, to include manned and unmanned aviation, as well as offensive and defensive fires.

COMMUNICATIONS SYSTEMS

C-2. All echelons, brigade and higher, contain airspace elements equipped with a full suite of airspace information systems and line-of-sight, beyond-line-of-sight, and tactical satellite communications systems. These systems provide access to integrated terrestrial, aerial, and spaced-based networks. These communications systems enable horizontal and vertical connectivity with airspace users, airspace elements, the battlefield coordination detachment, and theater air-ground system airspace control nodes. These nodes include the theater air control system, control and reporting center, Airborne Warning and Control System, air support operations center, tactical air control parties, tactical air command center or tactical air direction center, tactical air operations center, and direct air support center. Communications systems enable airspace elements to collectively perform the full range of their functions to identify, coordinate, integrate, and control Army airspace users as well as unified action partner airspace users, when appropriate, in the low to medium altitudes over their assigned area of operations.

C-3. Airspace users at different echelons use different communications systems. Divisions and corps have two communications systems that work together to support airspace control. The AMD element has a TSQ-253 air defense airspace management shelter. This shelter provides the integrated air picture for the unit and the airspace element while providing the airspace element its AMD applications. The airspace element uses the TSQ-221 Tactical Airspace Integration System (TAIS) shelter. This shelter provides the airspace element personnel with TAIS workstations as well as a wide range of digital and voice communications with joint, Army, and civil airspace users. It also provides a backup air picture capability for the AMD TSQ-253 shelter. At the brigade level, the air defense airspace management/brigade aviation element (ADAM/BAE) primary system is the TSQ-253. This shelter provides a similar air picture and AMD capabilities resident at division level but has only one TAIS workstation and fewer ground-to-air radios.

NETWORKS

C-4. The SIPRNET resident in command posts (CPs) provides connectivity to other mission command systems to include the CP server. The CP has connectivity to other airspace elements through high bandwidth multichannel tactical satellite. Through these networks, the airspace control applications connect to the CP server, publish airspace data, and subscribe to data from other mission command systems.

DATA DISSEMINATION SERVICES AND PUBLISH AND SUBSCRIBE SERVICES

C-5. Both the AMD workstation and TAIS publish and subscribe data from the CP server. Data dissemination services (known as DDS) is the currently fielded capability that goes beyond the publish and subscribe services (PASS) capabilities. As a federated service, data dissemination services are designed for global data dissemination. It replaces publish and subscribe services at all echelons, from battalion and above. It permits Department of Defense and joint interoperability beyond the current point-to-point interface. Data dissemination services afford discovery across the network, enable "many-to-many" exchanges, and supply a means to share information that is useful for any community of interest. With data dissemination services, the network exchange potential dramatically improves enabling exchanges typical in a net-centric data environment. Data dissemination services thus permit interoperable data exchanges to evolve from an intra-CP to an inter-CP, echelon, Service, and nation a reality. This ensures data is visible, available, and usable when and where needed to accelerate the decisionmaking process.

MULTI-TACTICAL DATA LINK NETWORKS

C-6. ADAM/BAE operators configure and integrate numerous data link networks. Key networks include tactical digital information link J (Link 16), tactical digital information link B (Link 11B), Intra-forward area air defense (FAAD) Network (IFN), situational awareness data link, exploitation support data, cursor on target, and radar element subsystem.

Link 16

C-7. Link 16 is a secure, jam-resistant, high-capacity, and nodeless tactical digital information link or TADIL and formerly known as TADIL-J. This link utilizes the joint tactical information distribution system, multifunctional information distribution system terminal, and its multiple access architecture for multi-netted communications. ADAM/BAE operators convey the information exchanged on this link in the J-series messages, which conform to the operational specifications contained in military standard (MIL-STD)-6016 series.

Link 11B

C-8. Link 11B is a tactical digital data link protocol, formerly known as tactical data link B, specified by MIL-STD-6011, for point-to-point communication over landline between two units. Known as M-series messages, the messages over Link 11B, adhere to the Link 11 message standard.

IntraFAAD Network

C-9. The IFN is more commonly referred to as the FAAD. Paragraph C-23 discusses FAAD in detail.

Situational Awareness Data Link

C-10. ADAM personnel use an enhanced position location reporting system radio and air defense system integrator. Situational awareness data link (known as SADL) gives non-Link-16 aircraft the ability to pass their location to Link-16 aircraft via the Link-16 gateway. Link-16 gateways have a situational awareness data link radio located with them which allows aircraft with Link-16 and situational awareness data link to see one another digitally. The situational awareness data link is the only system that fully integrates with the Army's enhanced position location reporting system network.

Exploitation Support Data

C-11. ADAM/BAE personnel use exploitation support data within the air defense system integrator to communicate with the Shadow's ground control unit for flight following. ADAM/BAE personnel use this capability when radar coverage is minimal or nonexistent to populate the Shadow's position and pass the ground control unit's location to joint and coalition forces flying or monitoring Link-16.

Cursor on Target

C-12. Cursor on target enables different communities across the Services to share vital information in near-real time. Near-real time pertains to the timeliness of data or information which has been delayed by the time required for electronic communication and automatic data processing, furthermore, near-real time implies that there are no significant delays. Cursor on target leverages the widespread extensible markup language and defines a common extensible message format for communicating key targeting information (what, when, and where). Small unmanned aircraft system operators connected to the SIPRNET can inject their what, when, and where into the common tactical picture. The FAAD and air defense system integrator are the primary data systems within the ADAM/BAE to exploit this capability.

Radar Element Subsystem

C-13. Radar element subsystem enables transmission control protocol/internet protocol capability for sensor connectivity to the ADAM's forward area air defense. The radar element subsystem allows counterfire (firefinder, lightweight countermortar, and sentinel) radar data to be shared on a network for an exploitation with a mission command system.

SELF-REPORTING TRACKING TECHNOLOGIES

C-14. Self-reporting tracking technologies are increasingly being integrated into aerial systems (manned, unmanned, cruise missiles, and precision munitions for example). When coupled with networked data systems (discussed in paragraphs C-5 through C-13), these technologies provide an accurate and complete low level air picture, rapid decisionmaking, and a significant improvement in an airspace elements' ability to integrate airspace users in near-real-time.

Blue Force Tracking–Air

C-15. The blue force tracking (BFT) network (BFT-A/2) provides self-reporting aircraft position, velocity, and mission parameters in a joint variable message format transmitted to ground control centers via an L-Band satellite. Control centers accumulate these reports and redistribute them via satellite to all BFT transceivers coded for the operation. Control centers also distribute the reports via the SIPRNET to make this information available to support various missions. However, aircraft reporting and control center reporting rules can induce tens of seconds, and in some cases several minutes, delay in the aircraft reported position data being received at a transceiver and displayed to the user. Such a delay limits the BFT's use in increasing situational awareness.

Automatic Dependent Surveillance–Broadcast

C-16. Automatic dependent surveillance-broadcast (ADS-B) is the basis for a revolution in worldwide civil air traffic control. ADS-B is one of a series of innovations that the federal aviation administration refers to as NextGen technologies in the national airspace. ADS-B establishes an air traffic surveillance structure that migrates from reliance on radars and interrogators to aircraft equipped with transceivers that transmit self-reported precise GPS position, velocity, and identification information every second.

C-17. There are two ADS-B data links planned for the national airspace system: Mode S extended squitter and universal access transceiver. All aircraft that fly above 18,000 feet worldwide use the Mode S extended squitter. Military aircraft use ADS-B Mode S extended squitter data link transmitted from military transponders. The universal access transceiver is used by general aviation within the national airspace system.

Mark XIIA Capabilities

C-18. Mark XIIA, provides identification, friend or IFF encrypted waveform messaging. It extends the current triggered, transponder technology into the uplink and downlink encrypted messaging (Mode 5) technologies. It also provides an unencrypted Mode S capability to augment the encrypted messaging capabilities to permit operations within the evolving national and international air traffic control systems of the future. Mode 5 is a line of sight capability that reliably populates the air picture with properly equipped friendly (blue) aircraft to altitudes as low as the surface of the earth. Aircraft using Mark XIIA Mode 5 Level 2 (M5L2), with embedded global positioning system and inertial navigation system, respond to interrogations from a ground-based or airborne system or automatically report (squitter) to the same, with data formats that include aircraft identification, position and altitude data. Mode 5 ID data should align with ATO planning per the "Mark XIIA Mode 5 and Mode Select (Mode S) Joint Concept of Operations (Joint CONOPS)" dated 4 November 2011.

C-19. Mode 5 Level 1(M5L1) and M5L2 not only reply to interrogations but also provide important multi-ship discrimination capabilities (M51) and identification information and position data (M5L 2). M5L 2 also provides the capability to report encrypted identification, position, altitude, and other information without prompting by interrogation. Mode 5 equipped aircraft can employ the following varying capabilities:

- M5L1 equipped: M5L1 replies to M5L1 interrogation format (no position data).
- M5L1 equipped: Reply to a M5L1 Lethal interrogation format, even if the transponder is set to STBY (no ID or position data). A Lethal report is only sent if the interrogator sends a lethal interrogation. Friendly air defense systems perform lethal interrogations as a final Combat Identification measure before engaging.
- M5L2 equipped and selected: M5L2 reports to M5L2 interrogation format and M5L1 replies to M5L1 interrogation format.
- M5L2 and "Squitter ON" equipped and selected: High resolution M5L2 report format is transmitted approximately every half second (interrupted only for M5L1 interrogations and lethal interrogations.). M5L2 Squitter ON is the default position.
- M5L2 equipped and selected: Reply to a M5L2 Lethal interrogation (includes ID and 3D position data), or M5L1 Lethal interrogation format even if the transponder is set to standby.

Air Situational Awareness Systems

C-20. ADAM/BAE operators configure and integrate numerous air situational awareness systems.

Air Defense System Integrator

C-21. The air defense system integrator provides brigades with direct near-real-time access to tactical and strategic communications, tactical data information links, and intelligence networks such the joint planning network, joint data network, and the integrated broadcast service. The air defense system integrator receives line-of-sight and beyond-line-of-sight data from—

- Multifunctional information distribution system low volume terminal-2 for radio frequency Link 16.
- Transmission control protocol/internet protocol, serial, and landline for MIL-STD-3011 A, B, and C joint range extension applications protocols.
- Wideband tactical radio for satellite tactical data Link 16.
- Enhanced position location reporting system for situational awareness data link to provide situation awareness for non-Link 16 capable platforms.

C-22. The air defense system integrator receives, processes, correlates, fuses, and displays up to 2,000 precise participant location and identification tracks from multiple tactical data link and intelligence sources. These tracks include the Link 16 direct and indirect (forwarding) participant location and identification messages, the variable message format 5.01 position reports, and cursor on target position reports transmitted into the joint data network. Participant location and identification messages are combined with unmanned aircraft system vehicle GPS reports to ground control stations to provide a more complete air picture. Airspace

personnel forward that single integrated picture to the AMD workstation to provide air situational awareness for dissemination into a mission command system.

Forward Area Air Defense

C-23. The FAAD system (that includes the IFN), which is interoperable with joint, multinational, and unified action partner air defense artillery systems, provides real-time targeting and accurate and timely identification of air targets. It alerts indirect fire protection capability intercept and sense and warning systems and it alerts and cues AMD units and weapon systems. FAAD systems receive air situational data from tactical digital information links via the joint data network and radar (sentinel, firefinder, lightweight countermortar radar, and Airborne Warning and Control System) data via radar elements subsystem. When augmented with AMD sensors and shooters, FAAD provides joint command and control for engagement operations and displays a low-level correlated air picture with target cueing and tracking. In addition, FAAD integrates and disseminates airspace coordinating measures, rules of engagement, air defense warnings, and weapons control orders to augmented AMD units.

APPLICATIONS

C-24. Airspace elements employ two applications in airspace control systems.

TACTICAL AIRSPACE INTEGRATION SYSTEM AIRSPACE WORKSTATION

C-25. The TAIS airspace workstation (AWS) provides automated airspace control planning and enhanced airspace control execution. TAIS interfaces with Army and joint command and control systems and provides a direct link to the theater air-ground system through interface with the theater battle management core system. It also has an added civil and government interagency capability.

C-26. For commanders, the system provides a visual three-dimensional airspace picture with near-real-time air tracks. TAIS combines multiple input sources into a single airspace picture for situational awareness, airspace control (to include clearing airspace for immediate fire missions), and fratricide avoidance. Combined with the electronic ground picture, TAIS provides the commander with visualization of the air and ground area of operations. TAIS enables ADAMs and ADAM/BAEs to digitally build, send, and receive airspace coordinating measures supporting the brigade unit airspace plan. TAIS publishes the airspace control order to the CP server enabling other mission command systems to subscribe to it. TAIS can also disseminate the airspace control order directly via e-mail to other mission command systems as well as in U.S. message text format.

C-27. Fielded software provides a Web-based, net-centric, thin client application called the dynamic airspace collaboration tool (DACT). This tool provides airspace control collaboration and a three dimensional visualization capability for non-TAIS users. This capability extends key elements of airspace functionality to other Army users, joint users, and unified action partners on shared mission command systems without the need for these other users to have a TAIS AWS. The DACT allows all airspace stakeholders to collaborate rapidly and accurately on airspace requests in near-real time. For example, an Army brigade combat team uses its TAIS AWS to collaborate with a Marine Corps airspace agency using the DACT while an Air Force airspace agency uses the DACT to expedite dynamic retasking of assets across Service boundaries. In future TAIS software versions, any device with an HMTL 5 compliant web browser on the network can access the TAIS 12 airspace collaboration service whether by tablet, laptop, desktop, or handheld. TAIS capabilities are permission based and fully customizable by the TAIS administrator. TAIS will also run on Virtual Machine and Blade Server Configurations and each TAIS server can simultaneously support 25 full TAIS operator capability instances and 75 DACT-like client connections.

C-28. Generally, the air defense system integrator provides air tracks to the TAIS. This integrator is a native component of a TAIS shelter. However, air tracks can also be provided through direct connections with remote TAIS via a network connection. All TAIS can receive BFT data through a network multicast session. Either TAIS AWS can pull air track data from another TAIS or it can connect remotely to an air defense system integrator in the ADAM cell or even a TAIS shelter through the network, provided such arrangements are made prior to an attempt to connect. The TAIS can only pull air tracks from a single source at a time (not including BFT) and the track data is limited to what the air track source is receiving and processing.

C-29. Fielding of the Expanded Air track Sensor Interface will update future TAIS shelters with modernized air track equipment and capabilities. Expanded Air track Sensor Interface is a government owned and developed air track fusion engine that will provide the ATC common air picture, access to ATC active and passive sensors, and will replace the commercial air defense systems integrator in all TAIS shelters. In TAIS command post shelters, the Expanded Air track Sensor Interface link management and track fusion capability will be retained as a backup to the AMD shelter air defense systems integrator and suite of systems that are currently providing command post air track inputs to enable development of the air picture.

AIR AND MISSILE DEFENSE WORKSTATION

C-30. The AMD workstation provides a common AMD staff planning and execution tool. It enables collaborative AMD integration with intelligence preparation of the battlefield through development of threat analysis and sensor/shooter employment. The workstation also provides an AMD gateway to a mission command system and AMD interface to joint and multinational systems. For commanders, the AMD workstation provides a visual three dimensional airspace picture with near-real-time air tracks. For ADAM/BAEs, the AMD workstation enables them to parse and graphically display the airspace control order, airspace coordinating measures, airspace control overlay, and unit airspace plan. The AMD workstation also enables ADAM/BAEs to leverage the integrated enemy target and friendly aircraft data for airspace clearance. The workstation enables not only integrated Army AMD and aviation planning but also near-real-time airspace control.

AIRSPACE CONTROL WITH A DEGRADED NETWORK

C-31. While networks and applications greatly enhance airspace control, commanders can exercise airspace control in a degraded network environment. However, in a degraded network environment, controlling airspace is based on preplanned airspace coordinating measures with limited capability to assess airspace control effectiveness or make adjustments during execution. The nature of an operational environment, combined with the broad range of threats, makes it likely that Army forces will have to operate under degraded conditions and networks. While Army air-ground system and airspace information systems are not envisioned as a primary target, they will be degraded as a result of attacks against key enabling networks and nodes.

C-32. For airspace elements, degraded network operations potentially cause loss of air picture or air-ground communications, brigade CP connectivity, or digital systems in the CP. Loss of air picture or air-ground communications will force airspace elements to resort to 100 percent procedural control. Loss of brigade CP connectivity affects connectivity to higher headquarters CPs and joint airspace control nodes. In this case, airspace elements continue to digitally plan airspace use, download airspace coordinating measure requests (known as ACMREQs) to a disk, and physically transport it to an adjacent brigade that has connectivity or to a higher headquarters airspace element. Loss of digital systems in the CP occurs when the TAIS malfunctions. In this case, airspace elements can—with connectivity—client into another unit's TAIS. Loss of connectivity forces airspace elements to update maps and overlays manually. Airspace element personnel need to retain skills and expertise to control airspace manually.

Appendix D

Airspace Messages, Requests, and Information Displays

This appendix discusses airspace messages, requests, and information displays. First, it discusses the types of digital messages. The appendix then discusses airspace coordinating measure and system peculiarities. Then the appendix concludes with a discussion on information displays.

DIGITAL MESSAGES

D-1. Digital messages consist of airspace messages, requests, and information displays. Airspace users transmit digital messages using two distinct formats compatible with multiple control systems within the data link architecture. The two primary formats used are United States message text format and joint variable message format. Digital airspace control systems, such as machine-to-machine exchange, determine appropriate formats to use for their particular systems. For example, TAIS communicates point-to-point with theater battle management core system via USMTF. Airspace users utilize USMTF predominantly on the Army mission command system and joint command and control automation systems. Airspace users utilize joint variable message format messages on the tactical Internet and at the platform level to support Force XXI Battle Command Brigade and below.

UNITED STATES MESSAGE TEXT FORMATTING

D-2. The USMTF establishes standards, rules, and conventions governing message text formats. USMTF is a set of character-oriented message text formats that provide common voice and automation templates to exchange information between joint command and control systems and enables interoperability for all military operations. The joint user handbook-message text formats (JUH-MTF) and FM 6-99 provide additional information on USMTF.

D-3. The USMTF voice-message templates provide the means for units to communicate effectively during degraded network operations. Communicating expeditiously and succinctly via voice will remain a requirement due to the potential degraded network operations.

D-4. Common USMTF voice templates used by airspace elements include the following:

- Airspace coordinating measure request [ACMREQ]-REPORT NUMBER: A030 {USMTF # F658} (also the USMTF message for Munition Flight Path – MFP).
- Airspace control order [ACO]-REPORT NUMBER: A035 {USMTF # F756}.
- Air defense command message [AIRDEFCOM]-REPORT NUMBER: A010 {USMTF # E710}.
- Airlift request [AIRLIFTREQ]-REPORT NUMBER: A015 {USMTF # D630}.
- Air Mission Request Status/Tasking [REQSTATASK]-REPORT NUMBER: A020 {USMTF # A661}.
- Battlefield Support Geometry Message (SPRTGEOM) - REPORT NUMBER: XXX {USMTF #S201) (supports PAH/TAH dissemination and coordination).
- Artillery Target Intelligence - Intelligence & Electronic Warfare (IEW) Target Coordination Message [ATIIEWTC] - REPORT NUMBER: XXX {USMTF #S308) (supports fire mission notification for airspace deconfliction and coordination).

Note: These messages and reports may also be a record and are identified by "(Record)" at the end of the description.

JOINT VARIABLE MESSAGE FORMAT

D-5. Joint variable message format is a modem-based message protocol that provides the most extensive digital information exchange between similarly capable platforms and ground-based terminal attack controller kits. The variable message format provides an extremely flexible message standard that consists of only essential information, allowing shorter messages than USMTF for reduced transmission time and network clutter. It is bit-oriented, digital information with variable-length messages. The conveyed data requires varying amounts of volume and detail of information, and it can be transmitted over a broad range of tactical communications systems. Variable message format uses Link 16 data elements to create variable length messages suitable for near-real-time data exchange in a bandwidth constrained combat environment. The variable message format is the Army solution to the battlefield digitization interoperability and bandwidth problems. Refer to MIL-STD-6017 for a complete listing of all variable message formats.

UNITED STATES MESSAGE TEXT FORMAT AND VARIABLE MESSAGE FORMAT RECORD TEMPLATES

D-6. Airspace users utilize USMTF and variable message format record templates to record messages and reports. Airspace elements routinely use record messages and digitally transmit them via a mission command system.

AIRSPACE CONTROL PECULIARITIES TO BE AWARE OF

D-7. Requesting airspace requires an understanding of the different airspace coordinating measures, how those airspace coordinating measures are communicated (messages) between airspace control nodes, as well as the information displays used to integrate airspace use. All users requesting airspace must understand the methods used to transmit their airspace use requests. These methods may range from a simple hand-held radio during degraded operations, through the most advanced and complex automated systems on the battlefield. No matter the situation, effective individual users understand the systems used (such as advanced field artillery tactical data system, tactical airspace integration system, theater battle management core system) and how system interoperability impacts their airspace use requests.

AIRSPACE COORDINATING MEASURES PECULIARITIES

D-8. *Airspace coordinating measures* are measures employed to facilitate the efficient use of airspace to accomplish missions and simultaneously provide safeguards for friendly forces (JP 3-52). While JP 3-52 and other doctrinal and joint standards documents define airspace coordinating measures (ACMs), the USMTF standard defines the implementation of these ACMs using current digital airspace control systems (such as machine-to-machine exchange).

D-9. The difference or peculiarities between the standards has caused confusion at times. In some cases, the name of the ACM differs between joint doctrine and USMTF. In other cases, the nature of the coordinating measure changes. In USMTF, a restricted operations zone is a category (type) with many associated coordinating measures (usages) one of which is a restricted operations area. The same situation exists for special use airspace, which in USMTF is a type, not a usage.

D-10. Since the language between the various Service command and control systems is USMTF, airspace element personnel need to understand how their automation systems use and exchange ACMs. Often airspace element personnel have to convert non-digital airspace requests using doctrinal definitions that may not be USMTF terms (such as coordinating altitude or restricted operations zone) into the appropriate digital USMTF format. In addition, since some digital systems do not process the entire USMTF set of coordinating measures, airspace element personnel must understand the peculiarities effects of ACM type, usage, and shape selection when translating text into a digital USMTF message to ensure that the ACM yields the desired outcome.

D-11. The shape tool used in the creation of an ACM is a critical aspect on whether the ACM can be processed among the systems used to integrate airspace use. For example, the tactical TAIS has eight different shape choices while the theater battle management core system has nine shape choices. See Table D-1 on page D-3.

Table D-1. Airspace control system shapes

TAIS	*TBMCS*	*Remarks*
Cylinder	Circle	A cylinder is a circle with three dimensions.
Route	Corridor	Route is the same shape as a corridor.
Orbit	Orbit	Cakes are complex Rad-Arcs.
Cake/Rad-Arc	Rad-Arc	
Polyarc	PolyArc	
Polygon	Polygon	
Track	Track	
Line	Line	
	Point	TAIS does not have a point shape, rather TAIS uses its airspace control point tool for entering point data.
Legend		
TAIS	Tactical Airspace Integration System	
TBMCS	Theater Battle Management Core System	

AIRSPACE SYSTEM PECULIARITIES

D-12. All effective airspace users know their system defaults, peculiarities, and how their system interchanges information between the available systems. Airspace users recognize that any software updates to their system may significantly change their "settings."

D-13. Each system has peculiarities. TAIS—one of the airspace control system used by air defense airspace management/brigade aviation element, the ADAM/BAE,—and airspace elements will parse, display, and run conflict checks against all USMTF compatible ACMs. However, the default setting for many ACMs is set to not check for conflicts. Operators of TAIS can change the default setting of "conflict check off" based on standard operating procedures or orders.

Note: The critical importance of clarity in the discussion of ACMs and the manifestation of them in digital messages cannot be overstated.

INFORMATION DISPLAYS

D-14. Information displays (also referred to as overlays) result from messages, either inputted or transmitted, into systems that portray a continuous common operational picture. This picture provides commanders with situational awareness and situational understanding of the operational area. Commanders use the common operational picture to support visualization of the mission. Staff components use it to support their running estimates that they continuously update.

D-15. Airspace elements are responsible for maintaining information displays based on accurate information and databases in near-real-time. This includes, but is not limited to the following:

- Ensuring airspace users disseminate up to date information to appropriate higher, lower, and adjacent command posts.
- Establishing a shared pasteboard for collecting, processing, displaying, and disseminating relevant information on the command post of the future system workstation.
- Preparing a shared plan using the two dimensional application on the command post of the future system workstation.
- Preparing a shared plan using the three dimensional application on the command post of the future system workstation.

D-16. Airspace elements typically publish the airspace control overlay (formerly airspace command and control overlay). Airspace control overlays can be digital (containing all data associated with ACMs), or graphic (drawn on plastic or paper for use during degraded network operations). Airspace elements typically subscribe to these overlays:

- Air defense artillery overlay.
- Fire support overlay.
- Intelligence overlay:
  - Information collection plan overlay.
  - Terrain overlay.
- Weather overlay.
- Operation overlay.

Appendix E

Airspace Element Collective Tasks

This appendix discusses Army collective tasks in general and then the specific airspace element collective tasks.

ARMY COLLECTIVE TASKS

E-1. ADRP 1-03, The Army Universal Task List (AUTL), is a comprehensive, but not all-inclusive listing of Army tasks, missions, and operations. The AUTL provides a common doctrinal structure for collective tasks that support Army tactical missions and operations. The airspace control AUTL task is the Army tactical task 5.4, Control Tactical Airspace.

E-2. A collective task is a clearly defined, discrete, and measurable activity or action performed by an integrated and coordinated collection of Soldiers and contributes directly to mission accomplishment. In terms of airspace control, the Army has 14 airspace control collective tasks.

COLLECTIVE TASKS FOR AIRSPACE CONTROL

E-3. The airspace control collective tasks apply across echelons, brigade through theater army. At the brigade level, the air defense airspace management/brigade aviation element, ADAM/BAE or ADAM, elements execute all the collective tasks. Above the brigade level (division, corps, and theater army), the airspace element and the air and missile defense (AMD) element collaborate to execute the tasks in contained in ADRP 1-03.

E-4. In ADRP 1-03, Army tactical task 5.4, titled Control Tactical Airspace, consists of 14 collective tasks that provide the basis for performance measures. These collective tasks are separated into two groups: tasks that focus on planning future airspace use and tasks that focus on the execution of airspace use. The first group of collective tasks integrate airspace requirements generated by all airspace user communities (movement and maneuver, intelligence, fires, sustainment, mission command, and protection), both joint and Army, while meeting commander's guidance for mission accomplishment and risk. The remaining collective tasks integrate airspace use during execution of current operations using both staff procedures and near-real-time procedural control. These latter tasks occur to resolve airspace use conflicts according to commander's guidance for mission accomplishment and risk. See Table E-1 on page E-2 for Army tactical task 5.4 Control tactical airspace.

Table E-1. Army tactical task 5.4 Control tactical airspace

	#	Scale	Measure	FM 3-52 Paragraph #
PLANNING	01	Yes/No	The unit determined integrated airspace user requirements.*	3-26
	02	Yes/No	The unit developed airspace usage priorities.	3-27
	03	Yes/No	The unit coordinated air traffic service, sensor emplacement, and data links.	3-28
	04	Yes/No	The unit determined combat identification authority and procedures for airspace users.	3-29
	05	Yes/No	The unit developed rules of engagement and early warning procedures for air defense operations in the area of operations.	3-31
	06	Yes/No	The unit determined reporting requirements and monitoring methods for manual reporting.	3-32
	07	Yes/No	The unit integrated airspace use within the area of operations.	3-33
	08	Yes/No	The unit developed airspace coordinating measures to support planned operations.*	3-34
	09	Yes/No	The unit developed the airspace appendix.	3-37
EXECUTION	10	Yes/No	The unit processed airspace orders and directives.*	4-16
	11	Yes/No	The unit managed airspace control information displays.	4-17
	12	Yes/No	The unit determined track Identification for airspace users.	4-18
	13	Yes/No	The unit monitored assigned airspace and airspace users within assigned area of operation.	4-19
	14	Yes/No	The unit resolved real-time conflicts for airspace users within the area of operations.*	4-20

E-5. For more detail, refer to the Digital Training Management System (known as DTMS) and the Training Development Capability (known as TDC) databases. These databases detail the task, condition, and standard of each collective task found by its training and evaluation outline task number. See Table E-2 on page E-3.

Note Brigade and higher units without assigned airspace element personnel (ADAM/BAE or airspace elements) are required to execute the collective tasks marked with an asterisk (*).

Table E-2. Airspace control collective tasks

	Task	*Task #*
PLANNING	Determine integrated airspace user requirements.	71-8-5702*
	Develop airspace usage priorities.	71-8-5700
	Coordinate air traffic services, sensor emplacement, and data links.	71-8-5706
	Determine combat identification authority and procedures for airspace users.	71-8-5705
	Develop rules of engagement and early warning procedures for air defense operations in the area of operations.	71-8-5713
	Determine reporting requirements and monitoring methods for manual reporting.	71-8-5707
	Integrate airspace use within the area of operations.	71-8-5704
	Develop airspace coordinating measures to support planned operations.	71-8-5703*
	Develop the airspace annex.	71-8-5701
EXECUTION	Process airspace orders and directives.	71-8-5711*
	Manage airspace control information displays.	71-8-5710
	Determine track identification for airspace users.	71-8-5709
	Monitor assigned airspace and airspace users within assigned area of operations.	71-8-5712
	Resolve real-time conflicts for airspace users within the area of operations.	71-8-5708*

Note Brigade and higher units without assigned airspace element personnel (ADAM/BAE or airspace elements) are required to execute the collective tasks marked with an asterisk (*).

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Appendix F

Airspace Control Appendix Format

An airspace control appendix is included in all maneuver brigade and functional brigade or higher units assigned an area of operations or that employ organic manned or unmanned aircraft. The airspace control appendix provides guidance on how to integrate airspace users in accordance with commander's intent, priorities, concept of operations, and risk guidance contained in Annex C (Operations) of the operation plan.

[CLASSIFICATION]

Include heading if attachment is distributed separately from the base order or higher-level attachment

APPENDIX 10 (AIRSPACE CONTROL) TO ANNEX C (OPERATIONS) TO [OPERATION PLAN/ORDER [number] [(code name)]—[(classification of title)]

(U) References: *List documents essential to understanding the attachment.*

a. *List maps and charts first. Map entries include series number, country, sheet names, or numbers, edition, and scale.*

b. *List other references in subparagraphs labeled as shown.*

c. *Doctrinal References for this appendix include the following: ADRP 5-0, FM 6-0, FM 3-52, ATP3-52.1, ATP 3-52.2, ATP 3-91.1, JP 3-30, and JP 3-52.*

(U) Time Zone Used Throughout the Plan or Order: *Write the time zone established in the base plan or order.*

1. (U) Situation. *Include information affecting the functional area that paragraph 1 of the operation plan (OPLAN) or operation order (OPORD) does not cover or that needs to be expanded.*

a. (U) Area of Interest. *Refer to Annex B (Intelligence) as required.*

b. (U) Area of Operations. *Refer to Appendix 2 (Operation Overlay) to Annex C (Operations).*

(1) (U) Terrain. *List all critical terrain aspects that impact airspace use. Refer to Annex B (Intelligence) as required.*

(2) (U) Weather. *List all critical weather aspects that impact airspace use. Refer Annex B (Intelligence) as required.*

c. (U) Enemy Forces. *Describe anticipated enemy air defense, enemy use of manned and unmanned aircraft, fires, and other capabilities (such as electronic warfare and cyber warfare) that will impact friendly use of airspace.*

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[CLASSIFICATION]

APPENDIX 10 (AIRSPACE CONTROL) TO ANNEX C (OPERATIONS) TO [OPERATION PLAN/ORDER [number] [(code name)]—[(classification of title)]

d. (U) Friendly Forces. *Outline the theater airspace structure to include higher headquarters airspace plans and airspace control appendixes as they pertain to airspace control. Outline the airspace control organization of unified action partners identifying airspace control entities and airspace users that will support or impact the issuing headquarters or require coordination and additional support. This will include joint force commander (JFC) designation of the airspace control authority (ACA), the area air defense commander (AADC), and the joint force air component commander (JFACC). Identify relevant theater air-ground system (TAGS) control agencies such as combat reporting centers, airborne warning and aircraft control systems, air support operations centers, direct air support centers, tactical air operations centers, air traffic control or services or their coalition equivalents involved with the operation of the airspace control system within the ground commander's area of operation. Describe probable airspace use by joint and coalition partners that will affect airspace control such as close air support, information collection, or special operations. Highlight aspects of higher headquarter airspace plans that impact operations. As a minimum, the joint force commander's airspace control plan and the airspace control appendix of the next higher headquarters will be addressed.*

e. (U) Interagency, Intergovernmental, and Nongovernmental Organizations. *Identify and describe other organizations in the area of operations that may impact the conduct of airspace control. Include both civil airspace control agencies as well as interagency, intergovernmental, and nongovernmental organizations that will be using airspace in the area of operation. Refer to Annex V (Interagency Coordination) as required.*

f. (U) Civil Considerations. *Refer to Appendix 1 (Intelligence Estimate) to Annex B (Intelligence) as required.*

g. (U) Attachments and Detachments. *List units attached or detached only as necessary to clarify task organization and the airspace control architecture such as air traffic services, air and missile defense, supporting tactical air control party and artillery organizations. Identify units with manned and unmanned aircraft. Identify units with airspace elements to include air defense airspace management/brigade aviation elements (ADAM/BAEs) or ADAMs (or a joint or multinational equivalent).* (***Note:*** *if the air traffic service information [Air traffic service facilities, airfields, or similar facilities] is lengthy or is not available from other sources, include Tab A, Air Traffic Services, to expand upon this sub-paragraph.)*

h. (U) Assumptions. *List any airspace control assumptions that support the appendix development.*

2. (U) Mission. *State the mission of the airspace element in support of the base plan or order*.

3. (U) Execution.

a. (U) Concept of Airspace Control. *Describe how airspace control supports the commander's intent, concept of operations, and concept of fires. Describe how the unit will manage airspace during the phases of the operation (radar, nonradar, procedural and positive control.) Specify the authority exercised at each echelon for each phase of the operation. Describe the roles and relationships between airspace elements in the organization and how the airspace elements will coordinate with joint and unified action partner airspace elements. Describe the authorities, responsibilities, and expectations of individual or multiple joint air ground integration centers if that technique is used. Describe how air traffic service units and capabilities (airspace information center) are integrated into the unit airspace plan. Describe how air and missile defense units located in the area of operations are integrated with airspace control.*

b. (U) Assessment. *Describe the priorities for assessment and identify the measures of performance and effectiveness used to assess end state conditions and objectives. Refer to Annex M (Assessment) as required.*

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[CLASSIFICATION]

APPENDIX 10 (AIRSPACE CONTROL) TO ANNEX C (OPERATIONS) TO [OPERATION PLAN/ORDER [number] [(code name)]—[(classification of title)]

c. (U) Tasks to Subordinate Units. *List airspace control tasks assigned to specific subordinate units not contained in the base order. This may include tasks to a division joint air ground integration center, tasks to the combat aviation brigade for air traffic services, tasks to air and missile defense units for sensor coverage, tasks to airspace information center and air traffic service units, and tasks to brigade combat teams and other functional brigades utilizing airspace assigned to Army elements..*

d. (U) Coordinating Instructions. *List only instructions applicable to two or more subordinate units not covered in the base order that affect airspace control procedures.*

(Note 1: For operations within the United States and its territories, title this paragraph "Rules for the Use of Force.")

(Note 2: Items listed below as examples do not need to be included if already in the unit standard operating procedure.)

(1) (U) Unit Airspace Plan. *Planned airspace coordinating measure requests (ACMREQs) procedures to integrate and nominate planned airspace coordinating measures to higher headquarters as part of a future airspace control order.*

(2) (U) Airspace Control Order Change Request. *Procedures for submitting ACMREQs that are within the current airspace control order cycle and can be integrated into the current airspace control order and disseminated as a change to the current airspace control order.*

(3) (U) Near-Real-Time Airspace Coordination. *Immediate airspace request procedures for near-real-time coordination with external airspace agencies such as a joint air ground integration center, U.S. Air Force combat reporting centers or U.S. Marine Corps direct air support centers.*

(4) (U) Airspace Control Order. *Airspace control order issuing and dissemination times from theater designated airspace control authority and methods for digital and non-digital units to receive it.*

(5) (U) Air Tasking Order. *Air tasking order issuing and dissemination times and methods for digital and nondigital units.*

(6) (U) Key and Enduring Airspace Coordinating Measures. *For example, this can be coordinating altitude, coordinating level.*

(7) (U) Priorities for Airspace Use for Each Phase of the Operation.

(8) (U) Risk Acceptance Guidance. *This can be the form of a matrix.*

(9) (U) Risk Reduction Measures.

(10) (U) Air and Missile Defense Rules of Engagement.

(11) (U) Constraints. *List any restrictions on airspace use placed on the commander by a higher commander that will restrict the freedom of action of the commander. Sources include higher headquarters airspace control and air and missile defense appendixes, airspace control plan, area air defense plan, airspace control order, and special instructions.*

(12) (U) Combat Identification Procedures. *Add detail to provide airspace personnel sufficient information to ensure friendly aircraft are accurately identified. For example, adding supplemental guidance for manually entering or correcting aircraft identification that is not correctly or incompletely identified in the common operational picture. Refer to Appendix 1 (Air and Missile Defense) to Annex E (Protection).*

(13) (U) Procedures for Manual Aircraft Reporting.

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[CLASSIFICATION]

APPENDIX 10 (AIRSPACE CONTROL) TO ANNEX C (OPERATIONS) TO [OPERATION PLAN/ORDER [number] [(code name)]—[(classification of title)]

4. (U) Sustainment. *Provide information as necessary for sustainment of airspace control and air traffic service unique equipment. Refer to Annex F (Sustainment) as required.*

5. (U) Command and Signal.

a. (U) Command. *State the location of key airspace control leaders. Identify who is authorized to make airspace control decisions for the commander and what authorities an air support operations center assigned to an Army unit has been authorized.*

b. (U) Liaison Requirements. *State the functional area liaison requirements not covered in the base order.*

c. (U) Signal. *Address any functional area-specific communications requirements or reports. Provide operations task link (OPSTASK Link) information for establishing data links. Refer to Appendix 7 (Air and Missile Defense) to Annex D (Fires) if the information is located there. Provide rules and procedures for using airspace control digital systems and other digital software such as chat programs, e-mail, and instant messaging including chat rooms to be used, types of information, monitoring requirements, and message verification requirements. Refer to Annex H (Signal) as required.*

ACKNOWLEDGE: *Include only if attachment is distributed separately from the base order.*

[Commander's last name]
[Commander's rank]

The commander or authorized representative signs the original copy of the attachment. If the representative signs the original, add the phrase "For the Commander." The signed copy is the historical copy and remains in the headquarters' files.

OFFICIAL:

[Authenticator's name]
[Authenticator's position]

Use only if the commander does not sign the original attachment. If the commander signs the original, no further authentication is required. If the commander does not sign, the signature of the preparing staff officer requires authentication and only the last name and rank of the commander appear in the signature block.

ATTACHMENTS: *List lower level attachment (such as tabs, and exhibits).*

DISTRIBUTION: *Show only if distributed separately from the base order or higher-level attachments.*

[page number]
[CLASSIFICATION]

Appendix G

Airspace Control during Defense Support of Civil Authorities

This appendix augments the thorough description of how the Army conducts defense support of civil authorities. The appendix provides an overview of defense support of civil authorities. It then discusses coordinating airspace during defense support of civil authorities and joint airspace control. Lastly, it addresses employment considerations of unmanned aircraft systems.

DEFENSE SUPPORT OF CIVIL AUTHORITIES OVERVIEW

G-1. During defense support of civil authorities, in particular disaster response operations, aircraft are in high demand. Therefore, Army leaders must understand how to coordinate airspace control procedures to operate effectively along with other organizations to reduce the chance of accident or injury. *Defense support of civil authorities* is support provided by U.S. Federal military forces, Department of Defense civilians, Department of Defense contract personnel, Department of Defense component assets, and National Guard forces (when the Secretary of Defense, in coordination with the governors of the affected states, elects and requests to use those forces in Title 32, United States Code, status) in response to requests for assistance from civil authorities for domestic emergencies, law enforcement support, and other domestic activities, or from qualifying entities for special events (DODD 3025.18). Defense support of civil authorities (DSCA) includes operations that address the consequences of natural or man-made disasters, accidents, terrorist attacks, and incidents in the United States and its territories. When the size and scope of events exceed the capabilities or capacities of domestic civilian agencies a governor or federal civilian agency requests support.

G-2. For Army forces, DSCA typically involves aviation support. Army aviation support includes air movement of logistics; transportation of personnel and equipment; medical evacuation; command and control support to federal, state, and local authorities; air evacuation; air traffic services; and information collection support to civilian law enforcement operations. Further, federal military and National Guard aviation units support civil authorities for counterdrug programs, civil disturbances, and border surveillance operations.

G-3. For Army aviation support for DSCA, several emergency support function (ESF) annexes of the national response framework guide employment. ESF annexes describe the roles and responsibilities of federal departments and agencies as ESF coordinators, primary agencies, or support agencies. The following ESF annexes are relevant to Army aviation support:

- ESF #1 – addresses transportation, including airspace control.
- ESF #5 – addresses information and planning.
- ESF #7 – addresses logistics and sustainment management.
- ESF #8 – addresses public health and medical, including medical evacuation and mass casualty evacuation flights.
- ESF #9 – addresses interagency search and rescue operations.

COORDINATING AIRSPACE DURING DEFENSE SUPPORT OF CIVIL AUTHORITIES

G-4. To facilitate cross-governmental coordination, the Federal Emergency Management Agency establishes a joint field office ("joint" in this context meaning interagency) to coordinate a national-level response. A joint field office is a temporary federal facility for coordination and liaison across agencies and jurisdictions. The cross-governmental coordination between Department of Defense (DOD) and other participating agencies ensures all units operate in an integrated and synchronized manner. Within the joint

field office, the air operations branch facilitates the coordination of aviation assets during disaster operations. DODD 3025.18 and JP 3-28 contain detailed information for implementing DSCA.

G-5. During DSCA, the national airspace remains under the control of the Federal Aviation Administration (FAA) (part of the Department of Transportation). The FAA assumes the role of the airspace coordinating authority. In this capacity, the FAA develops the airspace control plan. This plan describes processes and procedures for the safe employment of air assets, both military and civilian, operating within the rescue and recovery area. Other military operations within the scope directed by the joint force air component command use the airspace control plan.

G-6. The airspace control plan directs all assets, military or civilian, operating in or through the disaster area and assumes civil air traffic control facilities will control all air traffic and provide visual and instrument flight rule separation. Strict adherence to the airspace control plan and FAA air traffic control procedures ensures safe, efficient, and expeditious use of airspace while still enabling all participants to accomplish their respective missions. Lessons from recent DSCA underpin the importance of coordinating and integrating airspace use through airspace elements, at all echelons, and letting the highest airspace element interface with the joint force and state and federal agencies, if necessary and appropriate. This prevents other airspace users from inundating local state and federal agencies with requests. The air component command for the United States Northern Command (USNORTHCOM) is Air Force North (1st Air Force).

G-7. To augment the FAA's airspace control plan, each state maintains an airspace control plan signed by the adjutant general, maintained by 1st Air Force. The 601st Air and Space Operations Center (AOC [United States Air Force]), 1st Air Force, plans, directs, and assesses air and space operations for the North American Aerospace Defense Command, and USNORTHCOM. The AOC provides aerospace warning and control for North American Aerospace Defense defensive counterair activities, as well as directs Air Force air and space capabilities supporting USNORTHCOM homeland security and DSCA missions. As required, the joint force air component commander coordinates with the FAA and issues supplementary instructions to air commanders to accommodate changes required for emergency operations by military aircraft. To assist with coordination, all military and civilian agencies and organizations provide liaisons to the joint force air component command and coordinate all air activities with FAA representatives. While this is true for federal military missions, Air Force North (AFNORTH) offers the contingency response air support schedule (CRASS) to all agencies supporting disaster response operations.

G-8. While the CRASS is similar to an unclassified air tasking order, it is not a "tasking" document. It serves as a visibility document intended to maximize visibility of air operations in the disaster area or joint operations area among all participants. AFNORTH uses unclassified means to disseminate CRASS and amplifying information (airspace control plan, airspace control order, or special instructions). The CRASS provides increased situational awareness of all aircraft, including non-DOD aircraft, operating in the joint operations area. The CRASS includes all interagency missions, as well as planned flying by other agencies supporting the disaster, including nongovernmental organizations and Army National Guard aviation assets operating in State active duty or Title 32 status.

G-9. The fidelity of the CRASS depends on the information provided by non-DOD agencies and organizations. AFNORTH publishes it using a common application to ensure data access. It requires increased coordination with State emergency operations centers, law enforcement agencies, and other agencies to ensure accuracy. While compliance with the airspace control plan, airspace control order, or special instructions is not mandatory for non-DOD agencies, AFNORTH encourages these agencies to contribute to the CRASS work sheet. Participation is voluntary, and while not mandatory, it is highly encouraged. AFNORTH updates all information in accordance with the classified air tasking order cycle. AFNORTH (1st Air Force), coordinates with state emergency operations center and other agencies to ensure fullest dissemination of required information. Required information is also available on the AFNORTH public domain Web site at http://www.1af.acc.af.mil/.

JOINT AIRSPACE CONTROL

G-10. During DSCA, airspace control is transferred to the joint force air component command. All apportioned military aircraft operating in the joint operations area are line-tasked in the air tasking order. For those assets not directly tasked by the joint force air component command, applicable mission information

appears in the airspace control plan and special instructions section of the air tasking order for command, control, and coordination purposes. All participating military aircraft adhere to the air control plan and applicable air tasking order and special instructions.

G-11. AFNORTH's regional air movement coordination center, located at Tyndall Air Force Base, stands up during emergencies and contingencies to provide management of airflow into and out of designated airfields for the purpose of maximizing personnel and cargo throughput. The regional air movement coordination center coordinates with military command posts present at available airfields to determine constraints and limitations that affect airflow into those airfields. Subsequently, the regional air movement coordination center coordinates with the FAA, National Guard Bureau, and the Air Force's Tanker Airlift Control Center to determine and issue time slots for aircraft transiting the available airfields.

G-12. AFNORTH's (1st Air Force), standing AOC (601st), is particularly suited for DSCA taking place within the USNORTHCOM's area of responsibility. Additional tactical command and control systems (ground based or airborne) may be required to deploy to the area based on the availability of the local communications and command and control nodes.

Note The 1st Air Force controls military airspace within the USNORTHCOM area of responsibility except in Alaska, where the 11th Air Force Air and Space Operations Center supports Joint Task Force-Alaska. The 13th Air Force controls military airspace in Hawaii in support of United States Pacific Commands area of responsibility.

G-13. Coordinating DOD search and rescue support within the continental United States falls to the responsibility of 1st Air Force. See ADRP 3-28 for more details. To support DSCA, 1st Air Force is prepared to deploy numerous air component coordination elements as well as additional liaison elements to support other major commands.

G-14. Air National Guard air control squadrons provide operationally ready command and reporting center mission control elements for support of theater air operations. These elements include radar surveillance and tracking, radar service to tactical aircraft, supervision of subordinate deployed air control units, and data link of a combined air picture to higher headquarters.

G-15. Many Navy ships are well suited for air command and control support during DSCA. They possess robust communications capabilities. For example, Navy tactical air command and control centers are located on amphibious assault ships. They are able to assist the joint force air component command in air space planning, integration, and deconfliction of multiagency air assets.

G-16. Elements of the Marine air command and control system (known as MACCS) may deploy a capability for DSCA. Common agencies would include the direct air support center, Marine air traffic control detachment, tactical air operations center, tactical air command center, or task organized elements of one or all of these.

G-17. Air Force airborne warning and airspace control aircraft may deploy to provide a detailed air picture to the airspace control authority. These airborne control centers can become the link between the FAA controllers on the ground, working out of a military facility, and aircraft in and around the incident site.

G-18. Army air traffic service units may deploy to re-establish air traffic services or augment FAA capabilities in support of DSCA. Possible services being requested from Army units include airfield control tower, ground controlled approach radar, enroute flight management and airfield management.

UNMANNED AIRCRAFT SYSTEMS EMPLOYMENT CONSIDERATIONS

G-19. Over the last 10 years, the use of unmanned aircraft has grown exponentially. However, within the United States and its territories, the use of unmanned aircraft is severely restricted. During DSCA, commanders use unmanned aircraft systems as a last resort, when manned assets are neither available nor practical. Often they choose to employ an unmanned aircraft system because they require the capability in support of the operation. These systems give the commander many capabilities, but often unmanned aircraft systems may not be the most efficient, timely, or practical method of achieving the commander's desired

effect. Sometimes a manned platform can provide the desired capability in a much more timely and efficient manner. Commanders decide to employ unmanned aircraft systems judiciously. Use of unmanned aircraft systems requires approval at high levels within the DOD and the FAA prior to employment in DSCA.

CONTROL OF UNMANNED AIRCRAFT SYSTEMS

G-20. Command relationships for unmanned aircraft systems operations should be defined in advance of mission accomplishment. In general, the controlling joint task force typically exercises operational control of available unmanned aircraft systems.

G-21. Unmanned aircraft system operators supporting domestic missions should anticipate coordinating their actions through the joint task force to supporting the joint force air component commander. These operators also anticipate and prepare to include their operations in the air tasking order. Regardless of the nature of operations, unmanned aircraft systems command and control structures must be thoroughly planned (well in advance, when possible), responsive to both operator and user inputs, and flexible enough to handle changes to the operation. This is particularly important for retasking of unmanned aircraft systems assets.

G-22. Certain unmanned aircraft systems such as Global Hawk can operate far above normal commercial traffic while providing situation assessment to ground commanders. Intermediate systems such as the Predator have supported recent disaster operations, dramatically increasing situational awareness at the joint field office level. If available and authorized, these systems can provide near-real-time surveillance to command posts for extended periods. The approval process is not automatic. Requests for unmanned aircraft system surveillance support goes through the joint force air component command and joint task force to the joint field office for joint staff approval. The joint force air component command coordinates with the FAA and includes the mission on the air tasking order when approved. The FAA issues notices to airmen as required.

LIMITATIONS ON THE USE OF UNMANNED AIRCRAFT SYSTEMS

G-23. There are numerous limitations involving unmanned aircraft systems operations in the United States. The three most important are legal restrictions, FAA restrictions, and weather restrictions.

Legal Restrictions

G-24. Legal restrictions on the use of unmanned aircraft systems in domestic operations are numerous. Use of DOD intelligence capabilities for DSCA missions—such as incident awareness and assessment, damage assessment, and search and rescue—requires prior Secretary of Defense approval, together with approval of both the mission and use of the exact DOD intelligence community capabilities. Certain missions require not only approval of the Secretary of Defense but also coordination, certification, and possibly, prior approval by the Attorney General of the United States. Additionally, several Department of Defense directives (DODDs) and Chairman, Joint Chiefs of Staff instructions (CJCSIs) cover military support to civil authorities. For example, DODI 3025.21and CJCSI 3710.01B apply to domestic unmanned aircraft systems operations. Additionally, the Chairman of the Joint Chiefs of Staff standing execution order for DSCA (referred to as the CJCS DSCA EXORD) provides guidance on operational parameters and limitations on using DOD intelligence capabilities for DSCA missions. Further, per DODI 3025.21, military forces cannot use military systems for surveillance and pursuit of individuals. Concerns or questions regarding legal restrictions on the use of unmanned aircraft systems in domestic operations should be directed towards the assigned judge advocate or legal advisor.

G-25. All requests for unmanned aircraft systems must be approved by the Secretary of Defense. Operators of unmanned aircraft systems supporting civilian law enforcement agencies must be cognizant of, and fully comply with, DODI 3025.21and any operational parameters and limitations specified in the Chairman of the Joint Chiefs of Staff standing execution order for DSCA regarding collection, retention, and dissemination of unmanned aircraft systems sensor data and imagery. Operators cannot conduct surveillance on specifically identified U.S. persons, unless expressly approved by the Secretary of Defense, consistent with U.S. laws and regulations. Additionally, civilian law enforcement agencies will handle any data collected by such surveillance operations. Finally, per current Office of the Secretary of Defense guidance, National Guard forces conducting domestic unmanned aircraft systems operations are normally in Title 10 (United States

Code) status, unless the Secretary of Defense determines Title 32 (United States Code) status is more appropriate.

Federal Aviation Administration Restrictions

G-26. By far, access to the national airspace system proves the biggest challenge to operating unmanned aircraft systems in the United States, its territories, and possessions. Since unmanned aircraft systems differ from manned systems, unmanned aircraft systems do not meet the same standards for operations in the national airspace system required for manned systems (the ability to see and avoid other aircraft for example). To fly unmanned aircraft systems in other-than-military restricted airspace or warning areas, unmanned aircraft systems operators must apply for a certificate of waiver or authorization (certification of authorization) from the FAA granting permission to fly the unmanned aircraft systems in the national airspace system. Processing this certification of authorization can take up to 60 days, although work is underway to shorten this process. If conditions dictate, operators can receive emergency certification of authorizations in hours. Additionally, unmanned aircraft systems operators prepare to meet other FAA requirements such as qualification training for operators and knowledge of the airspace regulations for the type of airspace in which the unmanned aircraft systems will operate.

G-27. The joint force air component commander provides guidance regarding the certification of authorization approval process due to their long-term relationship established with the FAA. Regardless of the status of a certification of authorization application, active coordination with the FAA when planning to operate military unmanned aircraft systems in the domestic airspace of the United States cannot be overemphasized. Timely coordination with the FAA gives an operator a greater chance of gaining approval to operate unmanned aircraft systems where and when required. In those instances where no pre-existing certification of authorization exists, the joint force air component command and the FAA have a process to expedite certification of authorization approval for extreme cases.

G-28. The FAA can activate a temporary flight restriction in the vicinity of disaster and hazard areas or approve an emergency certification of authorization for the unmanned aircraft systems to operate. Unmanned aircraft systems operations within an approved temporary flight restriction should be added to the verbiage contained in the temporary flight restriction. For operations outside the temporary flight restriction, operators require an additional certification of authorization.

Weather Restrictions

G-29. Severe weather presents operational challenges to most unmanned aircraft systems. Planners have to carefully consider the weather in the intended area of operations to determine if manned systems are more suitable for the desired mission. In-flight conditions—such as icing, heavy precipitation, or instrument meteorological conditions at the launch and recovery site—often preclude unmanned aircraft systems operations. Throughout the DSCA mission, unmanned aircraft systems employment depends on the current and forecasted weather conditions of the affected area.

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Glossary

The glossary lists acronyms and terms with Army or joint definitions. Where Army and joint definitions differ, (Army) precedes the definition. The proponent manual for terms is listed in parentheses after the definition, if necessary.

SECTION I – ACRONYMS AND ABBREVIATIONS

AADC	area air defense commander
AADP	area air defense plan
AAGS	Army air-ground system
AAMDC	Army Air and Missile Defense Command
ACA	airspace control authority
ACM	airspace coordinating measure
ACMREQ	airspace coordinating measure request
ACO	airspace control order
ACP	airspace control plan
ADAFCO	air defense artillery fire control officer
ADAM	air defense airspace managment
ADAM/BAE	air defense airspace management/brigade aviation element
ADP	Army doctrine publication
ADS-B	automatic dependent surveillance-broadcast
AFNORTH	Air Force North
AGL	above ground level
ALO	air liaison officer
AMD	air and missile defense
AMSL	above mean sea level
AO	area of operations
AOC	Air and Space Operations Center
AOD	air operations directive
ASOC	air support operations center
ATO	air tasking order
ATS	air traffic service
AUTL	Army Universal Task List
AWACS	Airborne Warning and Control System
AWS	airspace workstation
BAE	brigade aviation element
BCD	battlefield coordination detachment
BCT	brigade combat team
BFT	blue force tracking
CAB	combat aviation brigade
CAS	close air support
CGRS	common geographic reference system

COA	course of action
COP	common operational picture
CP	command post
CRASS	contingency response air support schedule
CRC	control and reporting center
DASC	direct air support center
DCA	defensive counterair
DOD	Department of Defense
DSCA	defense support of civil authorities
DTED	digital terrain elevation data
ESF	emergency support function
FAA	Federal Aviation Administration
FAAD	forward area air defense
FAC(A)	forward air controller (airborne)
FL	flight level
FSCM	fire support coordination measure
G-3	assistant chief of staff, operations
G-5	assistant chief of staff, plans
GARS	Global Area Reference System
GPS	Global Positioning System
HAE	height above ellipsoid
HIDACZ	high-density airspace control zone
IFF	identification, friend or foe
IFN	Intra-forward area air defense (FAAD) Network
inHg	mercury
JACCE	joint air component coordination element
JAGIC	joint air ground integration center
JAOC	joint air operations center
JAOP	joint air operations plan
JARN	joint air request net
JFACC	joint force air component commander
JFC	joint force commander
JFLCC	joint force land component commander
JTAC	joint terminal attack controller
JTF	joint task force
JUH-MTF	joint user handbook-message text format
MAGTF	Marine air-ground task force
MGRS	Military Grid Reference System
MIL-STD	military standard
MSL	mean sea level
NATO	North Atlantic Treaty Organization

OPCON	operational control
S-3	operations staff officer
S-5	plans staff officer
SIPRNET	SECRET Internet Protocol Router Network
TACP	tactical air control party
TADIL	tactical digital information link
TAGS	theater air-ground system
TAIS	tactical airspace integration system
TAMD	theater air and missile defense
TAOC	tactical air operations center
U.S.	United States
UAP	unit airspace plan
USAF	United States Air Force
USMTF	United States message text format
USNORTHCOM	United States Northern Command
UTM	Universal Transverse Mercator
WGS 84	World Geodetic System 1984

SECTION II – TERMS

airspace control

Capabilities and procedures used to increase operational effectiveness by promoting the safe, efficient, and flexible use of airspace. (JP 3-52)

airspace control system

An arrangement of those organizations, personnel, policies, procedures, and facilities required to perform airspace control functions. (JP 3-52)

airspace coordinating measures

Measures employed to facilitate the efficient use of airspace to accomplish missions and simultaneously provide safeguards for friendly forces. (JP 3-52)

airspace management

The coordination, integration, and regulation of the use of airspace of defined dimensions. (JP 3-52)

area of operations

An operational area defined by the joint force commander for land and maritime forces that should be large enough to accomplish their missions and protect their forces. (JP 3-0)

battle rhythm

A deliberate cycle of command, staff, and unit activities intended to synchronize current and future operations. (FM 6-0)

defense support of civil authorities

Support provided by U.S. Federal military forces, Department of Defense civilians, Department of Defense contract personnel, Department of Defense component assets, and National Guard forces (when the Secretary of Defense, in coordination with the governors of the affected states, elects and requests to use those forces in Title 32, United States Code, status) in response to requests for assistance from civil authorities for domestic emergencies, law enforcement support, and other domestic activities, or from qualifying entities for special events. (DODD 3025.18)

execution

Putting a plan into action by applying combat power to accomplish the mission. (ADP 5-0)

joint fires

Fires delivered during the employment of forces from two or more components in coordinated action to produce desired effects in support of a common objective. (JP 3-0)

joint fires observer

A trained Service member who can request, adjust, and control surface-to-surface fires, provide targeting information in support of Type 2 and 3 close air support terminal attack control, and perform autonomous terminal guidance operations. (JP 3-09.3)

mission command

The exercise of authority and direction by the commander using mission orders to enable disciplined initiative within the commander's intent to empower agile and adaptive leaders in the conduct of unified land operations. (ADP 6-0)

mission command system

The arrangement of personnel, networks, information systems, processes and procedures, and facilities and equipment that enable commanders to conduct operations. (ADP 6-0)

operational environment

A composite of conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander. (JP 3-0)

planning

The art and science of understanding a situation, envisioning a desired end state, and laying out effective ways of bringing that future about. (ADP 5-0)

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)

rehearsal

A session in which a staff or unit practices expected actions to improve performance during execution. (ADRP 5-0)

unified action

The synchronization, coordination, and/or integration of the activities of governmental and nongovernmental entities with military operations to achieve unity of effort. (JP 1)

working group

A grouping of predetermined staff representatives who meet to provide analysis, coordinate, and provide recommendations for a particular purpose or function. (FM 6-0)

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20 October 2016

By order of the Secretary of the Army:

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