FM 3-01

U.S. Army Air and Missile Defense Operations

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U.S. Army Air and Missile Defense Operations

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Preface

FM 3-01 is the Army-specific air and missile defense (AMD) publication outlining doctrinal AMD principles and guidelines. It describes how air defense artillery (ADA), the Army's dedicated component for AMD, and its organizations prepare for and conduct operations. It presents how AMD forces support joint operations and Army multidomain operations, addressing offensive and defensive, stability, and defense support of civil authorities tasks. The strategic, operational, and tactical levels of war are discussed, and AMD operations are defined in terms of their contributions to Army operations, as expressed in FM 3-0, and the joint counterair mission as presented in JP 3-01. FM 3-01 provides doctrinal guidance for commanders, staffs, leaders, and trainers at all levels in the operational and institutional forces and is the basis for curricula development in the U.S. Army Air Defense Artillery School.

The primary target audience for this manual is the ADA community and Army/joint leaders and staff personnel. Other Services and joint organizations may use this manual to gain insight into Army AMD operations.

Commanders, staffs, and subordinates must ensure their decisions and actions comply with all applicable U.S., international, and, in some cases, host-nation laws and regulations, and all international treaties and agreements. Commanders at all levels must ensure their Soldiers operate in accordance with the law of armed conflict and applicable rules of engagement (see FM 6-27). They must also adhere to the Army ethics as described in ADP 6-22.

FM 3-01 uses joint terms where applicable. Joint and Army terms and definitions appear in both the glossary and the text. Terms for which FM 3-01 is the proponent publication are marked with an asterisk (*) in the glossary. Definitions for which FM 3-01 is the proponent publication are boldfaced in the text. For other definitions shown in the text, the term is italicized and referenced to the proponent publication number. All ADA-unique acronyms—with the exceptions of ADA, AMD, high-to-medium altitude air defense (HIMAD), and short-range air defense (SHORAD)—are spelled out the first time they are used in each of the chapters to enhance readability. Common Army acronyms are spelled out only once, the first time they are used. Acronym use has been minimized to further enhance readability.

FM 3-01 applies to the Active Army, Army National Guard, and United States Army Reserve forces unless otherwise stated.

The proponent for FM 3-01 is the Commandant, United States Army Air Defense Artillery School. The preparing agency is the United States Army Fires Center of Excellence, Directorate of Training and Doctrine, Doctrine Division. Send comments and recommendations on Department of the Army (DA) Form 2028 (*Recommended Changes to Publications and Blank Forms)*, to Directorate of Training and Doctrine, 700 McNair Avenue, Suite 128 ATTN: ATSF-DD, Fort Sill, OK 73503; by email to usarmy.sill.fcoe.mbx.dotd-doctrine-inbox@army.mil; or submit an electronic DA Form 2028.

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Introduction

Department of Defense Directive 5100.01 charges the Army to "conduct air and missile defense to support joint campaigns and assist in achieving air superiority." FM 3-01 describes the contributions of ADA, the Army's dedicated AMD component, in the planning, coordination, and execution of AMD operations in support of joint and multidomain operations. Multinational AMD operations are also addressed, though most discussions continue to refer to joint and Army AMD.

Air and missile defense is the direct (active and passive) defensive actions to destroy, nullify, or reduce the effectiveness of hostile air and ballistic missile threats against friendly forces and assets (JP 3-01). It includes actions that may be taken on the land, in the air, at sea, and in cyberspace and space. AMD is a key element of the defensive counterair construct for defeating air and missile threats. AMD operations are generally integrated with other offensive and defensive counterair missions within the overall counterair framework. **While this manual addresses aspects of offensive counterair and passive AMD, it focuses on active AMD tactics and procedures.** The ADA force exists to deter an enemy's undesirable actions, defeat their will to employ their airpower, and destroy them in the air.

The ADA force consists of high-to-medium altitude air defense (HIMAD) systems, such as Patriot and the Terminal High Altitude Area Defense (THAAD), and short-range air defense (SHORAD), systems, such as Maneuver Short-Range Air Defense (M-SHORAD), Avenger, Sentinel, and Land-Based Phalanx Weapons System (LPWS). **Deployed ADA units are normally tailored as ADA task forces or task-organized batteries with the right quantities and mix of capabilities to achieve mission requirements**.

FM 3-01 addresses today's operational environment which envisions evolving air and missile threats to the Army and joint force which will challenge these forces in all domains. In this environment, ADA units must adapt and prepare for large-scale combat operations in a highly contested air domain. FM 3-01 provides a doctrinal approach for ADA units to fight future conflicts, explaining how the ADA echelons contribute to the three phases in which Army forces conduct operations: competition below armed conflict, crisis, and armed conflict.

FM 3-01 has been reorganized to provide a common approach to Fires doctrine and align AMD with the Fires warfighting function. FM 3-01 describes the ADA units' employment in support of Army maneuver forces in current operations and synergies with joint and multinational AMD partners. **System capabilities presented are those that are in the force by FY25.** Key new capabilities introduced are the Integrated Air and Missile Defense Battle Command System (IBCS) and the M-SHORAD system.

The logic chart for AMD operations is presented in the introductory figure on page xii. The logic chart generally follows the logic framework presented in FM 3-0 but displays items through an AMD perspective.

Peer Threats Contest the Joint Force through the Air with Attacks and Surveillance by
Ballistic missiles   Aerodynamic missiles   Manned aircraft   Unmanned aircraft   Indirect fire

The US Joint Force Addresses These Threats in

Joint Operations
Military actions conducted by joint forces and those Service forces employed in specified command relationships with each other, which, of themselves, do not establish joint forces (JP 3-0).
DOD Directive 5100.01 directs the Army to "Conduct air and missile defense to support joint campaigns and assist in achieving air superiority."

Army Contributions to Joint Operations are Embedded in

Multi-domain Operations
The combined arms employment of joint and Army capabilities to create and exploit relative advantages that achieve objectives, defeat enemy forces, and consolidate gains on behalf of joint force commanders.

The Role of ADA in Joint and Multidomain Operations is

To defeat aerial threats, through surface-to-air fires and effects, and provide early warning to enable supported commanders to complete their missions in multidomain operations.

By

- Defeating the full range of enemy air and missile threats encountered in current and future strategic, operational, and tactical fights.
- Integrating with Army, joint, interorganizational, and multinational elements.
- Providing early warning.
- Enhancing situational awareness.
- Contributing to airspace management.

Executed by ADA Echelons during Competition, Crisis, and Conflict

AAMDC   ADA Brigade   ADA Battalion/Task Force   ADA Battery   ADA Platoon   Air Defense Support Element

To Support

Offensive Operations   Defensive Operations   Stability Operations
Defense Support of Civil Authorities

To do this, we must…
Provide a broad process for planning/executing AMD Ops

Develop operations characterized by AMD…

Provide basic options for describing AMD Ops

Incorporate additional capabilities

Employment Tenets
– Mutual Support
– Weighted Coverage
– Overlapping Fires/ Coverage
– Defense in Depth
– Balanced Fires
– Early Engagement
– Resilience

Principles
– Mass
– Mix
– Mobility
– Integration
– Agility
– Flexibility

Operations Process
– Plan
  ➢ IPOE
  ➢ MDMP
  ➢ CVT
– Prepare
– Execute
– Assess

Operational Framework
– Active Defense
– Passive Defense

Complemented by Attack Ops and C2

Force Contributions to AMD
– Joint AMD
– Multinational AMD
– Non-dedicated air defense

AAMDC	army air and missile defense command	IPOE	intelligence preparation of the operational environment
ADA	air defense artillery		
AMD	air and missile defense	MDMP	military decision-making process
C2	command and control	JP	joint publication
CVT	criticality, vulnerability, threat	Ops	operations
DOD	Department of Defense		

Introduction figure. FM 3-01 logic chart

FM 3-01 consists of six chapters and three appendices.

- **Chapter 1** provides an overview of Army AMD. Numerous definitions and expanded explanations of terms are presented throughout the chapter to facilitate understanding of AMD actions and language which are applicable to all ADA echelons.
- **Chapter 2** describes the Army AMD system. It addresses ADA leaders, command posts and operation centers, sensor and weapon systems, and enabling networks. It also presents those joint entities that command, control, or influence operations of the ADA force.
- **Chapter 3** describes the Army operations process from an AMD perspective. It discusses how ADA supports this process throughout the planning, preparation, execution, and assessment phases. The focus is on planning.
- **Chapter 4** describes how ADA units perform AMD operations in support of a higher headquarters scheme of AMD and supported commander's concept of operations. The discussions focus on preparation and execution.
- **Chapter 5** describes the ADA implications and contributions during competition below armed conflict and crisis.
- **Chapter 6** describes ADA contributions in support of large-scale combat operations. It addresses an enemy's use of antiaccess and area denial activities and U.S. force actions in deployment/entry, defense, offense, and stability operations.
- **Appendix A** provides an example of Annex I (Air and Missile Defense) to an operation plan/order.
- **Appendix B** provides an example of an AMD execution matrix and how it is used as a decision support tool for synchronizing AMD tasks. The matrix supports an ADA commander's development of tasks with associated purposes.
- **Appendix C** describes the air and missile threats facing the Army and joint warfighting forces. It also presents questions used to analyze threat capabilities.

Summary of Key Changes

- Modifies the logic chart.
- Adds discussions of joint and multidomain operations in lieu of unified action and unified land operations.
- Modifies the ADA role.
- Adds discussions of IBCS and M-SHORAD—new capabilities being fielded to the ADA force.
- Reintroduces the term "high-to-medium altitude air defense (HIMAD)".
- Changes air defense airspace management (ADAM) cell to air defense support element (ADSE).
- Changes rockets, artillery, and mortars (RAM) to indirect fire, in accordance with JP 3-0.
- Replaces counter-rockets, artillery, and mortars (C-RAM) with counter-indirect fire, in accordance with JP 3-01.
- Changes counter-rockets, artillery, and mortars (C-RAM) units to Land-Based Phalanx Weapon System (LPWS) units, consistent with FM 3-01.44.
- Updates discussion of the air and missile threats.
- Adds/modifies terms, definitions, and acronyms.

The introduction tables identify changes to Army and AMD terminology presented in FM 3-0 and JP 3-01. Introduction table 1 reflects new terminology, and introduction table 2 on page xiv those terms which have been modified or rescinded. The glossary contains the defined terms.

Introduction table 1. New terms and definitions

Term	*Reasoning*
air defense artillery	New definition
air defense coordinator	New term and definition
air defense support element	New term
air defense support officer	New term
intelligence preparation of the operational environment	New term
high-to-medium altitude air defense	New term and definition
position area for air defense	New term and definition
standoff range	New definition

Introduction table 2. Modified and rescinded Army and joint terms

Term	Reasoning
alert status	Modifies the term
counter-rocket, artillery, mortars	Deletes the term per JP 3-01
intelligence preparation of the battlefield	Deletes the term per FM 2-0
air defense airspace management	Deletes the term
out-of-sector	Modifies the term
rockets, artillery, and mortars	Deletes the term per JP 3-01
threat evaluation	Modifies the term

Chapter 1

Foundations of Army Air and Missile Defense

They were the first to fire and the last to lay down their arms and only reluctantly doing so after being given a directive.

LTG Jonathan M. Wainwright

This chapter provides an overview of Army air and missile defense (AMD). It begins with the introduction of AMD specific terms and continues with a short discussion of the aerial threat. It presents the role and capabilities of air defense artillery (ADA) and the ADA foundational principles and tenets. It then links these to the multidomain tenets of operations and imperatives. The chapter continues with a brief presentation of ADA contributions to joint operations and multidomain operations. The chapter concludes with a discussion of ADA training.

SECTION I – OVERVIEW

1-1. The Army supports joint operations by conducting multidomain operations. While operating as part of the joint force and working with interorganizational and multinational partners, the Army forces gain, sustain, and exploit control over land to deny its use to an enemy. They do this using combined arms formations and capabilities to defeat an enemy and establish control of areas, resources, and populations. AMD is one of the Army's critical contributions to these efforts. Confronted by decentralized, networked, and adaptive enemies in dynamic and uncertain environments, the Army must possess a versatile mix of capabilities, formations, and equipment to conduct AMD. The ADA force must deter, defeat, and destroy air and missile threats in support of joint campaigns and assist in achieving air superiority to assure victory in a complex and uncertain world.

1-2. The terms "air and missile defense" and "air defense" appear consistently throughout the chapters. *Air and missile defense* is the direct (active and passive) defensive actions taken to destroy, nullify, or reduce the effectiveness of hostile air and ballistic missile threats against friendly forces and assets (JP 3-01). AMD is the comprehensive role of ADA. AMD is embedded in the defensive counterair portion of the joint counterair operational framework (see paragraph 1-4). AMD refers to defensive counterair actions and to the capabilities of other Service and multinational partners involved in the counterair fight (for example, Navy AMD). Though not specifically addressed in the AMD definition, AMD implies an interdependency of capabilities across the Services and often with multinational forces. AMD operations normally occur at the strategic and operational levels (theater and corps). *Air defense* is the defensive measures designed to destroy attacking enemy aircraft or aerodynamic missiles, or to nullify or reduce the effectiveness of such attacks (JP 3-01). Air defense refers to active and passive defensive measures against air threats (such as manned and unmanned aircraft, cruise missiles, and air-to-surface missiles) to enable Army echelons freedom of action. Air defense operations occur at the tactical level (division and below maneuver formations). Air defense typically appears in discussions of the defense of corps-, division-, and brigade-level operations.

1-3. In the joint lexicon, *air defense artillery* is defined as weapons and equipment for actively combating air targets from the ground (JP 3-01); more precisely, **air defense artillery is the dedicated Army systems, personnel, and forces that provide active, land-based defense against air and missile attacks.** ADA units execute AMD operations. ADA is used throughout the document as the Army's dedicated AMD force. Army AMD appears in lieu of ADA when more broadly applied to ADA actions and activities in AMD operations.

1-4. The joint counterair operational framework is based on the integration of offensive and defensive counterair operations. *Offensive counterair* are offensive operations to destroy or neutralize enemy aircraft, missile launch platforms, and their supporting structures and systems both before and after launch, and as close to their sources as possible (JP 3-01). Attack operations are the predominant offensive counterair operations. Attack operations include offensive action by any part of the joint force in support of the offensive

counterair mission against surface targets which contribute to the enemy's air and missile capabilities (JP 3-01). Offensive actions can be conducted before, during, and after launch and, though focused on surface targets in the above definition, can include attacks against airborne command and control (C2) platforms. *Defensive counterair* are all defensive measures designed to neutralize or destroy enemy forces attempting to penetrate or attack through friendly airspace (JP 3-01).

> *Note.* The operational framework for AMD had previously been known as the pillars of AMD. The pillars were active defense, passive defense, attack operations, and C2. Active defense, passive defense, and attack operations are now elements of the joint counterair operational framework. While C2 is not presented as a separate element, it serves as a baseline and enabler of all the other framework elements.

1-5. Defensive counterair consists of two operational elements: active AMD and passive AMD.

- Active AMD operations are direct defensive actions taken to destroy, nullify, or reduce the effectiveness of air and missile threats against friendly forces and assets. Active AMD deters, defeats, or destroys aerial threats, thus enabling freedom of action for friendly forces. Active AMD includes air defense and *missile defense* (defensive measures designed to destroy attacking enemy missiles or to nullify or reduce the effectiveness of such attack [JP 3-01]). Though not included in the definition of active AMD operations, countering indirect fire munitions is a fundamental part of active AMD. Counter-indirect fire actions are defensive measures to destroy, nullify, or reduce the effectiveness of rocket, artillery, and mortar threats. For simplicity's sake, air, missile, and indirect fire threats are generally referred to as "air and missile threats" hereafter.

- Passive AMD operations are all measures, other than active AMD, taken to minimize the effectiveness of hostile air and ballistic missile threats against friendly forces and critical assets. These measures include detection, warning, camouflage, concealment, deception, dispersion, hardening, and the use of protective construction (JP 3-01).

> *Note.* Fixed-wing aircraft, rotary-wing aircraft, cruise missiles, and unmanned aircraft systems (UAS) have traditionally been referred to as "air-breathing threats," or more commonly as "ABTs", by ADA Soldiers. The term "air-breathing threat" has evolved over time to "air threat" in joint doctrine. Neither term has been formally defined in joint or Service doctrine; they are described simply in terms of the threat set that they both encompass. Air threat is used consistently throughout this document to refer to these collective threats. Missile threat refers to ballistic missiles; cruise missiles are considered to be air threats.

1-6. Active AMD is typically the more prevalent counterair operational element in the early phase of campaigns; however, active AMD is finite and arrayed against those assets essential for achieving the supported commander's end state. Attack operations reduce the capacity of the enemy to launch air attacks and willingness to employ those capabilities, due to threat of losses, over time. Attack operations may thus decrease the demand for active AMD munitions in the later stages of the campaign. C2 systems link the planning and execution activities of the other operational elements. All defensive and offensive counterair operations are enabled by joint and Army C2 elements and further facilitated by mission command. A *command and control system* is the facilities, equipment, communications, procedures, and personnel essential for a commander to plan, direct, and control operations of forces pursuant to the missions assigned (JP 6-0). *Mission command* is the Army's approach to command and control that empowers subordinate decision making and decentralized execution appropriate to the situation (ADP 6-0).

1-7. AMD is conducted from the strategic to the tactical levels. Strategic-level AMD encompasses defense of assets of national interest in the homeland and allied nations. Air defense aspects of AMD are typically conducted by defensive counter-air aircraft and Army air defense systems, while missile defense is conducted by wide-area missile defense systems, such as the Ground-based Midcourse Defense system and the U.S. Navy's Aegis weapon system. All ADA systems may augment missile defense operations. Strategic missile defense operations can affect more than one combatant commander and is often referred to as global missile defense. Strategic-level AMD normally deals with countering the longer-range ballistic missile threats, such as intermediate- and intercontinental-ballistic missiles. It is important to remember that multinational partners

approach AMD from a homeland perspective, so what ADA units categorize as theater AMD is strategic AMD to them. Multinational partners will generally employ their AMD systems to defend critical assets in accordance with their national priorities.

1-8. **While all operational elements and levels are mentioned in this document, the focus throughout is active AMD and C2 as executed by ADA organizations primarily at the operational and tactical levels.** Some discussion of strategic AMD capabilities is presented, but most is deferred to FM 3-27 and JP 3-27. The combination of active AMD to defeat, attack operations to prevent, and passive AMD to mitigate air and missile attacks and surveillance, enhanced by C2 capabilities, is critical to sustainable AMD operations, enabling freedom of action and the protection of forces, equipment, and other military and geopolitical assets.

1-9. **The planning, preparations, and execution of active and passive AMD operations against all air and missile threats by all ADA echelons are aligned with the Fires warfighting function and provide the surface-to-air component of the Fires triad (surface-to-surface, air-to-surface, and surface-to-air).** ADA and field artillery elements in fires cells exchange information on current and planned operations, support the coordination of airspace, and work to assure and enable commanders to have freedom of maneuver and action. Supported commanders and their staffs determine their AMD priorities which form the basis of the AMD plan. Protection elements at all echelons are informed of AMD plans and activities to ensure the synchronization of protection of critical assets against ground and air threats. The protection element coordinates for AMD support of a commander's critical assets, but defining and approving AMD priorities is ultimately the supported commander's responsibility. Representatives from ADA echelons actively participate in fires and protection cells and keep all cell personnel advised of pertinent AMD directives, actions, information collection efforts, and the overall AMD picture.

SECTION II – AIR DEFENSE ARTILLERY AND THE AIR THREAT

1-10. As noted in FM 3-0, the operational environment is in a constant state of flux for each commander in their respective operational area, when friendly or enemy operations may be initiated or curtailed at any time. What is more of a given, regardless of the turmoil inherent in these environments, is that the United States will face a peer threat and must plan for large-scale combat operations against that threat. In the past, U.S. forces have enjoyed relative advantages over their adversaries with superior capabilities in each of the domains, particularly in the air domain. However, adversaries of the past have become peer threats, capable of challenging U.S. operations in all domains. Peer threats generate tactical, operational, and strategic challenges that are an order of magnitude more challenging militarily than other adversaries. Japan was a peer threat in World War II. The actions of an ADA unit in combatting the Japanese threat in the Philippines are depicted in the following vignette on page 4.

> **First to Fire**
>
> The 200th Coastal Artillery Regiment was originally the 111th Cavalry Regiment, officially established in 1880 as a New Mexico National Guard unit. The regiment received its new designation in April 1940 and was converted to a Coastal Artillery regiment. In December of that same year, the 200th was federalized and then sworn in on the 6 January 1941. After moving to Fort Bliss Texas for training, the regiment was bolstered from 740 to approximately 1,800 personnel. Due to their demonstrated proficiency, the 200th was selected by General MacArthur to reinforce the Philippines.
>
> The 200th departed from Angel Island in San Francisco Bay on 30 August and was stationed at Clark Field by 9 September. Just after noon on the 8 December 1941, the men of the 200th would etch their names in history books. On this day, Japanese forces launched air attacks on Clark Field to begin their assault on the Philippines. The "Old Two Hon'erd" would be the first to fire upon the enemy in the defense of the nation and score the first kills of Japanese aircraft. Manila, the capital of the Philippines, had no anti-aircraft support, so one-third of the 200th would be split off, made into the 515th Coastal Artillery Regiment, and sent there. What remained of the 200th would continue to defend Clark Field until Christmas Day when they were ordered to head south to Bataan.
>
> For the rest of the defense of the Philippines, the 200th fought against a mounting Japanese offensive. For several months, it was responsible for providing air defense for the reinforcement and defense of Bataan; when the 200th could not provide this coverage, the Soldiers destroyed their equipment and headed to the front lines to fight as infantrymen. Following the American surrender on the 9 April 1942, the American and Philippine soldiers were moved from Bataan to Camp O'Donnell by the Japanese in a brutal march that would become known as the "Bataan Death March".
>
> The heroic actions by the 200th Coastal Artillery were memorialized in 1986 with the adoption of the Air Defense Artillery Branch Motto— "First to Fire".

1-11. Potential adversaries are investing in antiaccess strategies and area denial capabilities to counter the U.S. ability to project military force into an operational area with sufficient freedom of action to accomplish assigned missions. The concept of antiaccess and area denial is to control the access into and movement within a region. Preclusion, the combination of antiaccess and area denial methods, seeks to influence the ability of an enemy, outside the region, to introduce forces into the theater and sustain combat power. Many countries are pursuing weapon systems/capabilities (such as ballistic or cruise missiles, UASs, and electromagnetic warfare) which enable antiaccess and area denial. To deter current and potential adversaries from achieving these objectives, the United States must maintain its ability to project power in areas where access and freedom to operate are challenged.

1-12. From a pure ADA perspective, operational environment considerations are focused on the air domain, while maintaining an awareness and understanding of the potential impacts of actions on AMD operations within the other domains. The air domain challenges to Army operations include:
- Increased threats from traditional ballistic missile capabilities. The ballistic missile threat has increased both quantitatively and qualitatively and is likely to continue to do so over the foreseeable future. Our known and potential adversaries will continue to challenge both the proficiency and sufficiency of U.S. ballistic missile defenses with improvements in ballistic missile technical sophistication and accuracy, increases in inventories and launch systems, advancement of countermeasures, and continued proliferation.
- Expanding spectrum of air and missile threats. The air and missile arsenal of today's adversaries has become more robust, diverse, and complex. Not only do our adversaries have access to the increasingly sophisticated ballistic missiles, but they also have a growing array of cruise missiles.

- The availability and use of UASs has grown exponentially and technological trends are dramatically transforming legitimate applications of small-unmanned aircraft systems (sUASs) while simultaneously making them increasingly capable weapons in the hands of state actors, non-state actors, and criminals. They are effective for surveillance, targeting, electronic attack, and direct kinetic attack using onboard munitions or acting as precision guided munitions themselves. Manned fixed- and rotary-wing aircraft capabilities continue to evolve, and these aircraft remain as lethal threats to maneuver formations. Indirect fire munitions are easily attainable, relatively inexpensive, and extremely lethal. All air and missile threats must be addressed by Army and joint AMD forces within the context of antiaccess and area denial operations and of defeating countermeasures, electronic attack, and cyberspace efforts.

1-13. The threats to be countered by ADA systems are ballistic missiles, large-caliber rockets, cruise missiles, air-to-surface missiles, hypersonic weapons, manned fixed- and rotary-wing aircraft, UASs, and indirect fire (rocket, artillery, and mortar) weapons. Most aerial threats will be employed in the areas of operations in which ADA units operate.

SECTION III – AIR DEFENSE ARTILLERY ROLE AND FUNCTIONS

1-14. The role of air defense artillery is to defeat aerial threats, through surface-to-air fires and effects, and provide early warning to enable supported commanders to complete their missions in multidomain operations.

1-15. ADA units conduct AMD operations to support U.S., joint, and multinational forces across the range of military operations, from military deterrence through large-scale combat operations. The primary ADA functions in executing AMD operations are—

- **Defeat the full range of enemy air and missile threats encountered in current and future strategic, operational, and tactical fights.**
- **Integrate with Army, joint, interorganizational, and multinational elements.**
- **Provide early warning.**
- **Enhance situational awareness.**
- **Contribute to airspace management.**

1-16. ADA capabilities are currently being enhanced by the fielding of the Integrated Air and Missile Defense Battle Command System (IBCS) and Maneuver Short-Range Air Defense (M-SHORAD) system and further facilitated by the continued contributions of space elements. Though currently limited to fielding in some Patriot units, IBCS constitutes the beginning of a common C2 system—the backbone of the integrated ADA force. IBCS provides commanders with tailorable sensor and weapon capabilities to meet mission needs. It integrates ADA C2 nodes, sensors and weapons systems into a meshed network that eliminates the stove-piped processes of previous generations, enabling any-sensor, preferred-shooter engagements. M-SHORAD is a divisional ADA system that provides dedicated defense of maneuvering forces in BCTs against rotary- and fixed-wing aircraft and UASs. Space-based systems provide ballistic missile launch warnings, attack assessments, launch locations, predicted impact areas, and tracking data that make intercepts possible. Space elements also enable global and theater-wide communications and accurate targeting of enemy forces and key assets. For more information, see FM 3-14.

SECTION IV – THE ARMY AIR AND MISSILE DEFENSE SYSTEM

1-17. ADA is composed of composite systems (systems consisting of sensor, weapon, and C2 components) and singular systems (a sensor, weapon, or C2 system) that provide sense, engage, and interoperable capabilities to counter aerial threats to maneuver forces and other high priority assets. ADA systems are arrayed throughout a theater. Composite ADA systems are generically referred to as high- to medium-altitude air defense (HIMAD), and singular systems typically in the context of short-range air defense (SHORAD). Singular systems require sensors or weapons networked by and with C2 capabilities.

1-18. *High-to-medium altitude air defense* **are those capabilities that provide defense against longer-range air and ballistic missile threats.** HIMAD addresses capabilities that are primarily employed to

counter ballistic missile threats, ranging from close-range to intermediate-range variants, in theater. Most HIMAD systems have diverse, system-specific C2 sub-systems that require conventional manual processes and methodology to perform integrated AMD operations, though, as noted above, IBCS is being fielded to some Patriot units. Patriot and THAAD are HIMAD systems. ***Short-range air defense* are those capabilities that provide air defense against low-altitude air threats.** Short-range air defense (SHORAD) consists of dedicated ADA and non-dedicated air defense (known as combined arms for air defense) capabilities which deny an enemy the use of airspace and provide the supported commander freedom of action. SHORAD capabilities do this by deterring, defeating, or destroying low-altitude air threats to defended critical fixed and semi-fixed assets and maneuvering forces. SHORAD systems are M-SHORAD, Avenger, Stinger man-portable air defense (MANPAD), Counter-Small Unmanned Aircraft System (C-sUAS) variants, Land-Based Phalanx Weapon System (LPWS), Sentinel, and the forward area air defense (FAAD) C2 system. For more information on the ADA systems, see chapter 2.

SECTION V – PRINCIPLES, TENETS, AND IMPERATIVES

1-19. Fundamental to the planning and employment of ADA units and the capabilities cited above for joint and multidomain operations are the AMD principles and employment tenets. Principles provide an underlying rule set. Employment tenets identify criteria for the positioning of ADA systems. Army doctrine emphasizes tenets of operations and imperatives as guides for operations that improve the prospects of success by Army forces without being prescriptive.

1-20. The AMD principles and employment tenets are aligned with the Army tenets of operations, though most of the AMD principles and tenets differ in wording and scope. The AMD principles and tenets are used to develop air defense operations plans/orders and design defenses, while the multidomain tenets of operations are used to inform and assess courses of action throughout the operations process. While there is no specific alignment between the AMD principles and employment tenets and Army imperatives, ADA commanders must be cognizant of the imperatives and consider how the AMD principles and employment tenets enable/support the Army imperatives.

AIR AND MISSILE DEFENSE FOUNDATIONAL PRINCIPLES AND EMPLOYMENT TENETS

1-21. ADA commanders use principles and tenets to develop concepts of air defense and operation plans/orders. AMD principles and employment tenets provide a means of assessing the allocation and arrayal of ADA units to provide the right force in the right place to defend critical high value military and geopolitical assets and forces. When applying the principles and tenets, planners must consider the tactical and technical capabilities of each weapon and sensor system; the relevant factors of mission, enemy, terrain and weather, troops and support available, time available, civil considerations, and informational considerations (METT-TC [I]); intelligence preparation of the operational environment (IPOE); and AMD priorities.

1-22. Fielding of IBCS provides unique capabilities to achieve the principles and tenets. The enhancements that IBCS will bring to the ADA force, not just to select Patriot units, are discussed in the Task Organization section, beginning on page 101. New ADA systems will be fielded with IBCS components in accordance with the IBCS program schedule.

AIR AND MISSILE DEFENSE PRINCIPLES

1-23. Armed with a thorough understanding of the operational environment that is further focused through the lens of the mission variable conditions, commanders apply AMD principles when planning active AMD operations. A *principle* is a comprehensive and fundamental rule or an assumption of central importance that guides how an organization or function approaches and thinks about the conduct of operations (ADP 1-01).

1-24. **The AMD principles are mass, mix, mobility, integration, flexibility, and agility**. Mass, mix, mobility, and integration are traditional principles that have stood the test of time. Flexibility and agility are inherent considerations that address how ADA units organize and operate on future battlefields. Effective AMD not only defeats an enemy, but it also denies the enemy the freedom to maneuver in the airspace.

Mass

1-25. Mass is the concentration of combat power sufficient to achieve the commander's intent. Mass, when applied to AMD, is achieved by assigning sufficient AMD firepower (effects) to successfully defeat enemy aerial capabilities arrayed against friendly forces and assets. AMD mass can also be achieved by the launching of more than one missile against a target.

Mix

1-26. Mix is the employment of a combination of weapons and sensors to defend the force and assets from the threat. Mix offsets the limitations of one system with the capabilities of another and presents a threat with a more complex problem set. Mix typically results in the tailoring of a force to meet mission needs.

Mobility

1-27. *Mobility* is a quality or capability of military forces which permits them to move from place to place while retaining the ability to fulfill their primary mission (JP 3-36). ADA units should have mobility that matches that of their supported forces or defended assets.

Integration

1-28. Integration constitutes the combination of ADA and other joint counterair forces, systems, functions, processes, and information acquisition and distribution required to efficiently and effectively perform the mission. Integration combines separate systems, capabilities, or functions in such a way that they can operate singly or in concert without adversely affecting other elements. Integration has three sub-elements. Each of these can be applied to the Army architecture, larger joint or multinational AMD architecture, and planning processes.

- Functional integration consists of those activities associated with the allocation, distribution, and synchronization of functions into the joint and Army's scheme of AMD.
- Operational integration consists of those activities associated with enabling and optimizing the performance of AMD within the total theater resources.
- Architectural integration consists of those activities associated with establishing, assuring, and enhancing the information interchange within the AMD component elements (organizations, weapons, and communications systems and components) and with the Army theater information architecture (hardware, software, operations, and personnel).

Flexibility

1-29. Flexibility must characterize thoughts, plans, and operations to maintain the initiative during changing conditions with an adaptive enemy. Flexibility enhances rapid reaction to unforeseen circumstances (FM 3-0). The AMD principle of mix (see paragraph 1-26 above) discusses the combination of ADA systems as task-force tailored formations. The principle of flexibility is applied in AMD terms primarily within a system's capability to be adapted to different (changing) threat conditions. While ADA systems primarily have system-centric architectures, each of the architectures enables some flexibility to tailor defense planning to METT-TC (I).

Agility

1-30. *Agility* is the ability to move forces and adjust their dispositions and activities more rapidly than the enemy (APD 3-0). Agility is achieved through the continuous application of the aerial IPOE and use of digital systems to employ forces to defeat the threat by operating inside the enemy's decision space. This allows ADA commanders to leverage digital capabilities, such as the air picture, and allocate and array ADA units to defeat an air and missile threat.

AIR AND MISSILE DEFENSE EMPLOYMENT TENETS

1-31. While commanders should always start AMD employment planning by applying the principles described above, they should also strive to adhere to employment tenets (desirable attributes) when

planning and positioning their ADA resources. A tenet is a belief, dogma, or doctrine generally held to be true. **The AMD employment tenets are mutual support, overlapping fires and coverage, balanced fires, weighted coverage, early engagement, defense in depth, and resilience**.

1-32. The application of a specific tenet or tenets is dependent on METT-TC (I) and requires detailed coordination. Coordination is typically required between dedicated ADA units and non-dedicated air defense teams, joint and multinational AMD forces, and supported maneuver forces to avoid over engagements, potential fratricides, and unnecessary redundancies. In some cases, the application of one tenet can only be achieved at the expense of another, as noted below. In addition, IBCS enhancements expand the application of the tenets to sensors, as well as weapons.

Mutual Support

1-33. *Mutual support* is that support which units render each other against an enemy, because of their assigned tasks, their position relative to each other and to the enemy, and their inherent capabilities (JP 3-31). In AMD, weapons are positioned so that the fires of one weapon can engage targets within the dead zone (blind spots in the field of fire) of the adjacent weapon.

Overlapping Fires and Overlapping Coverage

1-34. Weapons are positioned so that their engagement envelopes overlap. Because of the many altitudes and ranges from which the enemy can attack or conduct surveillance operations, defense planners must apply mutual supporting and overlapping fires vertically and horizontally. Overlapping coverage is the positioning of sensors such that their coverage does not leave any seam in the defense that might be used by approaching threats. Overlapping fires and overlapping coverage should be considered together during defense planning.

Balanced Fires

1-35. Weapons are positioned to deliver an equal volume of fires in all directions. This is necessary for AMD in an area where the terrain does not canalize the threat or when the avenues of approach are unpredictable.

Weighted Coverage

1-36. Weapons coverage is combined and concentrated toward the most likely threat air avenues of approach or direction of attack. Based on the tactical situation, a commander may risk leaving one direction of attack undefended or lightly defended to weight coverage toward another direction. Weapons coverage is usually driven by threat indications and warnings and is terrain dependent. If the terrain canalizes the enemy to an air avenue of approach, then weighted coverage might be appropriate. Weighted coverage is generally desirable when designing defenses to defeat ballistic threats.

Early Engagement

1-37. Sensors and weapons are positioned so they can engage the threat before ordnance release or friendly target acquisition. Early engagements enable destruction of enemy platforms over enemy forces and unoccupied areas, thereby reducing the possibility of friendly collateral damage and fratricide.

Defense in Depth

1-38. Sensors and weapons are positioned so that air and missile threats are exposed to a continuous volume of fire as they approach the friendly defended asset or force, resulting in more opportunities to destroy the threats. Defense in depth decreases the probability that attacking missiles, aircraft, or indirect fires will reach the defended asset or force.

Resilience

1-39. **Resilience is the quality of the defense to maintain continuity of operations regardless of changes in or unanticipated tactics by enemy air or losses of critical air and missile defense components**.

TENETS OF OPERATION AND IMPERATIVES

1-40. Multidomain operations are baselined on tenets and imperatives of operations that improve prospects of success for employing Army forces. They are generally broader in context and scope than the ADA principles and tenets of employment.

1-41. Similarities in wording and associations between the tenets of operations and ADA principles and tenets of employment are presented in the discussions of the tenets and further displayed in table 1-1. Discussions of the imperatives and associated ADA considerations begin in paragraph 1-44. For more information on tenets and imperatives, see FM 3-0.

TENETS OF OPERATIONS

1-42. The *tenets of operations* are desirable attributes that should be built into all plans and operations and are directly related to the Army's operational concept (ADP 1-01). The tenets of operations inform and assess courses of action throughout the operations process.

1-43. There are four tenets: agility, convergence, endurance, and depth. Table 1-1 presents the multidomain tenet terms, their definitions, and association of the ADA principles and employment tenets to them.

Table 1-1. Multidomain and associated air and missile defense terms

MULTIDOMAIN TENETS	TENET DEFINITIONS	AMD PRINCIPLES AND TENETS
Agility	The ability to move forces and adjust their dispositions and activities more rapidly than the enemy (ADP 3-0).	• Agility. • Mobility. • Balanced fires.
Convergence	An outcome created by the concerted employment of capabilities against combinations of decisive points in any domain to create effects against a system, formation, or decision maker, or in a specific geographic area (ADP 3-0).	• Mass. • Mix. • Integration. • Overlapping Fires/Coverage. • Weighted Coverage.
Endurance	The ability to persevere over time throughout the depth of an operational environment (ADP 3-0).	• Resilience. • Mutual support. • Flexibility.
Depth	The extension of operations in time, space, or purpose to achieve definitive results (ADP 3-0).	• Early Engagement. • Defense in Depth. • Weighted Coverage. • Mutual support. • Balanced fires.
ADP Army doctrine publication	AMD air and missile defense	FM field manual

IMPERATIVES

1-44. Imperatives are actions Army forces must take to defeat peer enemy forces and succeed in the multidomain operational environment through all domains (FM 3-0). Brief discussions of pertinent Army and ADA considerations associated with each imperative are presented in table 1-2 on page 10. The bulletized notes are not inclusive. There is no attempt to align the bullets between the Army and ADA considerations.

Table 1-2. Army and ADA considerations in multidomain imperatives

MULTIDOMAIN IMPERATIVES	ARMY CONSIDERATIONS	AMD CONSIDERATIONS
See yourself, see the enemy, and understand the operational environment	• Commanders visualize operational environments in terms of the factors that are relevant to decision making. • Commanders simplify information collection, analysis, and decision making by focusing on how they see themselves, see the enemy, and understand the operational environment. • Commanders develop an understanding of their forces relative to mission requirements, enemy capabilities, and impacts from the operational environment. • Commanders see the enemy in terms of its combat power, advantages, and intentions within the operational environment and broader strategic context. • Leaders view the operational environment in terms of domains, dimensions, operational variables, and mission variables that are relevant to their decisions.	• Attain a holistic view of the operational environment. • Understand the unit's capabilities and organization for combat. • Use the IPOE to gain information on the enemy's ground capabilities. • Inform the supported commander and staff of the aerial portion of the IPOE. • Examine the AO's geography, terrain, weather, and infrastructure. • Analyze operations across the five domains—where, when, and how is the information to be used.
Protect against constant observation and all forms of enemy contact	• Leaders must assume they are under constant observation from one or more domains and continuously ensure they are not providing lucrative targets for the enemy to attack. • Army forces are typically in continuous visual, electromagnetic, and influence contact with adversaries. • Enemy forces employ UASs in large numbers and with a diverse array of capabilities. • Leaders combine multiple measures, including deception, to make it more difficult for enemy forces to detect friendly forces. • Leaders must ensure that their formations maintain dispersion and remain as mobile as possible to improve survivability from enemy indirect fires.	• Use passive defense measures, such as survivability moves, cover and concealment, and deception. • Designate primary, alternate, and supplementary positions with planned routes between them. • Develop PACE communication plans. • Use active defense measures to counter UASs.
Own the electromagnetic spectrum	• All communication, computing, and sensing systems operate in portions of the electromagnetic spectrum and create observable signatures. • Army and threat forces are in persistent electromagnetic contact. • The side that coordinates their actions, controls, and exploits activities in the electromagnetic spectrum while preventing the enemy from doing the same has a significant advantage. • Leaders must apply emission control measures to limit electromagnetic signatures.	• Minimize the length and frequency of radio transmissions. • Disperse command posts. • Position system components to take advantage of the terrain and implement passive defense measures. • Minimize electromagnetic signatures—turn off or rotate sensor radiate times. • Develop and enforce PACE communication plans.

Table 1-2. Army and ADA considerations in multidomain imperatives (continued)

MULTIDOMAIN IMPERATIVES	ARMY CONSIDERATIONS	AMD CONSIDERATIONS
Create and exploit relative physical, information, and human advantages	• Decision dominance is situationally dependent and always relative to an opponent. The goal is to understand, decide, and act faster and more effectively than the threat. • Adversaries and enemies pursue their own relative advantages, typically in asymmetric ways, while continually attempting to achieve decision dominance over friendly forces. • Because threat forces adapt, and situations evolve, decision dominance is relative and transitory. Commanders therefore continuously make assessments to determine which forms of relative advantage are most important to pursue over time.	• Actively participate in the targeting and information collection processes. • Use the IPOE to analyze enemy air capabilities and gather information. • Employ the MDMP to identify the best COA to deny or defeat enemy aerial operations. • Mix and mass capabilities/effects in task-organized ADA units. • Enhance execution of operations with joint and multinational AMD systems and non-dedicated air defense capabilities.
Make initial contact with sensors, unmanned systems, or the smallest element possible	• Army forces are extremely vulnerable when they do not sufficiently understand the disposition of enemy forces and become decisively engaged on terms favorable to enemy forces. • To avoid being surprised and incurring heavy losses, leaders must set conditions for making enemy contact on terms favorable to the friendly force. • Judicious employment of all available reconnaissance and security capabilities is the most effective way to make direct contact with the smallest possible friendly force. Friendly forces, for instance, should attempt to make contact using sensors and UASs first.	• Use the IPOE to identify enemy missile, UAS, and IDF launch sites and airfields. • Surveil and maintain situational awareness of the local airspace using organic ADA sensors. • Gain additional information of the airspace from other sensors and command posts. • Employ non-dedicated Stinger MANPAD teams toward the FLOT to conduct early engagements and shape future engagements by the ADA forces.
Impose multiple dilemmas on the enemy	• Imposing multiple dilemmas on enemy forces complicates their decision making and forces them to prioritize among competing options. It is a way of seizing the initiative and making enemy forces react to friendly operations. • Simultaneous operations encompassing multiple domains—conducted in depth and supported by deception—present enemy forces with multiple dilemmas. • Understanding enemy dispositions, systems, and vulnerabilities, and the characteristics of the terrain and population, informs situational understanding and course of action development.	• Plan layered defenses, with mixes of weapons and sensors, that do not allow enemy aerial forces a seam within which to surveil or attack. • Identify and analyze enemy aerial capabilities. • Establish defenses using the AMD employment tenets and revise as needed to counter enemy air. • Coordinate for electromagnetic warfare support to assist in negating enemy surveillance capabilities. • Provide point of origin information to intelligence or fire cells to enable attack operations against launch sites or targeted systems.

Table 1-2. Army and ADA considerations in multidomain imperatives (continued)

MULTIDOMAIN IMPERATIVES	ARMY CONSIDERATIONS	AMD CONSIDERATIONS
	• Understanding potential unintended consequences and the risk they pose to successful transition.	• Shift from defensive to offensive operations as maneuver forces execute attacks. • Delegate engagement authority to the most suitable ADA unit IAW enemy air types and concentrations, transitions across the coordinating altitude, and cross boundaries on the ground.
Designate, weight, and sustain the main effort	• Commanders frequently face competing demands for limited resources. They resolve these competing demands by establishing priorities. • One way in which commanders establish priorities is by designating, weighting, and sustaining the main effort.	• Analyze a supported commander's priority assets requiring defense. • Determine ADA force allocation and arrayal. • Recommend assets/activities that can be defended by available ADA units, noting that there are insufficient ADA units to defend all assets. • Adjust ADA allocations/arrayal IAW the supported commander's guidance and scheme of operations.
Consolidate gains continuously	• Commanders add depth to their operations in terms of time and purpose when they consolidate gains. • Commanders consolidate gains at the operational and tactical levels as a strategically informed approach to current operations and with considerations of the desired political outcome of the conflict.	• Maintain defenses of designated assets or areas. • Synchronize AMD operations to support rear area security operations.
Understand and manage the effects of operations on units and Soldiers	• Continuous operations rapidly degrade the performance of people and the equipment they employ, particularly during combat. • In battle, Soldiers and units are more likely to fail catastrophically than gradually. • Commanders and staffs must be alert to small indicators of fatigue, fear, indiscipline, and reduced morale, and they must take measures to deal with these before their cumulative effects drive a unit to the threshold of collapse. • Although all units experience peaks and valleys in combat effectiveness, well-trained, cohesive units under effective leaders have increased endurance and higher effectiveness than units that lack training and effective leaders.	• Increase endurance and higher effectiveness through well-trained units. • Institute an efficient and effective maintenance program to ensure high states of readiness. • Use alert states to designate units ready to fire and those in a maintenance or training status. • Establish crew rotation periods to mitigate fatigue factors and maintain radiate and maintenance schedules.

ADA	air defense artillery	IPOE	intelligence preparation of the operational environment
AMD	air and missile defense	MANPAD	man-portable air defense
AO	area of operations	MDMP	military decision-making process
COA	course of action	OPLAN	operation plan
FLOT	forward line of own troops	OPORD	operation order
IAW	in accordance with	PACE	primary, alternate, contingency, emergency
IDF	indirect fire	UAS	unmanned aircraft system

SECTION VI – AIR AND MISSILE DEFENSE OPERATIONS

1-45. Most AMD operations are currently set within the broader context of joint operations and executed with multinational forces. AMD operations entail the participation of joint and multinational forces operating as a cohesive team, with the interdependent capabilities of each's AMD components. The ADA force is typically the primary land-based contributor to AMD. While the ADA force primarily consists of THAAD and Patriot units today, divisional air defense (DIVAD) forces are being introduced into the active force to enable the supported commander's scheme of maneuver and desired end state in Army multidomain operations.

Note. DIVAD is a term currently applied to the ADA battalion in an active component division. The battalion can consist of M-SHORAD and Stinger MANPAD units or M-SHORAD and C-sUAS units. Avenger units currently provide air defense of Army National Guard divisions.

1-46. ADA units participate in the full range of operations and are critical enablers in the Army's ability to execute its tasks. ADA units support Army, joint, and multinational forces in the execution of offensive, defensive, stability, and defense support of civil authorities operations. They facilitate the conduct of decisive and sustainable land operations by Army and other land forces. Tasks can vary by type of operation and across the strategic, operational, and tactical levels of war. However, irrespective of the type of operation, ADA units deny, defeat, or destroy enemy aerial systems, denying them the use of the air domain and enabling friendly freedom of action. ADA units deny, defeat, or destroy enemy air platforms and missiles, ranging from indirect fire munitions to intercontinental ballistic missiles, and deny the enemy the use of airspace. See table 1-3.

Table 1-3. AMD functions and subordinate tasks

AMD Functions		Military Operations			
		Defensive Operations	*Offensive Operations*	*Stability Operations*	*DSCA Operations*
Defeat the full range of enemy air and missile threats encountered in current and future strategic, operational, and tactical fights. <u>*Purpose*</u>*: Support control of the air and enhance the supported commander's freedom of action.*					
T**a****s****k****s**	Defend directed assets, activities, and areas.	X	X	X	
	Determine, predict, and report enemy air and missile launch/ impact points and operating and sustainment bases.	X	X	X	X
	Develop targeting information for attack operations.	X	X	X	X
	Proactively engage aerial threats before they attack or surveil.	X	X	X	
	Defend maneuver forces on the march.	X	X	X	
	Engage aerial threats in accordance with the National Security Event ROE.				X
	Defend lines of communication and choke points along routes of march.	X	X	X	
	Plan transition to offense/defense, when directed to change missions.	X	X	X	

Table 1-3. AMD functions and subordinate tasks (continued)

AMD Functions	Military Operations			
	Defensive Operations	Offensive Operations	Stability Operations	DSCA Operations
Integrate with Army, joint, interorganizational, and multinational elements. _Purpose_: Ensure coordination between and synchronization of efforts during all phases of the conflict continuum.				
Coordinate/liaise/interoperate with Army, joint, and multinational supported/supporting commands.	X	X	X	X
Demonstrate national resolve by deploying AMD forces.	X		X	
Execute security assistance programs to build partner capacity.			X	
Perform or support Army-common tasks related to government services, emergency infrastructure reconstruction or humanitarian relief.			X	X
Deploy AMD forces/capabilities in support of National Special Security Events.				X
Provide early warning. _Purpose_: Alert forces to initiate active and passive measures.				
Incorporate ADA sensors into the supported commander's collection plan.	X	X	X	X
Position sensors to detect and track all air platforms.	X	X	X	X
Establish an early warning net with subordinate ADA units and the supported commander's forces.	X	X	X	X
Alert units/areas that may be surveilled/attacked by threat air systems.	X	X	X	X
Transmit all-clear when threat surveillance/attacks have ended.	X	X	X	X
Enhance situational awareness. _Purpose_: Facilitate commanders/leaders understanding of the air environment that allows them to plan and execute successful operations.				
Position sensors to detect and track all air platforms.	X	X	X	X
Maintain aerial surveillance of the supported commander's AO.	X	X	X	
Coordinate collection efforts with higher headquarters, other AMD elements, and the supported commander.	X	X	X	
Develop a collection plan; acquire information on friendly, enemy, and neutral air platforms.	X	X	X	
Support the development of an aerial IPOE.	X	X	X	

Table 1-3. ADA functions and subordinate tasks (continued)

AMD Functions		Military Operations			
		Defensive Operations	Offensive Operations	Stability Operations	DSCA Operations
Contribute to airspace coordination and management. <u>Purpose</u>: Conduct safe operations in the air domain.					
T a s k s	Plan sensor employments.	X	X	X	X
	Provide sensor inputs.	X	X	X	
	Establish/coordinate air defense measures.	X	X	X	
	Develop a collection plan; acquire information on friendly, enemy, and neutral air platforms.	X	X	X	
	Support the development of an aerial IPOE.	X	X	X	
	Coordinate with aviation elements in the development of airspace coordination measures.	X	X	X	
	Disseminate airspace coordination measures to ADA and supported unit commanders.	X	X	X	
	Support the characterization and identification of aerial platforms in the AO.	X	X	X	
	Execute clearance of fires.	X	X	X	

ADA	air defense artillery	DSCA	defense support of civilian authorities
AMD	air and missile defense	IPOE	intelligence preparation of the operational environment
AO	area of operations	ROE	rules of engagement

ADA IN SUPPORT OF JOINT OPERATIONS

1-47. Joint operations constitute the integrated actions of the U.S. armed forces that are able to respond to challenges from peace through war. The complex nature of the strategic environment may require U.S. forces to conduct different types of joint operations and activities simultaneously across the conflict continuum. Within this continuum, the range of military operations extends from military engagement, security cooperation, and deterrence in times of peace, through crisis response and limited contingency operations, to large-scale combat operations in times of war. Figure 1-1 presents a notional representation of such operations and activities (JP 3-0).
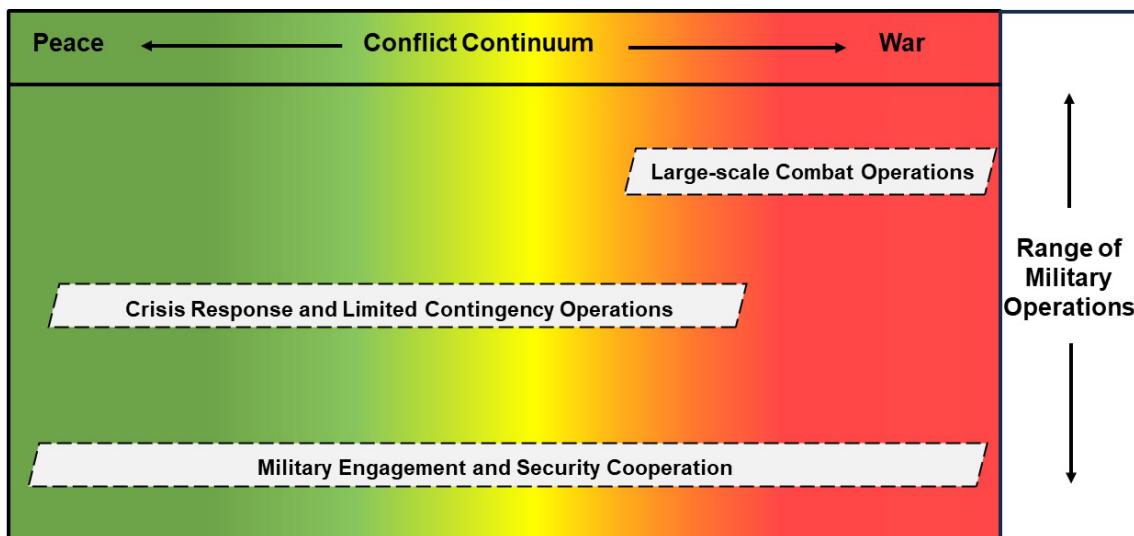

Figure 1-1. Notional operations across the conflict continuum

1-48. AMD is inherently a joint and interdependent endeavor at the operational and theater strategic levels. Each AMD component of the joint force contributes capabilities to deter, defeat, and destroy air and missile threats. In addition, Service capability and force structure development reflect a purposeful reliance on all components to maximize complementary and reinforcing effects while minimizing relative vulnerabilities (JP 3-01).

1-49. ADA units consistently operate in a joint environment, maintain forward presence, and preserve joint operational access, defending specified critical military and geopolitical assets throughout each operation. However, given the limitations in force structure, ADA units are unable to defend all of the critical assets dispersed throughout the theater. Mitigation of some of the capacity shortfalls can be achieved through active defense contributions by the AMD components of the other Services and multinational partners. The fielding of M-SHORAD systems and increased training of Soldiers to provide non-dedicated air defense further support the counterair campaign. However, in many cases, fixed, semi-fixed, and mobile assets must rely on passive defense measures to mitigate the effects of enemy air and missile attacks. ADA units provide concerted defensive capabilities in the air domain and in the littoral areas of the maritime domain in support of joint operations. The following paragraphs briefly discuss ADA actions and activities in support of the six general phases of military activities that are applicable to joint combat operations: shape, deter, seize the initiative, dominate, stabilize, and enable civil authority. While they are tied to combat operations in JP 3-0, many are equally applicable to all activities below actual combat. For more information, see JP 3-0.

1-50. **Shape**. Army shaping operations, though most prevalent in military engagement and security cooperation activities, are executed continuously throughout all joint military activities. ADA units help shape operations by supporting the assurance of friends, building partner capacity and capabilities, and promoting regional stability.

1-51. **Deter**. Operations to deter prevents an adversary's undesirable actions. Actions are generally weighted toward protection and security activities to defend friendly forces and assets—Army, joint, and multinational—and indicate the intent to execute subsequent phases of planned operations (FM 3-0). ADA units are a preeminent means of deterrence in support of the U.S.'s commitment to preserve the peace by providing assurance of defense of our forces and allies. In that regard, ADA units frequently serve as flexible deterrent options to demonstrate U.S. resolve in competition and crisis. ADA units may also be deterrents in large-scale combat operations, as an enemy may elect to not employ air platforms in an area that is recognized as having concentrations of AMD sensors and weapons.

1-52. **Seize the initiative**. Seize the initiative involves both defensive and offensive operations at the earliest possible time (JP 3-0). Joint force commanders seek to gain early superiority across the domains to allow the joint force to conduct land operations without enemy interference. Conditions preceding the ability to dominate vary depending on the adversary. Some adversaries possess significant capabilities to employ antiaccess and area denial strategies. ADA has a critical role in countering these and assuring access into a given region. The joint warfighting force's ability to conduct force projection requires ADA's ability to provide overarching force protection.

1-53. **Dominate**. Army forces conduct required actions to seize the initiative and dominate the enemy. Successful domination depends on overmatching enemy capabilities at critical times and places. Operations can range from large-scale combat operations to various stability actions depending on the nature of the enemy (JP 3-0). ADA is a key element and enabler in the counterair battle and a significant enhancer in the achievement of air superiority, or at a minimum, maintain air parity throughout operations. Large-scale combat operations require the employment of a considerable amount of ADA units to defend the most critical theater assets, as designated by the joint force commander.

1-54. **Stabilize**. Actions and activities are typically characterized by a shift in focus from sustained combat operations to the restoration of a safe and secure environment with local political, economic, and infrastructure stability. Operations to stabilize typically begin with significant military involvement, to include some combat. Operations then move increasingly toward transitioning to an interim civilian authority and enabling civil authority as the threat lessens and civil infrastructures are reestablished. Force protection will continue to be important, and combat operations might continue, although with less frequency and intensity than in the dominate phase (JP 3-0). ADA units support operations by defending critical assets and population centers as areas are secured.

1-55. **Enable civil authority**. Enabling civil authorities allows for them to regain their ability to govern and administer the services and other needs of the population (JP 3-0). ADA units continue their missions to ensure a safe environment. AMD efforts are presented to the protection cells of the supported echelon in the localized area of operations for situational awareness and synchronization with ground activities.

ADA IN SUPPORT OF MULTIDOMAIN OPERATIONS

1-56. Army forces conduct operations in support of the joint force, with multinational allies and partners, and in coordination with other agencies and organizations. The Army's contribution to joint operations is multidomain operations. *Multidomain operations* are the combined arms employment of joint and Army capabilities to create and exploit relative advantages that achieve objectives, defeat enemy forces, and consolidate gains on behalf of joint force commanders (ADP 3-0).

1-57. Multidomain operations span the competition continuum and seek to integrate and employ available capabilities to create and exploit relative advantages across the domains. All operations are multidomain operations. Army forces integrate land, maritime, air, space, and cyberspace capabilities in the operational environment to facilitate operations across the competition continuum. Within the context of an operational environment, a *domain* is a physically defined portion of an operational environment requiring a unique set of warfighting capabilities and skills (FM 3-0). For information on each of the domains, see FM 3-0.

1-58. ADA units at the tactical level that support Army formations are positioned throughout the land domain to defend assets critical to the execution of operations within all domains, such as maneuver forces, naval and air bases and forces, cyberspace and space nodes, and C2 facilities. ADA units execute their missions primarily against aerial threats transiting the air domain; they also contribute to the joint targeting process and the application of offensive actions to defeat or negate air and missile threats through the use of air, land, maritime, and cyberspace capabilities. Using organic sensors, ADA units assist in collecting information on air threat capabilities which enable the acceptance or rejection of potential threat courses of action. ADA elements support air operations and contribute to airspace management. Engaging, deterring, or destroying threat air platforms support the air component's ability to achieve air superiority. ADA units collaborate with Navy AMD elements, typically in the littoral regions, to engage air and missile threats in the land domain.

1-59. The air battle will be prosecuted in all domains, with the objective of winning the battle. Where and how the threat aerial platform is defeated or negated is irrelevant. Land-based maneuver, aviation, and artillery forces provide security for ADA and other AMD forces against land-based threats and their support structures and can proactively target air and missile threats on the ground, greatly reducing their numbers and/or effectiveness before they can be employed.

1-60. Multidomain operations are aligned with the six phases of joint operations. However, they are executed under the rubric of competition below armed conflict, crisis, and armed conflict. See chapters 5 and 6 for discussions of how ADA supports these.

SECTION VII – AIR AND MISSILE DEFENSE OPERATIONAL APPROACH AND FRAMEWORK

1-61. The operational approach provides the logic for how tactical tasks ultimately achieve the desired end state. It provides a unifying purpose and focus to all operations. Sound operational approaches balance risk and uncertainty with friction and chance. The operational approach provides the basis for detailed planning, allows leaders to establish a logical operational framework, and helps produce an executable order.

1-62. An operational framework organizes an area of geographic and operational responsibility for the commander and provides a way to describe the employment of forces. The framework accounts for operations across the strategic realm, close operations, and operations in depth.

OPERATIONAL APPROACH

1-63. An *operational approach* is a broad description of the mission, operational concepts, tasks, and actions required to accomplish the mission (JP 5-0). An operational approach is the result of the commander's

visualization of what needs to be done in broad terms to solve identified problems. It is the main idea that informs detailed planning. When describing an operational approach, commanders—

- Consider ways to defeat enemy forces in detail and potential decisive points.
- Employ combinations of defeat mechanisms to isolate and defeat enemy forces, functions, and capabilities.
- Assess options for assuming risk.

1-64. *Defeat* is to render a force incapable of achieving its objectives (ADP 3-0). *Defeat in detail* is concentrating overwhelming combat power against separate parts of a force rather than defeating the entire force at once (ADP 3-90). Defeat in detail requires leaders to evaluate enemy forces across all relevant domains and dimensions of an operational environment. ADA leaders must understand the projected air and missile threats in the area of operations and then discern the best ways to employ ADA systems to defeat the various types of threats.

1-65. A *defeat mechanism* is a method through which friendly forces accomplish their mission against enemy opposition (ADP 3-0). Army forces at all echelons commonly use combinations of four defeat mechanisms: destroy, dislocate, disintegrate, and isolate. ADA units help to support this by providing subject-matter expertise during the information collection and targeting processes and employing organic and non-organic capabilities. ADA units focus on the destruction of enemy air and missile threats. Through the continuous updating of the aerial IPOE, ADA forces leverage joint force capabilities and the joint targeting process to also dislocate, disintegrate, and isolate enemy air threat forces and operations

1-66. Commanders conduct risk management, analyzing risk in collaboration with subordinates to help determine what level and type of risk exists and how to mitigate it. Given operations where there are typically insufficient ADA units to defend all of a supported commander's key assets, the supporting ADA commander and the supported commander must decide which assets can be actively defended. The supported commander must accept risk for the remaining assets. Risk mitigation by these assets can be achieved through passive defense measures and the use of their organic weapons to defend themselves against air threats.

STRATEGIC FRAMEWORK

1-67. The strategic framework accounts for factors in the strategic environment and the connection of strategic capabilities to operational- and tactical-level operations. The strategic framework includes four areas: strategic support area, joint security area, extended deep area, and the assigned operational area.

1-68. The strategic support area describes the area extending from a theater of operations to a base in the United States or another combatant commander's area of responsibility. It contains those organizations, lines of communications, and other agencies required to support deployed forces. It also includes the airports and seaports supporting the flow of forces and sustainment into a theater.

1-69. A *joint security area* is a specific area to facilitate protection of joint bases and their connecting lines of communications that support joint operations (JP 3-10). The joint security area is inside, or immediately adjacent to, an operational area where significant forces and sustainment from two or more Services are positioned to conduct or support operations.

1-70. The extended deep area is comprised of operational and strategic deep areas. Extended deep areas are generally the purview of the joint force headquarters or another combatant command. The joint force air component command is normally the supported command in extended deep areas.

OPERATIONAL FRAMEWORK

1-71. The *operational framework* is a cognitive tool used to assist commanders and staffs in clearly visualizing and describing the application of combat power in time, space, purpose, and resources in the concept of operations (ADP 3-0). Commanders build their operational framework on their assessment of the operational environment, including all domains and dimensions.

1-72. The joint force commander assigns land forces an operational area within a joint organizational construct. There are three types of assigned areas that a land component or ARFOR commander uses: area of operations, zone, and sector.

1-73. ADA commanders generally use areas of operations in addressing assigned areas. An *area of operations* is an operational area defined by a commander for the land or maritime force commander to accomplish their missions and protect their forces (JP 3-0). A land area of operations by definition does not include a volume of airspace to control. Control of the airspace above assigned land areas is not an inherent responsibility of the land component commander. Airspace control authority resides with the joint force commander, who designates an airspace control authority to develop operational policies and procedures for airspace usage. **Airspace control authorities delegate airspace control to Army commanders based on the situation**. All commanders must thus be prepared to enable or coordinate airspace management. Airspace control must be delegated for operations below the coordinating altitude. The *coordinating altitude* is an airspace coordinating measure that uses altitude to separate users and as the transition between different airspace control elements (JP 3-52). The joint airspace control authority designates the coordinating altitude in coordination with the joint force land component commander and joint force air component commander (in the event the airspace control authority is not also the joint force air component commander). See table 4-4 on page 108 for more information on the coordinating altitude.

1-74. Within assigned areas, commanders organize their operations in terms of time, space, and purpose by synchronizing deep, close, and rear operations. Figure 1-2 on page 20 depicts the nominal locations of ADA units across the four areas of the strategic framework. The assigned operational area is further reflected as the rear, close, and deep areas.
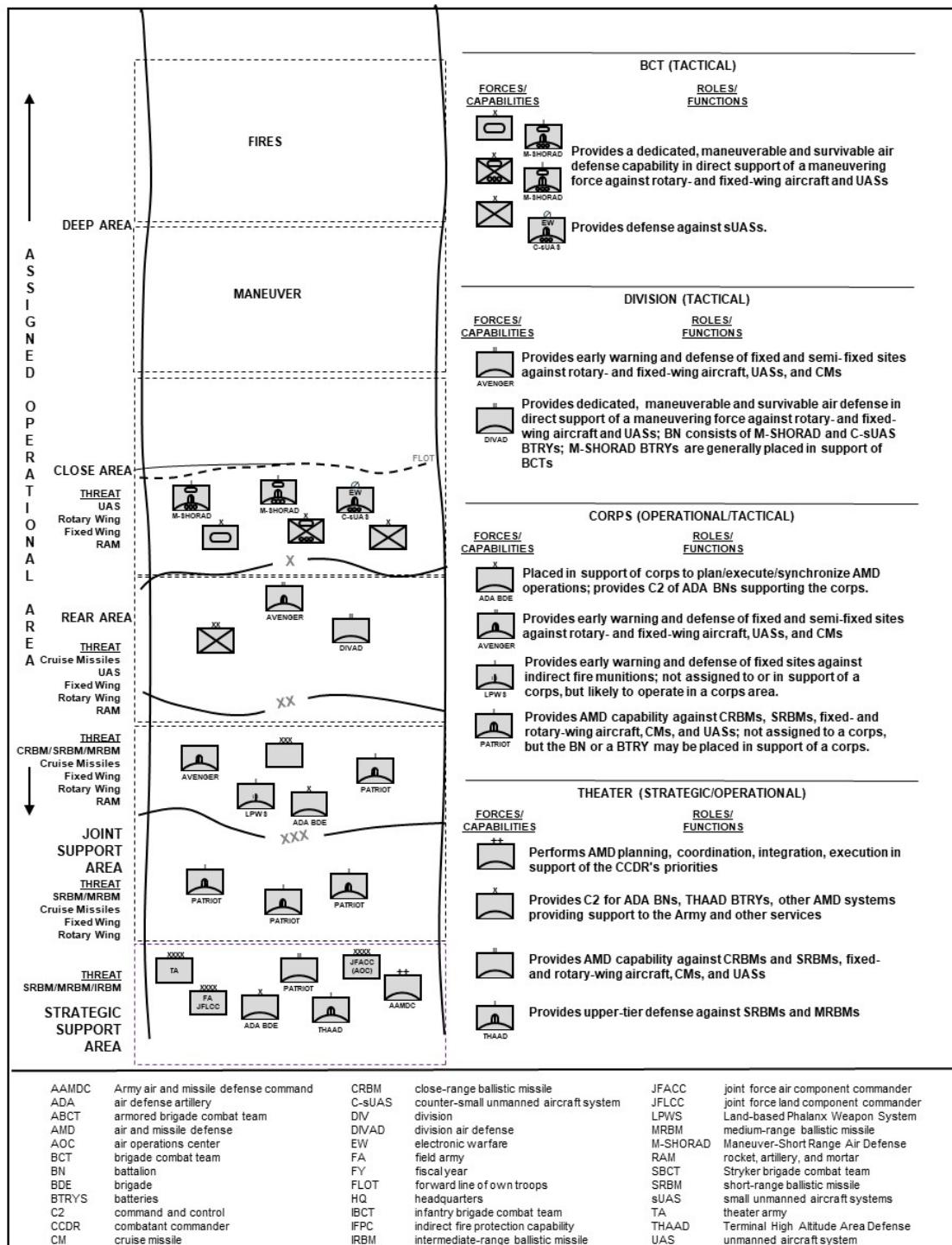
Figure 1-2. Air defense artillery forces arrayed across the operational framework

1-75. *Deep operations* are tactical actions against enemy forces, typically out of direct contact with friendly forces, intended to shape future close operations and protect rear operations (ADP 3-0). Deep operations are inherently joint. *Close operations* are tactical actions of subordinate maneuver forces and the forces providing immediate support to them, whose purpose is to employ maneuver and fires to close with and destroy enemy forces (ADP 3-0). *Rear operations* are tactical actions behind major subordinate maneuver forces that facilitate movement, extend operational reach, and maintain desired tempo (ADP 3-0).

1-76. ADA units are arrayed from the homeland to the forward areas of a theater of operations. Though not portrayed in the figure, ballistic missile defense systems defend the United States against ballistic missile attack, while AMD systems of all Services add defense against other air and missile threats. The army air and missile defense command (AAMDC) orchestrates the allocation and positioning of Patriot and THAAD units, as well as the integration of joint and multinational AMD capabilities to defend high priority theater and corps assets in the strategic support and joint security areas against the cited threats. Patriot and THAAD can also support AMD efforts across theaters or regions as well as those within the theater. In support of the fight in the corps or theater deep area, the AAMDC or ADA brigade and battalion employ the IPOE process to identify prospective enemy air and missile operating and launch areas and nominate those areas for subsequent targeting by long-range artillery and aviation assets. DIVAD forces, such as M-SHORAD batteries and platoons, generally defend assets in the division and brigade areas. They are positioned with division or brigade maneuver formations in the close area, where most subordinate maneuver forces conduct close combat. They are oriented to the threat using techniques such as target lines, sectors, or aerial engagement areas. An aerial engagement area, for instance, identifies the engagement parameters of DIVAD units and is established/adjusted to ensure denial or defeat of enemy air platforms. The C-sUAS batteries in DIVAD battalions and teams assigned to divisions can mitigate surveillance and attack options by unmanned aircraft and can assist in thickening defenses. The air defense support element (ADSE) personnel in the BCT plan and coordinate the support of SHORAD or other ADA units and relay pertinent AMD information and early warning of enemy air activity to maneuver formations. For additional information on the aerial engagement area, see paragraph 4-90 on page 113.

SECTION VIII – AIR DEFENSE ARTILLERY TRAINING CONSIDERATIONS

For every day of training in peacetime, we may save weeks and months of war.

Robert P. Patterson

1-77. The ADA branch requires agile and adaptive commanders and leaders, who are masters of their craft and who are comfortable operating in complex, often ambiguous, environments. ADA commanders and leaders are often the AMD subject matter experts at echelons two-to-three levels higher than they are. For instance, the DIVAD battalion commander provides a division commander with the relevant information on the aerial threats and the DIVAD capabilities to defeat these threats. The ADA commander or leader must be an active, aggressive participant in a supported commander's actions, an invaluable advisor, and the primary go-to person on all AMD matters. The ADA commander or leader must understand maneuver and how best to support the supported unit. ADA commanders and leaders also need to have a thorough understanding of Army operations, as well as joint counterair operations, and how they are planned and executed.

1-78. The principles of training provide foundational direction for all commanders and leaders. There are eight principles that guide and influence training at every echelon. See FM 7-0 for more information.
- Commanders are the primary trainers.
- Noncommissioned officers train individuals, crews, and small teams; advise commanders on all aspects of training.
- Train using multi-echelon techniques to maximize time and resource efficiency.
- Train as a combined arms team.
- Train to standard using appropriate doctrine.
- Train as you fight.
- Sustain levels of training proficiency over time.
- Train to maintain.
- Fight to train.

COMMANDERS ARE THE PRIMARY TRAINERS

1-79. Commanders at all echelons are the primary trainers in that they are responsible for ensuring that their units can perform their missions. Commanders cannot delegate this responsibility. However, actual training is generally conducted by unit non-commissioned officers. Commanders train and resource training one echelon down, and they evaluate to two echelons down. ADA commanders are directly responsible and

accountable for all aspects of unit training including the certification/qualification of their individuals, sections, platoons, batteries, and battalions. They understand and employ the principles of unit training and leader development.

1-80. Through guidance and direction, commanders drive the training management process. They directly observe and participate in the unit's training and leader development to better assess mission readiness and help their subordinates improve. They understand that unit training and leader development are inextricably linked; good training can develop good leaders, and good leaders are the key to good unit training, as subordinate leaders are the primary trainers of their units. Commander/leader involvement makes a quantitative and qualitative difference in unit training and leader development.

NONCOMMISSIONED OFFICERS TRAIN INDIVIDUALS, CREWS, AND SMALL TEAMS; ADVISE COMMANDERS ON ALL ASPECTS OF TRAINING

1-81. Noncommissioned officers are at the core of unit training. They train individual Soldiers, crews, and units to be proficient in AMD operations and capable of executing mission requirements. They advise commanders on what must be trained, how it is trained, and the training status of individuals through composite units.

1-82. Noncommissioned officers also—
- Help identify and prioritize unit collective tasks that support an ADA unit's mission-essential tasks.
- Train and enforce task standards.
- Continually focus training on sustaining strengths and improving weaknesses.
- Develop junior noncommissioned officers and help officers develop junior officers.
- Provide timely and objective training advice to their officers.
- Assist in planning, resource coordination, support, risk management, supervision, and evaluation of training.

TRAIN USING MULTIECHELON TECHNIQUES TO MAXIMIZE TIME AND RESOURCE EFFICIENCY

1-83. The Army trains at echelon as a team. ADA teams and units can conduct collective training using higher-level, lower-level, and possibly adjacent ADA units to train for AMD operations in a regionally-specific scenario.

1-84. The higher echelon provides the requisite C2 guidance and directives to its immediate subordinate unit(s) to allow it to conduct or direct aerial engagements. Higher echelon ADA personnel gain proficiency in working with and coordinating efforts across subordinate units, fostering a cohesive team. Subordinate ADA unit personnel gain proficiency in conducting operations with higher. Adjacent ADA units, to include non-dedicated Stinger MANPAD teams if available, can gain experience in relaying information and synchronizing operations as directed. Each commander determines what essential supporting tasks must be trained to attain the required levels of objective training required for mission-essential task proficiency.

TRAIN AS A COMBINED ARMS TEAM

1-85. Units must regularly train with the organizations which with they operate and the capabilities with which they intend to fight. ADA unit associations are generally addressed in operation plans and orders.

1-86. Some associations are habitual. For instance, a DIVAD battalion typically designates its batteries to support specific brigade combat teams. The support associations are coordinated, trained, and synchronized with that BCT's maneuver elements. The goal is to have a seamless integration of ADA training with a maneuver and joint force.

TRAIN TO STANDARD USING APPROPRIATE DOCTRINE

1-87. ADA units train to standard using gunnery tables, to prepare leaders, individual Soldiers, and teams to accomplish their assigned missions. Gunnery training provides a systematic approach to continuous training with the focus starting on individual procedures and developing to section, team, and higher collective proficiency. Gunnery tables are prescriptive for all units, while still allowing flexibility in selecting standardized engagements from a menu to enable achievement of training objectives within the scope of the commander's intent. Gunnery is a continuous process based on the unit's mission set and proficiency level to build and sustain lethal sections and formations. Gunnery must be incorporated into training at all levels with the necessary frequency and repetition to enable mastery.

1-88. Gunnery tables should be adaptable for specific areas of operation. Training should be tailored, with scenarios purpose-built for the mission and operational environment in which the ADA units will operate. Training should focus on the expected aerial threats, command and control architecture, and rules of engagement specified for that area. Standards should be consistent in common areas that are addressed at all echelons. Successful accomplishment of gunnery table tasks results in certified ADA Soldiers and teams/crews—those capable of applying their skills and accumulated knowledge in a field environment or real-world setting.

TRAIN AS YOU FIGHT

We must remember that one man is much the same as another, and that he is best who is trained in the severest school.

Thucydides

1-89. A unit primarily must seek to train with its full complement of equipment, from the sensor to the shooter, in live, virtual, and constructive environments that simulate the expected area of operations. Training aids, devices, simulations, and simulators support individual ADA Soldiers to gain and sustain proficiency in how they fight their positions, crews in how they fight their systems, and units in how they fight as organizations. Combat-ready ADA forces are built through repetitions in realistic training environments under challenging conditions.

1-90. Habitual associations of ADA units with designated units provide opportunities for collective training that replicate situations in a deployed setting. Participation in exercises and combat training center rotations provide a final check on learning at home station further enhance how to fight skills prior to fighting for real. This reinforces the mantra of train as you fight, fight as you train.

SUSTAIN LEVELS OF TRAINING PROFICIENCY OVER TIME

1-91. ADA commanders are responsible for maintaining high standards of training within their units. Commanders strive to reach training proficiency in individual Soldiers, crew, and subordinate units and to sustain levels of proficiency over time. Proficiency of individuals and units in ADA activities, at all echelons, must be established, reinforced, and monitored. Leaders understand the impact of task atrophy—that over time and circumstances, individual and unit skills naturally erode. Leaders actively and aggressively work to mitigate the effects of task atrophy by using available training resources to extend training proficiency. One way to achieve this is through a progressive approach to individual and collective training that leverages live, virtual, and constructive methods. Training must be focused and progressively stressing.

1-92. Rigorous, challenging certification programs should be enacted at unit level to determine the strengths and weaknesses of individuals and crews/teams and periodically by higher headquarters to assess the proficiency of subordinate organizations' Soldiers and units. ADA units certify individual Soldiers, leaders, and teams, generally using gunnery tables, to prepare them to accomplish their assigned missions. ADA Soldiers and leaders receive their individual certifications by their unit. Teams require certification from one or two higher levels of command, generally by an ADA battalion and ADA brigade, based on the ADA system they use. Re-certifications are required on a periodic basis to ensure continuing mastery in AMD operations.

1-93. DIVAD personnel should assist in the training of non-dedicated air defense teams. DIVAD personnel execute evaluations and recommend approval for their qualifications as a team/crew to the owning brigade commander. If a DIVAD unit is not resident in or supporting a division, the owning brigade commander may request support from the ADSE. The ADSE can attempt to obtain assistance from an ADA unit in the vicinity of the brigade. Certification training can be provided by the ADA unit's master gunner as appropriate. If a supporting ADA unit is not available, the ADSE can provide training support.

TRAIN TO MAINTAIN

1-94. Training is the cornerstone of readiness. Readiness is built on the ability to be proficient regardless of the environment, including chemical, biological, radiological, and nuclear conditions. To achieve and maintain a high degree of readiness, a commander should train in the most efficient and effective manner possible. Training should address all aspects of readiness to ensure that a unit can sustain required training proficiencies and keep personnel, equipment, and systems in the fight. Crew rotations, for instance, should be established for designated periods of time and with hand-over responsibilities clearly delineated.

1-95. Commanders must ensure there is adequate recovery, services, and maintenance operations to replenish Soldiers, equipment, and systems. Sustainment activities focus on how, when, and where to accomplish the functions of manning, arming, fueling, fixing, and moving. Ensuring the adequacies of personnel services, health services, field services, quality of life, and general supply support should also be priorities.

FIGHT TO TRAIN

1-96. Training must be a fundamental part of each Soldier's day. Realistic training with limited time and resources demands ADA commanders focus their unit training efforts to maximize training proficiency. It is a commander's duty to fight through distractions and protect training. Commanders should develop a training program that supports individual and collective training and then ensure that such training is performed. Noncommissioned officers supervise the personnel and coordinate equipment to execute the training to meet the commander's objectives. Distractions should be avoided as much as possible. When distractions cannot be avoided, commanders should consider ways to revise the scheduled training to be conducted. Simulations can be used to mitigate unexpected constraints in time and availability of resources. Simulations, for example, can be used to support training on equipment positioning procedures in lieu of training such tasks in a local training area.

1-97. Although training begins at home stations, ADA units continue to train to standard and to rehearse following arrival in theater, as time, the threat, and other conditions permit. Units should regularly review Soldier and equipment readiness and perform emergency deployment readiness exercises to ensure preparedness for deployment. Lessons learned should be passed up the chain of command, from unit to unit and from early deploying units to follow-on forces.

Chapter 2

The Army Air and Missile Defense System

The ability to sense first, to understand first, to decide first, which gives you the ability to act faster than a future opponent, is going to be a significant advantage for any commander on the future battlefield.

General John M. Murray

This chapter focuses on the components of the ADA force—its leaders, command posts and operation centers, sensor and weapon systems, and enabling networks—that constitute the Army AMD system. The Army AMD system provides the capabilities to defend supported forces and other assets at the strategic, operational, and tactical levels in the United States and overseas. Joint commanders and operation centers are also addressed to provide the full context for the C2 of AMD forces.

SECTION I – AIR AND MISSILE DEFENSE COMMAND AND CONTROL

2-1. *Command and control* is the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. (JP 1, Volume 2). *Command* is the authority that a commander in the armed forces lawfully exercises over subordinates by virtue of rank or assignment.(JP 1, Volume 2). Command is the authoritative act of making decisions and ordering actions. *Control* is the regulation of forces and warfighting functions to accomplish the mission in accordance with the commander's intent.(ADP 6-0). Control is the act of monitoring and influencing command actions. Both are essential to all military operations (FM 6-0).

2-2. Command of AMD forces and the control of AMD fires are derived from separate authorities. Army commanders exercise legal authority and responsibility for the ADA formations assigned to them or otherwise placed under their operational control. The area air defense commander (AADC) controls AMD fires that support joint operations. The AADC establishes the AMD ROE for the theater of operations. The separation of command responsibility from the authority to control AMD fires presents unique challenges for ADA commanders. They command their ADA units in the planning, preparation, and execution of the AMD mission, but at the same time, they engage air threats according to specified authorities and controls promulgated by the AADC. This complex environment results in the following set of conditions, which characterize nearly all AMD operations:

- **Most AMD operations are joint and interdependent.**
- **Army AMD operations require an integrated and networked C2 system.**
- **Command of ADA units is exercised by Army commanders.**
- **Control of Army AMD fires is exercised in accordance with joint force commander directives and by delegated authorities.**

2-3. **Most AMD operations are joint and interdependent.** The joint force commander counters air and missile threats to ensure freedom of action, provide protection, and deny enemy freedom of action (JP 3-01). The joint force's service component commands are typically tasked to conduct operations in support of the counterair mission to maximize the complementary and reinforcing capabilities that each Service brings to joint warfighting while minimizing relative vulnerabilities.

- The U.S. Army provides the primary land-based AMD forces to the joint force. The joint force commander depends on the Army to execute AMD, from the land, of critical assets within the context of a larger joint counterair mission, which includes offensive and defensive operations. As the land AMD force to the larger joint defensive counterair effort, ADA units depend on other Service capabilities to provide space-, air-, and land-based intelligence, surveillance, and reconnaissance to detect, track, provide early warning of aerial threats, and cue ADA weapon systems to effectively counter these threats. The combination of Army AMD capabilities brought

to the joint counterair effort, coupled with the support required of other Services, make most AMD operations inherently joint and interdependent.

- ADA units are also employed to directly support Army echelons. Divisional air defense (DIVAD) battalions provide active air defense for divisional maneuver formations and other critical assets. DIVAD units may be assigned general or direct support missions in accordance with the supported commander's concept of operations and priorities for AMD.
- ADA commanders must build cohesive Army teams that understand joint and Army doctrine, tactics, techniques and procedures, and that are trusted by other members of the supported joint or Army force. Further, through training and exercises, collaboration, and regular interaction, ADA commanders and those of other joint/Army components foster shared understanding that is critical to the execution of the counterair mission.

2-4. **Army AMD operations require an integrated and networked C2 system**. ADA units' dependence on other Service capabilities, as well as on each other, requires that all contributing systems (or sensor and weapon components) be networked and integrated to the greatest extent possible to facilitate a shared understanding of the operational environment for the air domain. Current capabilities are somewhat limited in the extent to which they can network and integrate due to their unique system interfaces and other proprietary and regulatory considerations. HIMAD systems rely on joint tactical data links to share track data and coordinate engagements. SHORAD systems are linked by the forward area air defense (FAAD) C2 system.

- To overcome the inherent system-centric limitations to integration, the Army has begun fielding the Integrated Air and Missile Defense Battle Command System (IBCS), a comprehensive and common networked C2 capability package that leverage all relevant external data links for full joint integration; integrate all Army AMD sensor, weapon, and C2 platforms; employ an integrated defense design planning capability; provide a robust tool set to manage planning, preparation, and engagement activities; and allow for dynamic task organization of previously stove-piped ADA systems and major components into tailored force packages.
- By employing these capabilities, ADA units are able to overcome many of the inherent challenges associated with the complexities and ambiguities that characterize the wide range of air and missile threats they must defeat. The IBCS is being fielded in Patriot battalions, but during this time frame Patriot will have a mix of C2 capabilities. Some battalions retain Patriot-centric C2 while the fielding process is underway. Within Patriot battalions equipped with IBCS, the goal of a comprehensive and common networked C2 is realized. External to those Patriot battalions equipped with IBCS capabilities, ADA units rely on joint tactical data links and Army networks to other Army, joint, and multinational systems.

3-5. **Command of ADA units is exercised by Army commanders. The command of ADA units is always retained by Army commanders and cannot be delegated in Army, joint, or multinational operations**. Similarly, while the control of AMD fires for specific aerial threats (such as fixed-wing aircraft) is usually retained by the designated AADC, that control does not lessen the fundamental responsibility of ADA commanders to lead their formations and accomplish the designated mission.

- Army command policy and C2 doctrine apply to all commanders regardless of unit type. Command of ADA units includes the authority and responsibility for effectively using available resources and for planning the employment of, organizing, directing, coordinating, and controlling forces for the accomplishment of assigned missions. The ADA commander issues the commander's intent which expresses the purpose of the operation and the desired military end state, provides focus to the staff, and helps subordinate and supporting commanders act to achieve the commander's desired results.
- Operational control is inherent in command authority and can be delegated within the command. Operational control, defined in paragraph 3-72 on page 76, includes the authoritative direction over all aspects of military operations and joint training. Operational control normally provides full authority to employ those forces as the commander in operational control considers necessary. However, operational control does not give the commander in operational control the implied authority to direct logistics or administration, discipline, internal organization, or unit training. These authorities reside with the commander pursuant to Service directives. ADA units can receive operational control of subordinate organizations and can also be placed under the

operational control of higher-level Army organizations or another Service component in support of a joint force or component commander.

- ADA commanders make decisions and direct assigned ADA units or those placed under their operational control. The planning, preparation, execution, and sustainment of the total AMD mission is conducted before, during, and after commencement of combat operations. Guided by the principles of mission command, ADA commanders, assisted by their staffs, direct the operations of subordinate forces. The net results of these operations are units ready to perform the AMD mission and ADA capabilities integrated with, and under the control of, the designated engagement authority to execute AMD engagements.

2-6. **Control of Army AMD fires is exercised in accordance with joint force commander directives and by delegated authorities**. The separation of command responsibility from the control of AMD fires can appear problematic given that ADA commanders can only direct the engagement of air threats under their command authority in compliance with the promulgated ROE and designated engagement authority; yet they possess the mission to defend critical assets. This challenge is overcome by the joint common operating precept of unity of effort in the accomplishment of the joint force commander's objectives.

- Control of AMD engagements is executed through various personnel and agencies that collectively constitute the engagement authorities in the kill chain. An *engagement authority* is an authority vested with a joint force commander that may be delegated to a subordinate commander that permits an engagement decision (JP 3-01). **The *kill chain* is the successive linkage of commanders who can authorize engagements of air and missile threats.** The kill chain emanates from the joint force commander, who normally designates the AADC as the engagement authority. In joint operations, the kill chain is, in essence, a joint engagement authorization chain. In divisional and below operations, the kill chain consists of designated ADA commanders who control and direct SHORAD units in accordance with the promulgated ROE.
- An AMD engagement authority is permitted to direct engagements of air or missile threats. Within the theater, the engagement authority is normally delegated to the AADC who can further delegate the authority (for example, to the regional/sector air defense commander, an ADA battalion/task force commander, or lower echelon ADA leader). Delegation of authority to ADA commanders/leaders is typically by threat types, such as ballistic missiles, sUASs, or indirect fire munitions. At the tactical level, the ADA engagement authority controls engagements of air and missile threats in accordance with the supported commander's guidance, scheme of AMD, and desired end state. Engagements are conducted using the promulgated ROE and air defense and airspace coordinating measures, such as the coordinating altitude.

Note. Corps, division, and brigade and below commanders must understand the area air defense plan (AADP) and their authorities with respect to AMD. It is critical that these commanders understand both their authorities and the process to advocate for the authorities they need to execute their missions. These authorities may include, but are not limited to, positioning authority, engagement authority, and emissions authority. Several factors influence the organizational level in which these authorities can be delegated; these include C2 capability/capacity, maturity of the theater, type of operation, tempo of operation, and desired end state. For example, authority in some cases may be based on the ADA weapon system that is employed.

AIR AND MISSILE DEFENSE KEY COMMAND AND CONTROL PERSONNEL

2-7. AMD operations are complex and require commanders who, through mastery and application of the art of command and science of control—

- Understand the air and missile threat,
- Know how to execute defenses in accordance with AMD plans.
- Develop cohesive teams,
- Employ forces to maximize weapon system capabilities with joint and multinational AMD partners,
- Defend Army forces to support freedom of maneuver and freedom of action.

2-8. The Army's principles of C2 enable ADA commanders at all echelons to effectively conduct operations. These principles—competence, mutual trust, shared understanding, commander's intent, mission orders, disciplined initiative, and risk acceptance—allow commanders to cut through the "fog of war" and make timely and effective decisions despite operating in an environment that is both uncertain and often ambiguous.

AIR DEFENSE ARTILLERY COORDINATORS

2-9. **The *air defense coordinator* is the senior air defense artillery commander at theater, corps, division, or brigade levels who serves as the supported commander's primary advisor to plan, coordinate, and integrate air and missile defense fires and support in the execution of assigned tasks.** Table 2-1 presents the primary coordinators and assistants for air defense based at the various Army echelons. Thus, for example, the supporting ADA brigade/battalion commander is the air defense coordinator for a corps, assisted by the chief, AMD operations on the corps G-3 staff; the SHORAD battery commander is the coordinator for a brigade. In the event multiple batteries are placed in support of a BCT, the battery commander with the preponderance of ADA systems/capabilities is the air defense coordinator. **The air defense coordinator is always an ADA commander** and is typically a commander two levels below that of the supported command.

Table 2-1. Air defense coordinators

Echelon	Air Defense Coordinator	Assisted by
Theater	AAMDC Commander	Senior AMD Operations Officer
Corps	Supporting ADA Brigade/Battalion Commander	Chief, Corps AMD Operations Section
Division	DIVAD Battalion Commander	Chief, Division AMD Operations Section
Brigade	SHORAD Battery Commander	Air Defense Support Officer
AAMDC army air and missile defense command DIVAD divisional air defense ADA air defense artillery SHORAD short-range air defenses AMD air and missile defense		

Note. The army air and missile defense command (AAMDC) commander is referred to as the theater AMD (not air defense) coordinator and the ADA brigade commander as the AMD coordinator. These titles reflect the commanders' roles in joint AMD operations.

For those divisions that do not have organic DIVAD battalions, the air defense coordinator is the commander of the supporting ADA unit.

2-10. Air defense coordinators ensure that ADA plans and operations consider all domains and are synchronized with and integrated into the plans and operations of supported commanders. Air defense coordinators must be recognized as the air defense experts/advisers by virtue of their technical and tactical proficiencies and the trust instilled in them by supported commanders.

2-11. Key coordination tasks (echelon dependent) include:
- Advise supported commanders and their staffs of the AMD capabilities, unit locations, and statuses.
- Develop an air IPOE; assess air and missile threats and supported commander's priorities to optimize defense planning.
- Develop, with the supported commander and G-3, a scheme of air and missile defense to support the operation.
- Coordinate positioning of AMD assets.
- Plan, prepare, execute, and assess all AMD tasks in support of offensive, defensive, and stability operations and provide inputs to the preparation of the operation plan and order, including Annex I (Air and Missile Defense).
- Request and disseminate AMD information, to include airspace coordinating measures or restrictions.

- Assist the fire support coordinator in integrating attack operation's priorities into the force's targeting process.
- Inform fires and protection cells in corps and below of current operations and future AMD plans.
- Coordinate with the joint air ground integration center for use and defense of divisional airspace.
- Recommend airspace coordination measures to support current and future operations and manage changes to them.
- Assist in facilitating force protection and sustainment support for ADA units.
- Integrate and synchronize joint AMD and multinational fires with the other elements of combat power.
- Lead the theater AMD working group and coordination board (AAMDC).
- Attend targeting working group and targeting coordination board.
- Accompany the supported commander during execution of tactical operations (when directed).
- Establish AMD standard operating procedures across the brigade, division, corps, and theater.
- Provide for consolidated and focused AMD-specific qualifications, certifications, readiness, and oversight (personnel management, equipment issues, and training).
- Oversee the professional development of the 14-series career management field Soldiers.
- Mentor, train, and educate junior AMD leaders on all aspects of the Army AMD system and AMD operations.

AAMDC COMMANDER

2-12. The AAMDC commanding general has three primary roles: senior ADA commander, theater Army AMD coordinator, and, if appointed, deputy AADC for AMD.

- The AAMDC commander commands subordinate ADA brigades and task-organized forces. **The AAMDC commander is the Army proponent for the AMD combat function and has total responsibility for active AMD planning within Army forces and, when assigned, for the entire land force**.
- As the theater Army AMD coordinator, the commander ensures organic, assigned, and supporting ADA units' contributions to accomplish AMD objectives in support of the ARFOR commander's, joint force land component commander's (if appointed), and joint force commander's concept of operations are properly planned, coordinated, and synchronized. The AAMDC commander is also responsible for recommending AMD missions for the other members of the joint combined arms team. The AAMDC commander can establish priorities of support by phase of the operation or change priorities during operations to ensure that operational and force sustainment is provided in accordance with their relative importance to accomplishing the mission.
- The AAMDC commander is normally designated as a deputy AADC and advises the AADC on the best distribution of Army AMD capabilities between the requirements for the theater-level defended asset list and maneuver forces of the ARFOR commander/joint force land component commander. Deputy AADC responsibilities include assisting in development of the AADP; integrating respective Service component and multinational AMD into defensive counterair operations; and advising on ROE, coordination measures, weapons control measures, and air defense warnings (JP 3-01). In addition, as the deputy AADC, the commander may chair the theater AMD coordination board which recommends changes to AMD priorities on the defended asset list, adjustments to planned defense designs, and active AMD actions across all the operational elements based on threat activities and/or friendly operations.

AIR DEFENSE ARTILLERY FIRE CONTROL OFFICER

2-13. The air defense artillery fire control officer (ADAFCO) is the single point of contact between Army HIMAD fire control elements and the joint/Army controlling authority. An ADAFCO is required in any area/region/sector air defense command in which an ADA capability is employed in support of joint operations. An ADAFCO must be collocated with the joint commander possessing engagement authority for air and missile threats. The ADAFCO is responsible for coordinating Army AMD for designated assets on the defended asset list in that area/region/sector and for coordinating and monitoring the tracking and engagement activities of individual ADA fire units. The ADAFCO is the Army AMD engagement expert for the AADC and regional/sector air defense commanders.

2-14. An ADAFCO team consists of a fire control officer, a control assistant, and an operations assistant. ADAFCO personnel must have proper clearances for the specified operation and duty location. They conduct continuous 24-hour operations and ensure effective control of AMD fires. Typically, ADAFCO requirements are identified by the responsible ADA headquarters staff during the mission analysis step of the military decision-making process (MDMP) with consideration for the joint air operations plan, AADP, and supported commander's requirements.

2-15. ADAFCOs are found in both the AAMDC and ADA brigade. The ADAFCO provides for the rapid engagement of airborne targets/platforms, coordinates, and controls AMD engagements, and assists the controlling authority with friendly protection and fratricide prevention. When AAMDC and brigade ADAFCOs are deployed, they must have access to a display of the integrated air picture at the hosting unit (for example, joint air operations center, Aegis, or Airborne Warning and Control System [AWACS]), voice and data communications with subordinate ADA battalions and separate batteries, and access to the senior weapons officer at the hosting unit, such as the senior air defense officer at the joint air operations center.

2-16. The AAMDC ADAFCO, who serves as the Army's upper and lower tier coordination officer, assists in coordinating engagements across the theater and region. This involves coordination between the Navy's Aegis, Patriot, and Terminal High Altitude Area Defense (THAAD) weapon systems, all of which can be employed in the homeland defense mission as well as in theaters. The ADAFCO is deployed at the joint air operations center or other appropriate joint controlling headquarters, in conjunction with the naval ballistic missile defense liaison officer; the ADAFCO uses equipment provided by the joint controlling headquarters and organic voice communications. The AAMDC ADAFCO provides Army AMD operational expertise and monitors, coordinates, and synchronizes surveillance and engagement activities of ADA assets with joint and multinational AMD units. The ADAFCO is also responsible for the coordination and deconfliction of upper-tier engagements by joint and multinational systems in conjunction with the naval liaison officer. The ADAFCO maintains communications with the ADA brigade ADAFCOs at other controlling authorities, sharing tactical air pictures and situational awareness and coordinating for the engagement of upper-tier leakers. The ADAFCO additionally serves as the conduit for the issuing of fire control or engagement orders from the controlling authority to ADA units.

2-17. The ADA brigade integrates into the joint kill chain by attaching the brigade's ADAFCO to the AADC's designated engagement authority. This authority is usually the regional or sector air defense commander. ADA brigade ADAFCO functions include—

- Controlling ADA engagements and assisting rapid engagement of airborne targets or platforms by maintaining a continuous communications link with the AAMDC ADAFCO, engagement authority, and subordinate fire control officers, as appropriate.
- Tracking deconflictions between AMD and other joint sensors via the regional/sector air defense command's mission crew to assist in resolving identification and correlation issues.
- Disseminating and complying with air defense warning conditions, airspace control orders, special instructions, early warning data, real-time intelligence, and air tasking orders.
- Issuing surface-to-air missile tactical orders which direct ADA fire unit readiness based on guidance from the AADC, regional/sector air defense commander, AAMDC, or ARFOR headquarters.
- Monitoring ADA unit information such as status and engagement reports, to include counter-indirect fire.

Note. Upper tier **is a layer of airspace that encompasses very high altitudes within the atmosphere to outside the atmosphere in which missile defense engagements are conducted**. Upper tier systems are designed to defeat ballistic missiles, from intercontinental to short-range variants, during the midcourse and early terminal phases of their flight. *Lower tier* **is a layer of low-to-high airspace within the atmosphere in which air and missile defense engagements are conducted.** Lower tier systems are designed to defeat close-, short-, and medium-range ballistic missiles during the terminal phase of their flight, as well as manned aircraft and aerodynamic missiles.

CHIEF CORPS AND DIVISION AIR AND MISSILE DEFENSE SECTIONS

2-18. The chiefs of the corps and division air defense sections are the senior ADA officers in the corps and division staffs. They coordinate and assist in planning AMD operations when ADA units are placed in support of, or operate within, the areas of operations of those organizations. They primarily perform planning, integration, and liaison functions, though they also provide/relay information to support AMD engagement operations. The chiefs also assist in targeting and information collection, providing/forwarding data on enemy air assets, capabilities, and potential operating areas.

2-19. The chiefs of corps and division air defense sections—
- At the corps (or division when a corps headquarters is not present), link to the AAMDC in theater and ADAFCO at the joint air operations center or regional/sector centers for planning, coordination, and rapid integration with joint airspace users within the area of operations.
- Advise the AAMDC of the supported commander's intent, scheme of maneuver, designated critical assets, and the proposed positions of the supporting ADA units.
- Receive the overall AMD plan for the area of operations, the projected locations of ADA units within the corps or division's area of operations, and the allocation of ADA units to support maneuver forces from the AAMDC.
- Ensure that air defense operations are supportive of and synchronized with the corps/division commander's overall scheme of AMD.
- Coordinate with the supporting and adjacent ADA units and inform the fires (joint air ground integration center at division) and protection cells to ensure a common and consistent understanding of AMD capabilities and mission requirements.
- Advise the commander and staff of air and missile threats and supporting or in-vicinity ADA force capabilities, locations, and activities.
- Plan and coordinate AMD operations with supporting ADA units.
- Coordinate airspace requirements with aviation, field artillery, and other prime airspace user representatives.
- Participate in the targeting, IPOE, and collection processes.
- Receive, stage, and integrate supporting ADA units/positions into the corps/division's area of operations.
- At the division, establish and monitor the division early warning net with the G-6.
- Broadcast air defense warning conditions, ROE, and other pertinent AMD information to corps/division elements to support their active and passive AMD actions.
- Write Annex I (Air and Missile Defense) to the supported commander's operation plan/order if a supporting ADA commander is not present; if present, support the ADA commander's in developing the annex.
- Continuously assess requirements for AMD augmentation.

CHIEF AIR DEFENSE SUPPORT ELEMENT (AIR DEFENSE SUPPORT OFFICER)

2-20. The chief of the air defense support element (ADSE), known as the air defense support officer (ADSO), is the senior ADA staff officer in BCTs, field artillery brigades, maneuver enhancement brigades, and theater/combat aviation brigades. The ADSO is also resident in a division artillery headquarters; however,

the ADSO is not the senior staff ADA officer in the division headquarters—the chief, division air and missile defense section is the senior officer.

> *Note*. Neither the chief, division air and missile defense section nor the ADSO are commanders. They assist the DIVAD commander, who is the division air defense coordinator, as deputy coordinators.

2-21. The ADSO and ADSE team plan, coordinate, and distribute tactical information necessary to provide situational awareness and airspace deconfliction of AMD operations throughout designated areas of operation. They develop, display, and disseminate a near-real-time, common operational air picture to facilitate early warnings of air attacks, mitigate potential fratricides, and support the execution of AMD operations. The ADSO, in conjunction with the chief, air-ground integration element (formerly known as the brigade aviation element), ensures that AMD and aviation plans are considered in corps, division, and brigade planning and preparations for Army operations.

2-22. The ADSO in BCTs links the maneuver forces to the joint kill chain to implement appropriate ROEs. The ADSO also links the BCTs to theater-level sensor and early warning networks and coordinates operations with the division ADSE and any supporting ADA units.

2-23. The ADSO facilitates the supported commander's understanding of current and projected AMD operations within and around the BCT's area of operations and assists a supporting ADA commander in synchronizing AMD operations with the brigade commander's scheme of maneuver. The ADSO and supporting ADA battery commander help to inform and shape the scheme of maneuver, advising on air defense capabilities and recommending the best way to employ the capabilities. The ADSO also contributes to airspace coordination and management. The ADSO reinforces the supported commander's knowledge and understanding of the airspace by providing a common air picture at the unit level.

2-24. Other major responsibilities of the ADSO include:
- Coordinate airspace requirements with aviation, field artillery, and other prime airspace user representatives.
- Advise the commander and staff of air and missile threats and supporting or in-vicinity ADA force capabilities, locations, and activities.
- Plan and coordinate AMD operations with supporting ADA units.
- Receive, stage, and integrate supporting ADA units/positions into the brigade's area of operations.
- Coordinate early warning of air activity and complementary defense coverage with other Army, joint, and multinational AMD units.
- Coordinate airspace use, with airspace control authorities and other users, for AMD engagements.
- Relay early warning of enemy air and missile attacks to maneuver and supporting forces.
- Broadcast air defense warnings, ROE, and other pertinent AMD information to maneuver elements to support their active and passive AMD actions.
- Write Annex I (Air and Missile Defense) to the supported commander's operation plan/order if a supporting ADA commander is not present; if present, support the ADA commander's in developing the annex.
- Continuously assess requirements for AMD augmentation.

ADA LIAISON OFFICERS

2-25. ADA liaison officers are organic staff members of the AAMDC, ADA brigades, and ADA battalions. They are deployed to headquarters of Army, joint, and multinational forces that ADA units support or that may conduct operations in the same area of operations. When deployed and positioned in supported elements' headquarters, liaison officers act as their ADA force's primary representatives to the respective commanders and facilitate interaction among the respective staffs with respect to AMD.

2-26. They participate in the supported commander's planning and preparation activities. Key responsibilities include:

- Advise the supported commander and staff of the ADA units and capabilities operating in the commander's area of operations.
- Assist in coordinating actions and activities of the supporting ADA commander and the supported commander's staff.
- Advise the supported commander and staff of directives that govern AMD operations, such as ROE and air defense warning conditions.
- Provide their parent ADA headquarters with information concerning the supported commander's current and future plans and operations.

INTERFACE CONTROL OFFICER

2-27. The Army interface control officer in the AAMDC, ADA brigades, corps, and divisions focuses on the planning and integration of the many Army and joint systems, networks, and information exchange capabilities. The interface control officer works with the designated joint interface control officer who is normally located at the joint air operations center.

2-28. An interface control officer supports the AMD operational networks. The officer is responsible for planning data links for early warning dissemination within the area of operations. The interface control officer in the G-6 staff, or in the supporting ADA echelon, coordinates with ADA units, the Army AMD network design facility, and the joint interface control officer to plan the network design with the information exchange requirements that have been provided by subordinate units and the ADA command. The interface control officer manages and coordinates the entire multi-link interface for supported units and works with the joint interface control officer for connectivity into the larger joint and multinational networks. The G-6, normally from the AAMDC, deploys an interface control officer, as necessary, to the joint interface control officer's location to integrate Army AMD assets into the tactical data link architecture. This network support system may change as the IBCS continues fielding and matures in the manner planned.

JOINT FORCE AIR COMPONENT COMMANDER

2-29. A *joint force air component commander* is the commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for recommending the proper employment of assigned, attached, and/or made available for tasking air forces; planning and coordinating air operations; or accomplishing such operational missions as may be assigned. (JP 3-0). The joint force air component commander synchronizes and integrates actions of these forces in time, space and purpose. The joint force air component commander, or the joint force maritime component commander in some circumstances, also typically serves as the airspace control authority and AADC, though these functions can be assigned to different individuals. As the airspace control authority, the joint force air component commander coordinates use of the airspace through the airspace control plan and synchronizes/deconflicts all airspace user requirements through the airspace control order (see JP 3-52 for more information).

2-30. The joint force air component commander normally plans, coordinates, allocates, and tasks joint air operations based on the joint force commander's concept of operations and air apportionment decision. The joint force air component commander normally has operational control of his or her Service's component forces and tactical control or direct support of the other forces made available for tasking. Service component commanders normally retain operational control over their assigned and attached Service forces.

2-31. For theater-level AMD, the joint force air component commander commands offensive counterair/attack operations and the AADC commands defensive counterair operations. The JFACC is typically the supported commander for air and missile defense. **The joint force air component commander is responsible for integration between the offensive and defensive counterair components**.

AREA AIR DEFENSE COMMANDER

2-32. The joint force commander designates an AADC with the authority to plan, coordinate, and integrate overall joint force defensive counterair operations. The *area air defense commander* is the component commander with the preponderance of air defense capability and the required command, control, and communications capabilities who is assigned by the joint force commander to plan and execute integrated air defense operations (JP 3-01).

2-33. AADC responsibilities encompass the planning, integration, synchronization, and coordination of defensive counterair operations with other tactical operations throughout the joint area of operations. AADC responsibilities may be facilitated by the joint force commander's designation of regional and sector air defense commanders to enhance decentralized execution of defensive counterair operations.

2-34. Additional AADC responsibilities include:
- Develop, integrate, and distribute a joint force commander-approved AADP in coordination with Service and functional components.
- Appoint a deputy AADC, as required, to advise on how to integrate and synchronize Service component defensive counterair capabilities and assets.
- Develop and execute a detailed plan to disseminate timely air and missile warning conditions and cueing information to components, forces, multinational partners, and civil authorities, as appropriate, in coordination with the intelligence directorate (J-2), the operations directorate (J-3), and the communications system directorate of a joint staff.
- Develop and implement identification and engagement procedures that are appropriate to air and missile threats.
- Establish timely and accurate track reporting procedures among participating units to provide a consistent common tactical picture.
- Make defensive counterair recommendations after consultation with defensive counterair representatives from the joint force components.
- Make offensive counterair/attack operations recommendations to help counter air and missile threats.

AIRSPACE CONTROL AUTHORITY

2-35. The airspace control authority is a commander designated by the joint force commander to assume overall responsibility for the airspace control system. The airspace control authority also develops policies and procedures for airspace control that are incorporated into an airspace control plan and distributed throughout the joint operations area (JP 3-01).

2-36. The airspace control authority coordinates use of airspace through the airspace control plan, including integration with the host nation's airspace control system, and synchronizes all user requirements using the airspace control order. The airspace control authority must be able to rapidly implement coordination measures in the dynamic counterair environment to enhance freedom of action of components while preventing friendly fire. The airspace control order implements the airspace control plan; all component forces that affect joint air operations are subject to the airspace control order. However, this control of airspace by the airspace control authority does not imply any type of command authority (for example, operational control) over any aircraft. The ACA responsibilities for counterair operations include:
- Link the airspace control plan to the AADP when designating volumes of airspace.
- Develop coordination measures that support and enhance operations.
- Provide a flexible airspace control plan that can adapt to changing requirements of the tactical situation (JP 3-52).

2-37. Although airspace control is the responsibility of the airspace control authority, the controlling authority vested with the airspace control authority does not infringe on a commander's authority to approve, disapprove, or deny combat operations. The airspace control authority recommends, and the joint force commander approves, the boundaries within which airspace control is exercised and provides priorities and restrictions regarding its use.

REGIONAL AND SECTOR AIR DEFENSE COMMANDER

2-38. Upon approval of the joint force commander, the AADC may divide the operational area into separate air defense regions, and potentially air defense sectors, to facilitate decentralized execution as allowed by ROE and necessitated by the operational situation. Generally, the regions and sectors are based on geographic size and obstacles/features over land. Each air defense region is commanded by a regional air defense commander who is delegated responsibilities and decision-making authority to synchronize/deconflict and control engagements and to exercise battle management within the region. The AADC and regional air

defense commander, as further approved by the joint force commander, may choose to further divide regions into sectors, each with a sector air defense commander who exercises authority delegated by the AADC. In all cases, the AADC must specify the conditions and limits for which engagement authority is decentralized to both regional and sector air defense commanders.

2-39. The core of a region/sector is a Service component airspace control/air defense organization with the necessary situational awareness and communications links up to the AADC/joint force air component commander/joint force commander, down to the tactical units' operation centers, and laterally to other regional and sector air defense commanders. Each regional/sector air defense commander with a surface-based air defense requirement or capability must have that expertise on staff and the requisite C2 links. For a Navy/maritime component, the integration of air-to-air and surface-to-air capabilities is organic to established fleet air defense. A Marine air-ground task force also has an organic, integrated air defense capability. The Air Force must rely on Army augmentation (a liaison officer/team) for surface-to-air expertise. A Navy or Marine Corps regional/sector air defense commander should have Army expertise as a liaison if they rely on an Army AMD capability within their region/sector. Additionally, if a ground-based regional/sector air defense commander is being supported by a Navy/joint force maritime component commander's surface-based AMD system (such as an Aegis-equipped ship), then an equivalent Navy air defense specialist should augment or be liaison to that regional/sector air defense commander.

JOINT INTERFACE CONTROL OFFICER

2-40. The joint interface control officer is the senior interface control officer in support of multi-tactical data link network operations and is that network's coordinator for the joint data network within the theater/joint area of operations. The joint interface control officer plans, monitors, and manages the architecture and technical integration of joint data and communications systems (such as Link 16) for the multi-tactical data link network.

2-41. When regional/sector air defense commands are established, the joint interface control officer coordinates with the regional interface control officer/sector interface control officer designated for and normally located at those commands. The joint interface control officer controls and acts as the coordinating authority for the joint interface control cell and for any regional/sector interface control officers for planning and executing tactical data link functions that cross regional and/or sector air defense boundaries or impact the theater-wide multi-tactical data link network. The regional/sector interface control officer coordinates with the joint officer but is responsible to the regional/sector air defense commander for tactical data link continuity at their levels.

AIR AND MISSILE DEFENSE COMMAND AND CONTROL POSTS

2-42. The principal facility employed by the commander to control operations is a command post. A *command post* is a headquarters, or a portion thereof, organized for the exercise of command and control (FM 6-0). It provides a physical location for people, processes, and networks to directly assist commanders in understanding, visualizing, describing, directing, leading, and assessing operations The organization of the command post reflects the commander's needs. It can vary in size, complexity, and focus.

2-43. ADA command posts must support the commander wherever the commander is located. They must provide assured access to timely, accurate, and relevant information through integrated, interoperable digitized links with all echelons, other services, other government agencies, and multinational forces. ADA command posts must also provide the commander with the ability to respond to changing circumstances regardless of location, while moving or stationary.

2-44. Command posts are organized to perform the following functions:
- Monitor the execution of operations.
- Synchronize combat activities to sustain tempo and adjust the plan to fit the situation.
- Maintain the current operations situation.
- Effectively manage logistics, ensuring a continuity of combat consumables.
- Provide a focal point for the receipt and development of intelligence.
- Plan future operations.
- Monitor combat operations of supported, adjacent, and higher echelon organizations.

- Provide situation information to higher headquarters.
- Conduct AMD engagement operations through a fire control element.

2-45. While the above is discussed in terms of ADA command posts, all of the information is equally applicable to joint command posts and operation centers. Many of the joint command posts and operations centers focus on air operations. They are included as they either house a commander who directs or may direct AMD operations (such as the AADC and a regional air defense commander), or they control airspace in which AMD operations are conducted. Major ADA and joint AMD command post, to include system-specific C2 elements, are presented in the following paragraphs.

ARMY AIR AND MISSILE DEFENSE COMMAND

2-46. The AAMDC is the primary ADA command organization and lead for theater army AMD. AAMDCs are regionally aligned, mission tailored organizations. One AAMDC is normally assigned to a theater of operations to plan and synchronize the execution of Army AMD fires. ADA formations are typically task organized to the AAMDC to conduct AMD operations.

2-47. The AAMDC is staffed for its primary role to plan for and integrate U.S. and multinational land-based AMD forces (less tactical-level ADA formations that are assigned to a corps/division) and their defenses into the AADC's overall AMD plan. The AAMDC is an organization of either wholly active or reserve component AMD; fire support; aviation; intelligence; chemical, biological, radiological, and nuclear; signal; and sustainment personnel melded into an effective AMD team. All AAMDCs are constructed based on a core table of organization and equipment but are staffed somewhat differently to meet unique regional challenges in performing their missions.

2-48. The AAMDC's structure and staff functions reflect those of a typical theater-level staff. Some unique functions of the AAMDC's staff follow. For more information on the AAMDC staff, see ATP 3-01.94.

- Coordinate integrated AMD operations with fires elements and attack operations (field artillery and aviation).
- Nominate threat aerial infrastructure and operating bases, to include ballistic and cruise missile hide sites and support facilities and UAS C2 centers, for targeting to the joint air operations center.
- Integrate Army AMD capabilities into joint forces' AMD plans.
- Provide ADAFCOs and targeting teams to assist subordinate unit operations and monitor air battle operations and engagements.

AIR DEFENSE ARTILLERY BRIGADE

2-49. The ADA brigade provides ground-based AMD command across a large area of operations. An ADA brigade is normally under the operational control of the AAMDC and in direct support of the AADC for the execution of operational and strategic missions. The brigade may be placed in direct support of a corps for the execution of tactical operations.

2-50. The brigade is the highest echelon that is properly resourced with the skills, equipment, and staff to integrate multiple ground-based ADA capabilities into the joint and multinational AMD fight and in support of Army maneuver forces. Each brigade consists of a headquarters, a brigade staff, and subordinate battalions and batteries. ADA brigades differ in their compositions, which are driven by METT-TC (I), and the way their battalions are task organized. The typical brigade can expect to have between two and seven battalions which will be formed into task forces as situations dictate.

2-51. Organization, duties, and responsibilities of the brigade staff elements are typical of those of any brigade-level staff. For more information, see FM 6-0.

2-52. While the capabilities of the ADA brigade and AAMDC have significant overlap, their roles and responsibilities are distinct, as highlighted in table 2-2 on page 37. In the absence of the AAMDC, the ADA brigade can assume the AAMDC's responsibilities. For example, the brigade commander can serve as the deputy AADC in specific situations. However, while capable of executing the AAMDC's role, the brigade can only do so for a limited period.

Table 2-2. Air defense artillery brigade and army air and missile defense command responsibilities

Responsibility	ADA Brigade	AAMDC
Planning	• Plans current operations and makes required plan adjustments and modifications. • Performs AMD threat assessment (IPOE) for its area of operations.	• Plans future operations and adjusts existing plans as dictated by METT-TC (I). • Performs theater AMD threat assessment (IPOE).
Current Operations	• Supports regional/sector air defense center. • Provides administrative, operational, and sustainment support of deployed forces.	Supports joint air operations center.
Joint/Multinational Air and Missile Defense Integration	Executes integrated operations.	Plans for and coordinates integrated operations.
Sustainment	Executes ADA requirements.	Plans and coordinates Army, joint, and multinational requirements.
Force Provision	• Provides forces to achieve needs. • Certifies battalions/batteries/force packages for deployment. • Ensures battalions and batteries are trained.	• Develops requirements for forces needed. • Certifies brigades for deployment. • Ensures brigades are trained.
Air Battle Management	• Highest organizational echelon equipped, trained and staffed to operationally integrate joint and multinational land-based AMD forces. • Primary organization linking subordinate task forces to the kill chain via the ADAFCO.	• Primarily performs upper tier ballistic missile, defense coordination and execution. • Can link subordinate task forces to the kill chain via the ADAFCO.
Force Protection	• Implements local security measures and inherent protection capabilities. • Coordinates with higher headquarters for additional protection resources as required. • Synchronizes and integrates external protection support to prevent and mitigate detection and the effects of threats and hazards.	• Implements local security measures and inherent protection capabilities. • Synchronizes and integrates external protection support, to prevent and mitigate detection and the effects of threats and hazards, with the joint force land component commander.
AAMDC	army air and missile defense command	
ADA	air defense artillery	
ADAFCO	air defense artillery fire control officer	
AMD	air and missile defense	
IPOE	intelligence preparation of the operational environment	
METT-TC (I)	mission, enemy, terrain and weather, troops and support available, time available, civil considerations, and informational considerations	

AIR DEFENSE ARTILLERY BATTALION AND BATTERY

2-53. In peacetime, ADA battalions are organized in accordance with tables of organization and equipment. There are multiple types of ADA battalions, organized according to system types. A peacetime battalion serves as the baseline for an ADA task force, providing the resources from which ADA task forces are tailored and deployed in wartime. A peacetime battalion without further tailoring, and once deployed, can be designated as a task force if METT-TC (I) indicate that it is the right size capability to accomplish the mission.

2-54. There are five types of peacetime ADA battalions:

- Patriot battalions are fielded in the active component. A Patriot battalion consists of a headquarters and headquarters battery, four Patriot firing batteries, and a field maintenance company.
- Composite Patriot/Avenger battalions, also in the active component, have the same Patriot force as a Patriot battalion plus one organic Avenger battery. The maintenance company is adjusted to include system-peculiar maintenance for the Avenger component of the battalion. This battalion composition constitutes an integrated battalion consisting of Patriot and Sentinel radars, the Patriot family of missiles, and Stinger missiles.
- DIVAD battalions are being fielded in the active component. A DIVAD battalion consists of three Maneuver Short-Range Air Defense (M-SHORAD) batteries, a Counter-small Unmanned Aircraft System (C-sUAS) battery, and a maintenance company. DIVAD battalions provide dedicated, maneuverable, and survivable air defense capabilities which are typically placed in direct support of BCTs and their subordinate maneuver battalions (when so missioned) against rotary wing- and fixed-wing aircraft and sUASs. A battalion's major items of equipment are the M-SHORAD systems, Sentinel radars, C-sUAS variants, and FAAD C2 system. The M-SHORAD system is mounted on a Stryker vehicle and contains multiple weapon sub-systems, on-board radars, and a FAAD C2 link.
- Composite Integrated Fire Protection Capability (formerly known as Indirect Fire Protection Capability)/Avenger battalions are fielded in the active component. They consist of a headquarters and headquarters battery, one battery of Avenger missioned primarily to defeat fixed- and rotary-wing aircraft; two batteries of Indirect Fires Protection Capability with their Land-Based Phalanx Weapon System (LPWS) missioned primarily to defeat the indirect fire threat; and a maintenance company.
- Avenger battalions are fielded in the Army National Guard. Avenger battalions consist of a headquarters and headquarters battery, three firing batteries with two firing platoons each, and a maintenance detachment.

2-55. The peacetime ADA battery structure is consistent with that of a traditional Army company-size unit. The battery typically contains some 70-90 Soldiers and is equipped with launchers or guns, sensors, C2 elements, and general Army materiel such as vehicles and generators. Peacetime battery organizations vary by type of system.

2-56. ADA batteries are normally subordinate organizations within ADA battalions. However, THAAD batteries are separate entities that are not organized under higher-level battalions. They can, however, be included in ADA battalion task forces.

2-57. An ADA battery is also typically task organized to meet mission requirements. The ADA task-organized battery's roles and responsibilities generally remain the same irrespective of type of operation—offensive, defensive, or stability. The battery can be deployed in tactical to strategic roles, depending on its inherent capabilities, the priority of its defended assets, and the commander's intent.

FIRE CONTROL ELEMENT

2-58. A fire control element is a generic term for an operations center that provides air battle management for ADA units. It is a subset of the current operations section in ADA units. The composition of a fire control element is echelon and METT-TC (I) dependent.

2-59. A fire control element is referred to by different names in different systems—for example, information coordination central in Patriot battalions and an air battle management operations center in DIVAD battalions—but always retains the same responsibilities. In Patriot units fielded with IBCS, the fire control element is called an engagement operations center.

2-60. Fire control elements in ADA battalions/task forces are manned by ADA officers, warrant officers, and Soldiers who fulfill five functions: fire control, surveillance, identification, weapons control, and information control. Titles of these personnel can vary, but the functions are constant:

- The fire control function encompasses the overall management of the air battle and engagement decisions. A fire control officer oversees the other members of the fire control team. The fire control officer relays engagement authorizations from the designated authority, or, when designated, authorizes engagements in accordance with the ROE and other AMD directives.
- The surveillance function provides for clarity in the air picture. The surveillance operator uses inputs from local ADA radars and, when available, other Army and joint sensors to create a composite picture of the airspace in the unit's area of operations.
- The identification function focuses on proper combat identification. Identifications may be provided by a higher authority or the ADA unit's radar. The identification and fire control functional can be combined and executed by a single operator.
- The weapons control function addresses actions from receipt of an engagement decision from the fire control officer to execution of the engagement. Depending upon span of control and pace of combat operations, more than a single weapon control functional position can be manned—a situation which may be required in an ADA task force. Allocation between control positions for multiple weapons can be based on threat type (for example, one position for the ballistic missile fight and one for the air fight), a geographical division (for example, one controlling all engagements occurring in the northern sector of the defense and one controlling those occurring in the southern sector), or along system type lines (for example, one controlling Patriot fires and one controlling Avenger fires).
- The information control function addresses the maintenance of networks and information flow across the task force and with higher, adjacent, and supported units. The function is normally performed by a warrant officer who serves as the unit's interface control officer.

2-61. ADA battery leaders also perform most of these functions, though they do not necessarily man the functional positions in command posts or centers. Patriot batteries typically man the functional positions, while SHORAD batteries rely on subordinate leaders to perform many of the functions in accordance with ROE and procedural methods of control.

Air Battle Management Operations Center

2-62. The air battle management operations center (known as ABMOC) executes engagement operations functions in SHORAD battalions. It collects, stores, digitally processes, displays and disseminates real-time cueing and tracking information, the common tactical air picture, and information and intelligence to all ADA weapons. The ABMOC is equipped with FAAD C2 and an air and missile defense workstation.

2-63. The battalion ABMOC integrates early warning from an AWACS or other airborne platforms, an adjacent ADA unit, or a multinational AMD source—received from the tactical operations section—and disseminates this over the appropriate net to subordinate ADA batteries.

Base Defense Operations Center

2-64. A base *defense operations center is* a command and control facility established by the base commander to serve as the focal point for base security and defense (JP 3-10). The base defense operations center plans, directs, integrates, coordinates, and controls all base defense efforts for the base commander. Such coordination normally involves tactical control of forces assigned or attached to the base primarily for the purpose of local base defense.

2-65. The base defense operations center functions include—
- Preparing plans to implement the base commander's base defense guidance.
- Monitoring assigned, attached, and tenant unit forces and resources, and providing the commander information to aid, allocate, and move forces and materiel to meet base defense requirements.
- Informing the base commander of base security concerns (ATP 3-90.20).

2-66. ADA commanders employed on a base should establish collaborative relationships with local base defense operations centers. While base defense operations centers operate under distinct kill chains, fostering an understanding of their mission, capabilities, limitations, and associated threats is essential. This knowledge enables ADA commanders to provide informed advice and advocacy for base-specific concerns, enhancing

the overall defense posture of critical assets and units. Additionally, the exchange of intelligence and resources between operational units and base defense operations centers can offer a significant advantage in countering air and missile threats, ensuring a more cohesive and effective defense strategy.

Joint Air Ground Integration Center

2-67. The joint air ground integration center (known as the JAGIC) is designed to support and enable division-level current operations through the rapid execution and clearance of joint fires and airspace deconfliction (ATP 3-91.1). It integrates and synchronizes fires and airspace control in the division area of operations in accordance with guidance received from the division commander, supporting air component commander, and airspace control authority. Its major functions are control of joint fires, airspace control, interdiction coordination, friendly force identification, and information collection. For more information on the JAGIC, see ATP 3-91.1.

2-68. ADA personnel in the JAGIC synchronize AMD operations and assist other JAGIC airspace users in resolving immediate airspace conflicts. ADA personnel monitor weapons systems coverage and ADA unit statuses. They also provide the division with a tactical airspace picture for the area of operations, using ADA sensors to maintain surveillance of the divisional airspace and support airspace management.

Terminal High Altitude Area Defense

2-69. The primary fire control node components in each THAAD battery are the Air and Missile Defense Planning and Control System version B and THAAD fire control and communications. The THAAD fire control and communications component is comprised of two tactical shelter groups. Each tactical shelter group consists of a tactical operation station, launch control station, and a station support group. The station support group contains an antenna support vehicle and cable support vehicle.

2-70. The THAAD fire control and communications component supports planning/preparation activities, engagement operations, embedded and netted training, and interoperability. The fire control crew fights the air battle inside the tactical operations station and launch control station. The fire control section provides a THAAD portable planner to the command post for planning and preparations and remotes a workstation into the command post for situational awareness of the air battle and system status.

Patriot

2-71. Patriot C2 is uniquely designed to provide the full range of C2 capabilities for Patriot system operations. It consists of echelon-specific components that distribute and collectively accomplish planning, preparation, and engagement operations for Patriot. The components at battalion level are the information coordination central, tactical control station, and dismounted information coordination central; battery level components are the engagement control station and the battery command post.

2-72. The information coordination central is the Patriot battalion's control center and interfaces with the Patriot firing battery, adjacent battalion information coordination centrals, and other Army and joint AMD systems. It exercises tactical control, fire direction center functionality, and supervision of Patriot batteries. It can, when applicable, integrate with THAAD for engagement coordination and deconfliction when THAAD is attached to a Patriot-based ADA task force.

2-73. The battalion's tactical control station directly supports the information coordination central by providing automated defense and communications planning for the battalion and situational awareness to the commander. The tactical control station is collocated with the battalion's fire direction center. It is equipped with the air and missile defense workstation and Patriot tactical planner workstation. The tactical planner workstation, along with common data link modules, provide unit commanders with tools to create and test the defense design plans. The Patriot tactical planner workstation provides operator access to the joint air picture over Link-16. The tactical control station and its components assist the commander with early warning and friendly protection.

2-74. The dismounted Patriot information coordination central is a configuration that provides information coordination central functionality in locations where the physical emplacement of the vehicle-configured information coordination central may not be desirable or possible, such as inside buildings, to support mobile

operations ("jump" capability while operations continue in base location) or during rapid initial insertions. The dismounted Patriot information coordination central has data processing and man-machine interfaces to effect air battle management, and data communications, less active transmission capabilities, to link to higher, adjacent, lower, and supported echelons. Linkage is achieved by fiber optic or copper wire or transmission services provided by supporting Army communications or host nation infrastructure.

2-75. The engagement control station is the Patriot battery's control center for air battle management. It provides fire direction functionality for the battery. It remotely controls the radar and launchers during air battle operations. Additionally, it establishes tactical data links to the information coordination central and adjacent Patriot fire units via the Patriot digital information link.

2-76. The battery command post operates in a manner similar to the tactical control station at the battalion. It directly supports the engagement control station during planning and air battle operations. It is also responsible for tracking battery-level administrative/logistical operations and equipment status and reporting these to the battalion. External elements link to the battery command post using standard protocols such as Link 11 and Link 16.

Engagement Operations Center

2-77. The engagement operations center hosts IBCS software/hardware and communications equipment in IBCS-enabled Patriot units. Battalion centers control subordinate battery centers. Battery centers control the sensors and weapon systems assigned within their subordinate span of control. Engagement operations centers facilitate situational awareness, decrease decision cycles, enhance engagement times, and expand defenses over a greater number of critical assets with fewer ADA resources. Engagement operations centers add flexibility to ADA employments, resulting in reduced stress on the ADA force through task organization compared to today's limited employment based on the constraints of a closed architecture.

2-78. IBCS-enabled Patriot battalion headquarters have two organic engagement operations centers: a current operations center and a future operations center.

- The current operations center provides oversight of subordinate battery engagement operations centers operating within the battalion's span of control. It is the focal point for execution of operations and is concerned with the immediate situation. Crew members monitor, assess, and action current operations.
- The future operations center plans adjustments to current operations, including positioning, resourcing, and integrating Patriot forces. It updates running estimates as a part of ongoing MDMP process for the current mission. It may also address and participate in the planning, preparation, execution, and sustainment activities in support of the mission.

JOINT AIR OPERATIONS CENTER

2-79. The joint *air operations center* is a jointly staffed facility established for planning, directing, and executing joint air operations in support of the joint force commander's operation or campaign objectives (JP 3-30). The joint air operations center normally functions as the joint force air component commander's principal operations center and the one from which he operates. It is also the primary operations center for AMD, with information and command guidance flowing to and from subordinate units.

2-80. The joint air operations center is structured to operate as a fully integrated command center and should be staffed by members of all participating components, to include key staff positions, to fulfill the joint force air component commander's responsibilities. The joint air operations center's staff is responsible to the joint force air component commander for integrating the planning, coordinating, allocating, tasking, executing, and assessing tasks for all joint air operations. The staff coordinates with the director of mobility forces to meet airlift and tanker priorities with the support of United States Transportation Command forces. Similarly, the staff coordinates space operations and space support requests with the space coordinating authority.

2-81. Joint air operations center organizations can differ. Elements that should be common to all are the strategy division; combat plans division; combat operations division; intelligence, surveillance, and reconnaissance division; and air mobility division. Planning future joint air operations and assessing the effectiveness of past operations is usually the responsibility of the strategy division, while the current plans division is usually devoted to near-term planning and drafting of the daily air tasking order. Execution of the

daily air tasking order is carried out by the combat operations division and closely follows the action of current joint operations, shifting air missions from their scheduled times or targets, and making other adjustments as the situation requires. The intelligence, surveillance, and reconnaissance division provide the joint force air component commander with timely, relevant, accurate, and predictive intelligence, targeting support, and collection management expertise to support the air tasking cycle. The air mobility division integrates inter-theater and intra-theater airlift, aerial refueling, and aeromedical evacuation into air plans and tasking orders and coordinates with the joint force commander's movement requirements and control authority and the Air Mobility Command. Each of the joint air operations center's major activities relies on expertise from liaisons (such as the AAMDC liaison team, battlefield coordination detachment, naval and amphibious liaison element, Air Force liaison element, and Marine liaison element) to coordinate requests or requirements and maintain a current and relevant picture of the other components' operations.

CONTROL AND REPORTING CENTER

2-82. The Air Force control and reporting center is the airspace control and surveillance radar facility directly subordinate to the air operations center. The control and reporting center, as a worldwide deployable airspace control and battle management platform, is employed at the tactical level to support air operations planning and execution across the entire range of operations. It operates independently or in combination with other tactical C2 elements (such as the air support operations center and AWACS). It supports horizontal integration with tactical resources and vertical integration with the Air Force air operations center.

2-83. The control and reporting center is a key battle management/C2 element for defensive counterair operations. It can be used as the core element for an air defense region and/or sector and can monitor and direct implementation of airspace control, identification, and weapons control procedures. For a large-scale, extended campaign, the commander, U.S Air Force forces may provide appropriate elements of the theater air-ground system, such as control and reporting centers and AWACS, in support of joint air operations and counterair operations. If required, several control and reporting centers can be provided to cover various operational areas within the joint operations area.

AIRBORNE WARNING AND CONTROL SYSTEM

2-84. The E-3 AWACS aircraft is a C2 platform with organic sensors that is capable of persistent operations, providing 360-degree wide-area surveillance, early warning, battle management, target detection and tracking, and weapons control functions. AWACS works directly with other Services' air defense aircraft and ADA units supporting the joint defense against air and, to a limited extent, ballistic missile threats.

2-85. The AWACS provides the theater air control system with a flexible and capable airborne radar platform. The AWACS elevated radar system can find, fix, track, and target maritime or airborne threats at lower altitudes and extended ranges, compared to ground-based radars, and can exchange radar picture data with other battle management C2 systems and weapon systems. It provides an accurate, real-time picture of the battlespace to the joint air operations center.

2-86. AWACS may provide an initial capability in the joint operations area until the control and reporting centers are deployed and operational. The AWACS can perform many, but not all, control and reporting center functions. In operations of a limited scope or duration, it can control airspace, provide identifications, and direct/forward weapon-control procedures.

MARINE TACTICAL AIR CONTROL CENTER

2-87. The Marine tactical air control center is the senior agency for the aviation combat element commander and battle staff to plan, command, supervise, and direct Marine air-ground task force air operations. The tactical air control center maintains complete information on the friendly situation, including an integrated air picture with ground combat information essential to the air effort. It can provide automated displays, air tasking order generation equipment, and data link feeds.

2-88. A tactical air control center is designed to support a Marine expeditionary force. The airspace C2 functions performed by the tactical air control center are comparable to the Air Force's air operations center.

2-89. The tactical air control center consists of three mutually supporting, cross-functional operational sections: current operations, future operations, and future plans. The current operations section executes the daily air tasking order and assesses its effectiveness. The future operations section develops future air tasking

orders and prepares orders for the next aviation combat element missions. It ensures assets are available for executing the air tasking order. The future plans section develops aviation courses of actions and supports plans and orders for operations (48 hours or more in advance) for the next Marine air-ground task force mission.

MARINE TACTICAL AIR OPERATIONS CENTER

2-90. The tactical air operations center is the principal AMD agency in the Marine air-ground task force. The tactical air operations center is similar to the U.S. Air Force's control and reporting center.

2-91. Subordinate to the Marine tactical air control center, the tactical air operations center provides real-time surveillance, direction, positive control, and navigational assistance for friendly aircraft. It performs real-time direction and control of all anti-air warfare operations, including manned interceptors and surface-to-air weapons. When necessary, the tactical air operations center can perform alternate tactical air control center functions (designated functions of the current operations section only) for the remainder of the current air tasking order.

2-92. As the primary anti-air warfare agency within the Marine air-ground task force, the tactical air operations center can perform as a sector air defense command. It then becomes the headquarters of a sector air defense commander (when designated by the AADC) during joint AMD operations.

MARITIME OPERATIONS CENTER

2-93. The maritime operations center manages the Navy's maritime AMD planning process. The purpose of the center is to help the Navy component commander, numbered fleet commander, or joint force maritime component commander exercise control of subordinate forces and coordinate support from other component commanders. It provides a framework within which these commanders exercise C2 at the operational level of warfare.

2-94. The maritime operations center is responsible to a maritime component commander for translating the joint force commander's operational-level guidance into discrete tasks planned and executed by subordinate maritime commanders. In this capacity, the maritime operations center supports and interacts with the AADC planning staff, other components, and multinational partners to integrate Navy AMD capabilities into operational-level plans. For more information on the maritime operations center, see NTTP 3-32.1.

2-95. The maritime operations center's integrated air and missile defense (known as IAMD) cell serves as the joint force maritime component commander's primary coordination conduit for planning and execution with higher headquarters, other Service components (such as an air operations center and AAMDC), subordinate forces, and outside support agencies for IAMD requirements. The maritime component commander may use an IAMD planning cell in the maritime operations center's organization or establish a task force IAMD with selected planning and execution authorities. A task force IAMD provides a standardized C2 layer between the numbered fleet commander and subordinate maritime commanders focused on tactical-level missions. A task force IAMD or an IAMD cell should work closely with the maritime operations center, subordinate maritime commanders, AADC planning staffs, other components, allies, and partners, as required. The IAMD cell/commander or task force IAMD coordinates with the AMD commander to ensure maritime forces are seamlessly integrated into the execution of the AADP.

Note. The Navy's use of the term IAMD refers to a function and is not defined the same as the joint definition in JP 3-01.

E-2 HAWKEYE

2-96. The E-2 Hawkeye is the Navy's all-weather, aircraft carrier-capable, tactical airborne early warning and control aircraft with advanced C2 and surveillance capabilities. With its active and passive organic sensors, as well as a large communication and data link suite, it provides airspace management; identifies and tracks friendly aircraft; detects, identifies, and tracks enemy air for early warning and air defense purposes; and supports execution of the air tasking order.

2-97. The E-2 can act as a sector air defense center in a limited role if a control and reporting center or other ground-based C2 node is not in the joint area of operations. This is usually a short-term solution until a

control and reporting center, or more capable airborne platform deploys into theater or if an operation is of limited scope or short duration.

AIR DEFENSE ARTILLERY SUPPORTING NETWORKS

Communications dominate war; broadly considered, they are the most important single element in strategy, political or military.

Alfred Thayer Mahan

2-98. The major networks supporting Army AMD are the tactical data link 16 (more commonly referred to as Link 16), integrated fire control network, and Department of Defense Information Network (DODIN). They also support joint, interorganizational, and multinational elements. Link 16 provides connectivity with joint forces and C2 elements. The integrated fire control network is the implementing network for the IBCS. The DODIN supports the global information grid and Soldier and leader connectivity into and out of that grid. Link 16, also known as tactical data link-J, is a Department of Defense primary AMD command, control, and intelligence data link, providing critical joint interoperability and situational information and supporting AMD engagements. Link 16 is a relatively high-speed link normally using radios operating in a line-of-sight frequency band but has a capability to use beyond line-of-sight media. It provides technical and operational improvements to older capabilities, including spread spectrum frequency hopping, increased data rate, data volume and granularity, hardware size and weight reduction, digital secure voice capability, relative navigation, improved security, jam-resistance, seamless network entry and exit, precise position and location information, and increased numbers of participants.

2-99. The integrated fire control network is the network part of the IBCS. The integrated fire control network is a secure, flexible internal network for the exchange of radar measurement data, track data, and voice/data engagement coordination commands. It has an open architecture using internet protocol version 6 networking and a data distribution system. The primary transport is currently the terrestrial line-of-sight equipment. Data is encrypted prior to leaving IBCS equipment, allowing extension over any network transport that meets quality of service requirements through the two alternate media fiber ports. Adaption kits allow non-organic sensors and weapons to participate on the network. The network is partially fielded with some Patriot radars and launchers, and Sentinel radars. The network relay or the engagement operations center provides connectivity for these components into the network. One engagement operations center is designated with responsibility to be the Link 16 Gateway.

2-100. DODIN (formerly known as LANDWARNET) is the Army's contribution to the global information grid. It consists of all globally interconnected, end-to-end Army information capabilities, associated processes, and personnel for collecting, processing, storing, disseminating, and managing information-on-demand supporting warfighters, policy makers, and support personnel. It includes all U.S. Army owned, leased, and leveraged Department of Defense/joint communications and computing systems and services, software (including applications), data security services, and other associated services. DODIN exists to enable the warfight through C2. As the Army's enterprise system-of-systems, DODIN moves information through a seamless network that facilitates information-enabled joint warfighting and supporting operations from the operational base to the individual Soldier.

2-101. Other AMD supporting networks include the many tactical data links and unique connections throughout the joint, interorganizational, and multinational community. The AMD networks support development of the air picture with situational understanding, intelligence activities, planning, preparation, and engagement operations with threat position information and firing guidance. Some of the networks are legacy networks for U.S. joint forces but are still in use with multinational forces. However, some joint forces currently retain the capability to enter or monitor the legacy networks to maintain connectivity with joint and multinational organizations and elements.

2-102. Examples of legacy AMD supporting networks still in use on some platforms are Link 11 (also known as tactical data link-A), Link 11B (also known as tactical data link-B), Patriot air defense information link, FAAD data link, and the Army tactical data link-1. Another network, the Missile Defense Agency's

Command and Control Battle Management and Communications network, supports ballistic missile defense:

- Link 11 is a secure, half-duplex, netted digital link that provides a network for exchanging tactical data between subscribers. It is normally operated in a roll call or polling mode, using either high frequency or ultra-high frequency communications. It is controlled by a net control station to exchange information between airborne, land-based, and shipboard systems. The system uses the M-series messages.

- Link 11B is a secure, full duplex, point-to-point digital data link using serial transmission frame characteristics and standard message formats. The system uses M-series messages, which can be exchanged using ultra-high frequency or landline communications.

- The Patriot air defense information link is a Patriot system internal data link. It has a high capacity, full-duplex, and line-of-sight/point-to-point radio system. Its normal routing is between fire units and the battalion's information coordination central, although it can also link to another battalion's information coordination central. Digital traffic includes high quality digital voice equipment with a data service channel. Analog voice for circuit installation and maintenance is available for additional communications between operators using a handset directly attached to the radio set.

- The FAAD data link is used with the FAAD C2 system and passes information, including targeting information, between the Sentinel radar C2 node, M-SHORAD and Avenger batteries and platoons, M-SHORAD and Avenger platforms (squads), and LPWS batteries. FAAD C2 includes an air and missile defense workstation and common data link interface module. A variant of FAAD C2 is used to support LPWS systems and C-UAS capabilities.

- The Army tactical data link-1 is a legacy secure, full-duplex, point-to-point digital data link using serial transmission frame characteristics and standard message formats. It is used to interconnect tactical air control systems and Army or Marine Corps tactical air defense systems. Data can be exchanged using ultra-high frequency, very high frequency, or landline communications. The link also provides a means to exchange air and missile data with some multinational partners.

- Command and Control Battle Management and Communications is used to integrate the Ballistic Missile Defense System components. It is a vital operational system that provides the U.S. President and Secretary of Defense a common operating picture. It also enables combatant commanders at strategic, regional, and operational levels to systematically plan missile defense operations, collectively see the battle develop, and dynamically direct designated networked sensors and weapons systems to achieve global and regional mission objectives.

SECTION II – AIR DEFENSE ARTILLERY SENSORS

2-103. Army and joint AMD ground- or air-based sensors, or combinations of both when available, are employed to perform surveillance of the airspace and provide focused early warning to at-risk forces. The sensors provide engagement authorities with the time to make engagement decisions that deny threat platforms the ability to see or impact the defended assets, and for early warning of possible attack to be transmitted to at-risk units or assets.

2-104. ADA sensors are normally optimized to perform specific surveillance or control functions. A number of complementary systems are necessary to provide the spectrum of coverage required for AMD operations. These systems range from a mix of static and mobile equipment to strategic warning systems. Systems are netted to enable the gathering and dissemination of information to all ADA units under all operational conditions. Airborne early warning systems extend detection ranges and consequently increase the time available for reaction. Spaced-based platforms provide warning of ballistic missile attack and other information and intelligence. Intelligence sources can provide indications of imminent hostile activity, potential early warning, and positive hostile identification before detection by the ADA system.

2-105. ADA sensors are collection assets. They help to understand and characterize the enemy and the operational environment, confirm or deny courses of action, and confirm or deny named areas of interest converting them to target areas of interest as necessary.

2-106. ADA sensors also provide supported commanders with information on the airspace in the area of operations. In conjunction with ground sensors, they facilitate understanding of the operational environment through data collection of friendly, neutral, and enemy elements. This information enables commanders to

identify potential enemy courses of action and establish friendly air operating areas as part of the IPOE process. For more information on the IPOE, see chapter 3.

2-107. The forward-based AN/TPY-2 and Sentinel are standalone radars (not organic components of a weapon system) that support various AMD operations. The forward-based AN/TPY-2 supports missile defense missions, and Sentinel air defense missions. They are discussed below. Weapon-specific radars are presented in the discussions of the weapon systems, starting with paragraph 2-115 on page 47.

AN/TPY-2

2-108. AN/TPY-2 radars are high precision, long-range, three-dimensional X-band, phased-array radars having two modes of deployment: forward-based and terminal. (The terminal mode supports THAAD and is discussed in paragraph 2-117 on page 47.) In the forward-based mode, the AN/TPY-2 radar primarily supports the Ballistic Missile Defense System by detecting ballistic missiles early in their flight and providing precise tracking information. The radar provides boost phase identification, discrimination, early warning/surveillance, and tracking of ballistic missiles for the theater and global Ballistic Missile Defense System kill chains.

2-109. C2 is enabled through the Command and Control Battle Management and Communications system. For more information on forward-based mode operations, see ATP 3-27.5.

SENTINEL

2-110. The Sentinel system consists of a light medium tactical vehicle, a trailer-mounted radar towed by a family of medium tactical vehicles truck, and a shelter. The Sentinel radar, AN/MPQ-64, provides persistent air surveillance and fire control quality data. The system features an X-band, 360-degree phased array radar that provides cueing and target identification to an instrumented range of 75 kilometers. It can acquire, track, and classify cruise missiles, UASs, and fixed- and rotary-wing aircraft. Sentinel is air transportable by medium-lift helicopters (sling-loadable by CH-47 or UH-60) and C-5, C-17, and C-130 aircraft. The Sentinel variant in the Army National Guard, mounted on a high mobility multipurpose wheeled vehicle (known as a HMMWV), can be sling-loaded as a complete system The Sentinel variant in active component forces, mounted on a family of medium tactical vehicles platform, may require the removal of the palletized antenna transceiver group from the vehicle platform. For more information on the Sentinel system and its components, see ATP 3-01.48.

2-111. Sentinel is normally organized as a section within a M-SHORAD and Avenger battery and deployed as a team. It is also in the intercept battery in the Integrated Fire Protection Capability/Avenger battalion, LPWS battery, and headquarters and headquarters battery in division artillery. Sentinels are arrayed to support the division's scheme of maneuver, scheme of AMD, and the mission.

2-112. Sentinels and field artillery radars may be positioned to create complementary and overlapping early warning in division elements and to support offensive and defensive targeting efforts. Additionally, adjustments in position locations and trade-offs in allocation of resources may be required as the fire support coordinator may desire Sentinels for support of indirect fire and counterfires, while the air defense coordinator may need Sentinels for the counter-UAS fight.

SECTION III – AIR DEFENSE ARTILLERY WEAPON SYSTEMS

When the history of DESERT STORM is written, the Patriot system will be singled out as the key.

General Norman Schwarzkopf

2-113. ADA weapon systems are employed at all three levels of war. The Ground-Based Midcourse Defense system and National Advanced Surface-to-Air Missile System (NASAMS), as employed, defend strategic assets in the homeland. Patriot and THAAD are generally considered to be operational-level systems. The AN/TPY-2 forward-based mode radar (addressed above) is a strategic system, which also supports operational-level AMD systems. M-SHORAD, Avenger, Counter-small Unmanned Aircraft System (C-sUAS) variants, LPWS, and Sentinel are deemed tactical systems.

2-114. Such designations, however, are scenario and situational dependent. Patriot, THAAD, and even Avenger and C-sUAS units, for instance, can assume strategic missions. THAAD's employment in Korea has strategic implications, as does Avenger's in the National Capital Region. C-sUAS units may be positioned to defend national assets in the homeland and overseas. Patriot may be assigned tactical missions, such as support of a maneuver formation.

STRATEGIC LEVEL WEAPONS

2-115. The *theater strategic level of warfare* is the level of warfare at which combatant commanders synchronize with unified action partners and employ all elements of national power to fulfill policy aims within the assigned theater in support of the national strategy (ADP 3-0). Defense of the homeland—by its very nature—is a strategic mission. *Homeland defense* is the protection of U.S. sovereignty, territory, domestic population, and critical infrastructure against external threats and aggression, or other threats as directed by the President (JP 3-27).

2-116. The United States relies on the ground-based midcourse defense system to maintain defense of the U.S. homeland against a limited ballistic missile attack from rogue nations. It relies on NASAMS and tactical-level SHORAD systems to defend the National Capital Region.

GROUND-BASED MIDCOURSE DEFENSE

2-117. Ground-Based Midcourse Defense is a major component of the Ballistic Missile Defense System and the U.S. missile defense strategy to counter intermediate-range and intercontinental ballistic missiles in defense of the United States and designated areas. Ground-Based Midcourse Defense is an upper tier system.

2-118. The Ground-Based Midcourse Defense system consists of multiple sensors, a complex communications system and fire control capability, and ground-based interceptors. Its fire control and ground-based interceptor components are deployed in the United States, while contributing sensors, operated by the Army, Navy, and Air Force; Space Force; and intelligence community (National Reconnaissance Office, National Geospatial-Intelligence Agency, and National Security Agency), are deployed around the world and in orbit.

NATIONAL ADVANCED SURFACE-TO-AIR MISSILE SYSTEM

2-119. The NASAMS is designed for mid-range air defense and can be deployed to engage aircraft, helicopters, cruise missiles, and UASs. The system is fielded to protect high-value assets and mass population centers in the National Capital Region. In addition, the United States has provided NASAMS batteries to support Ukraine's air defense campaign against Russian air threats.

- NASAMS is armed with three launchers, each carrying up to six AIM-120 missiles. It can engage targets simultaneously in active and passive modes and, using active seeker missiles, can intercept targets beyond visual range.
- The NASAMS uses the Sentinel radar to detect and track targets. It also has a passive electro-optic and infrared sensor, hard real-time communication network, and embedded and standalone mission planning tool. It uses a fire distribution center C2 unit to perform battle management command, control, and communications.

OPERATIONAL LEVEL WEAPONS

2-120. The *operational level of warfare* is the level of warfare in which campaigns and operations are planned, conducted, and sustained to achieve operational objectives to support achievement of strategic objectives (JP 3-0). The operational level links the employment of tactical forces to the achievement of strategic objectives.

2-121. At the operational level, the Army contributes to theater counterair operations. Army forces provide support for offensive and defensive counterair operations. For ADA units, the operational level typically requires support of Army corps and joint and multinational forces. ADA units defend forces and assets in the theater base as required by the joint force commander's and joint force land component commander/ARFOR's AMD priorities.

THEATER HIGH ALTITUDE AREA DEFENSE

2-122. THAAD is an upper tier, anti-ballistic missile system that provides the capability to engage and negate short-, medium- and intermediate-range ballistic missiles within and outside the atmosphere. Engagements can be conducted against ballistic missiles in both the late midcourse and terminal phases of their trajectories (see FM 3-27 for more information on defense against ballistic missiles during their flight phases).

2-123. THAAD is organized and deployed as a battery. THAAD is deployable and globally transportable via air, land, and sea. THAAD system components are air transportable by C-17 and C-5 aircraft. THAAD missiles require special authorization to ship and separate shipment (not on the launcher). For more information on the THAAD system see ATP 3-01.91.

2-124. The THAAD radar (AN/TPY-2) is an X-band, solid state, phased-array radar capable of tracking multiple threats and multiple missiles during engagements. In the terminal mode of operations, the THAAD radar supports engagements against missiles by providing surveillance, acquisition, track discrimination, missile communications, and hit assessment for the THAAD fire control and communications equipment.

2-125. The THAAD launcher is a heavy expanded mobile tactical truck (known as HEMTT)-mounted, stabilized missile launch platform carrying a missile round pallet. The launcher has a high rate-of-fire and can be rapidly reloaded. The pallet contains eight hit-to-kill, passive terminal homing missile rounds per launcher. The THAAD missile round is a certified round composed of a canister and missile containing a single-stage booster and a kill vehicle. There are six launchers in a THAAD battery.

PATRIOT

2-126. Patriot is a multi-mission system that provides AMD of combat land forces and other critical assets. Patriot forces can defend against ballistic missiles, cruise missiles, UASs, tactical air-to-surface missiles, large-caliber rockets, and fixed- and rotary-wing aircraft.

2-127. Patriot is organized as battalions and deployed generally as the base capability of ADA task forces, though it can also be deployed in smaller configurations such as batteries or sub-sets of batteries, known as minimum engagement packages (MEP). Standard MEP composition, as defined in ATP 3-01.85 and ATP 3-01.87, can be utilized for planning considerations. However, several factors should be considered when developing a MEP. These include mission, threat, available lift, terrain, maturity of deployment location, and available external support. All Patriot system components are air transportable by C-17 or C-5 aircraft. For more information on the Patriot system and its components, see ATPs 3-01.85 and 3-01.87.

2-128. The Patriot radar, AN/MPQ-65A, provides precise three-dimensional search and detection, target track and discrimination, and a Patriot-missile uplink to support defense against close-range, short-range and selected medium-range ballistic missiles and the full gamut of air threats. The radar is part of the battery organization and is deployed primarily as a component of an ADA task force or ADA task organized battery.

2-129. Patriot launchers house, transport, store, and fire Patriot missiles capable of long-range, low-to-high altitude, all-weather defeat of close-, short-, and medium-range ballistic missiles and the other threat types mentioned above. Patriot provides both lower tier ballistic missile defense and air defense.

2-130. Three types of Patriot missiles are employed: Patriot Advanced Capability-3 missile (known as PAC-3), PAC-3 missile segment enhancement (known as MSE), and guidance enhanced missile (known as GEM); all are certified rounds, and all possess the capability to intercept air and missile threats.

- The PAC-3 missile is a medium-range, low-to-medium altitude, radio frequency, terminal homing hit-to-kill missile.
- MSE is a radio-frequency terminal homing, extended altitude and range, hit-to-kill missile.
- GEM is a medium-to-long range, low-to-high altitude, semi-active guided missile optimized against cruise missiles and other air threats.

Patriot launchers, depending on version/configuration, can mount a maximum of 16 PAC-3 missiles, 12 MSEs, or 4 GEMs. PAC-3 and MSE missiles can be mixed on launchers; however, launchers cannot load a mix of GEM with PAC-3 or MSE missiles. Patriot missiles require a Patriot radar to provide uplink commands for midcourse guidance of the PAC-3 and MSE missiles or for the full engagement sequence for GEM missiles.

TACTICAL LEVEL WEAPONS

2-131. The *tactical level of warfare* is the level of warfare at which forces plan and execute battles and engagements to achieve military objectives (JP 3-0). Engagements are typically conducted at brigade echelons and below. They are usually short, executed in minutes or hours.

2-132. ADA systems at the tactical level focus on the defense of corps, division, and BCT forces as they plan and execute battles and engagements. They support the overall objectives of these echelons. ADA units, in coordination with other Army elements and joint AMD forces, control the air environment over supported forces; defend priority forces and assets from attack and surveillance; provide supported forces freedom to maneuver while denying the enemy freedom to use the airspace; and destroy enemy aircraft and missiles in flight.

MANEUVER SHORT-RANGE AIR DEFENSE

2-133. M-SHORAD is a system of mixed, integrated sensors and weapons, enabled by the FAAD C2 system, that facilitates the movement, maneuver, and defense of BCT maneuvering forces against fixed- and rotary-wing aircraft and groups 2 and 3 sUASs throughout the range of military operations. The mix of different sensors provides the capability to detect, identify and track a variety of air objects, including fast moving targets and small signature objects. The mix of different, selectable weapons, that can be fired on the move, enables the M-SHORAD gunner to precisely match munitions to targets, increasing efficiency and effectiveness against targets of all types.

2-134. M-SHORAD systems are currently organized in DIVAD battalions and normally deploy and fight as batteries or platoons, often in direct support of a maneuver unit. The M-SHORAD system is air transportable by C-17 or C-5 aircraft. For more information, see FM 3-01.44.

2-135. The M-SHORAD system consists of a digitized Stinger Vehicle Universal Launcher, four multi-mission hemispheric radars, maneuver and FAAD C2 systems, and associated fire control, power generation, and related components on a Stryker vehicle.

- The launcher mounts four Stinger missiles, a 30-milimeter cannon, a 7.62-milimeter coaxial machine gun, and sensor system with electro-optical and infrared cameras for target acquisition and general situational awareness. The Stinger missiles can be dismounted from the launcher and used in man-portable roles.
- The multi-mission hemispheric radars are small, fixed-position, active electronically-scanned array radars positioned on the front and back of the Stryker. The radars detect, track, and identify low-altitude air targets up to 360 degrees using onboard acquisition and tracking sensor capability, including under obscured, day and night conditions. The radars can also "stare" at a specific track while continuing to scan.

2-136. M-SHORAD is integrated with FAAD C2 and is interoperable with the Sentinel radar. M-SHORAD is integrated into the maneuver force network though the joint battle command platform. The joint battle command platform consists of Blue Force Tracker and the Single-Channel Ground and Airborne Radio System (known as SINCGARS).

COUNTER-SMALL UNMANNED AIRCRAFT SYSTEMS

2-137. The C-sUASs are being fielded to DIVAD battalions to defeat sUASs by disrupting or blocking the signal between the unmanned vehicle and its controlling element, such as the ground control station, or destroying the unmanned vehicle in flight. The fielded system is the Low, Slow, Small Unmanned Aircraft System Integrated Defeat System (known as LIDS).

2-138. The LIDS is deployable as either fixed site (known as FS-LIDS) or mobile (known as M-LIDS) relocatable platforms. The system can provide both stationary support for an installation, asset or site, and a transportable configuration for deployment flexibility. Both versions are equipped with an air surveillance radar, counter-sUAS electromagnetic warfare system, and electro-optic/infrared camera to detect, classify, and defeat low-flying and small moving UAS targets. The mobile version also includes direction-finding sensors, multi-mission radar, and a 30-millimeter chain gun. The sensors and shooters are mounted on an integrated-weapons platform turret on two mine-resistant, ambush-protected, all-terrain vehicles.

AVENGER

2-139. The Avenger weapon system is a mobile lightweight, day or night, limited adverse weather fire unit used to counter enemy reconnaissance, surveillance, and target acquisition efforts and low-level fixed- and rotary-wing threats. Avenger contains missile pods carrying Stinger infra-red homing, fire-and-forget missiles and a M3P .50 caliber machinegun mounted on a high mobility multipurpose wheeled vehicle (known as HMMWV). Avenger weapons can also be fired on the move. Avenger has on-board forward looking infra-red sensors to aid visual acquisition and identification of tracks. It links to the FAAD C2 for air battle management, early warning and cueing, and aids for track identification. The system is air transportable by cargo helicopters (CH-47 and CH-53) and C-130, C-17, and C-5 aircraft. For more information on the Avenger system and Stinger see ATPs 3-01.64 and 3-01.18, respectively.

2-140. Avengers are currently organized as battalions and batteries in Patriot/Avenger battalions, Integrated Fire Protection Capability/Avenger battalions, and Avenger battalions and normally deploy as batteries or platoons. Avenger formations include the Avenger weapon system, Sentinel radars, and FAAD C2.

MAN-PORTABLE STINGER

2-141. Stinger is a shoulder-fired, infrared radiation homing, heat-seeking, guided missile system that tracks to the target through proportional navigation. It is designed to counter low-level fixed- and rotary-wing aircraft. The Stinger components are a missile housed in a fiberglass launch tube; a permanently attached, hinged, open sight assembly located atop the launch tube; a grip stock with an identification friend or foe antenna; and a battery coolant unit.

2-142. Stinger is a fire-and-forget system. The Stinger team receives cueing information from the Sentinel radar. Once identifying the target as hostile (using ROE and identification friend or foe) and locking onto it, the gunner fires the missile. After firing, the gunner has no control over the missile and is required only to observe the missile's flight trajectory to the target.

LAND-BASED PHALANX WEAPON SYSTEM

2-143. The LPWS is a fast reacting, short-range system used to detect and destroy incoming rockets and artillery and mortar rounds in the air before they hit their ground targets, or simply to provide early warning. LPWS is organized as an intercept battery and typically deploys as a battery.

2-144. LPWS is a trailer-mounted close-in weapon system. The system has a 310-degree, 20-millimeter gun system with separate search-and-track radars, and a forward-looking infrared capability. The gun system is capable of firing 4,500 rounds per minute, with a magazine storage capacity of 1,580 rounds. Two 60-kilowatt generators mounted on the trailer supply power to the entire system.

2-145. LPWS leverages ADA and field artillery sensors to provide alerting and cueing of incoming threats. The Sentinel radar and AN/TSQ-50 Lightweight Counter-Mortar Radar are organic to the battery; LPWS pulls data from the AN/TSQ-53 Firefinder radar while Firefinder is executing its primary counterfire mission. A FAAD C2 variant, with specific counter indirect fire modifications, provides the requisite battle management.

SECTION IV – OTHER CONTRIBUTORS TO AIR AND MISSILE DEFENSE

2-146. ADA units are an integral part of Army and joint/multinational operations. They provide the predominate land-based active defense of Army and joint critical assets. However, there are insufficient ADA units with, in some cases, limited capabilities to execute all AMD operational actions.

2-147. Capability shortfalls can be mitigated by non-dedicated air defense elements. Non-dedicated air defense capabilities (such as Stinger MANPAD teams, C-sUAS elements, and organic weapons) resident in maneuver formations can provide active defense of units/assets that are not defended by ADA units. Space-based sensors can provide extended range surveillance and tracking capabilities, enhancing those of ADA systems and creating more decision space for ADA commanders. Electromagnetic warfare elements can provide offensive, non-lethal capabilities to hamper threat surveillance activities and defensive capabilities to protect friendly forces' use of the electromagnetic spectrum.

NON-DEDICATED AIR DEFENSE

2-148. Given the limited amount of dedicated ADA resources available within the Army, it is incumbent on non-ADA units to contribute to their own defense against air threats using organic weapons when ADA units are not available or to supplement any dedicated ADA units allocated to them. In addition to organic crew-served and individual weapons, divisional forces have Stinger MANPAD systems and are being fielded with C-sUAS capabilities.

2-149. Engagements can be lethal or non-lethal, and they can be executed against air and missile threats that are airborne. Engagements are conducted in accordance with the promulgated ROE and the local commander's priorities. Engagements are conducted by the best available system or systems positioned and capable of negating an enemy's capabilities. Key to the engagements is the detection of the threat in sufficient time and with sufficient accuracy to allow friendly forces to execute necessary responses.

2-150. Figure 2-1 presents a doctrinal framework for C-UAS applicable to non-dedicated air defense and dedicated AMD Soldiers and units. It notes the non-dedicated protection task for air defense and considerations for C-UAS AMD missions. It also depicts overlaps in capabilities in engagements.
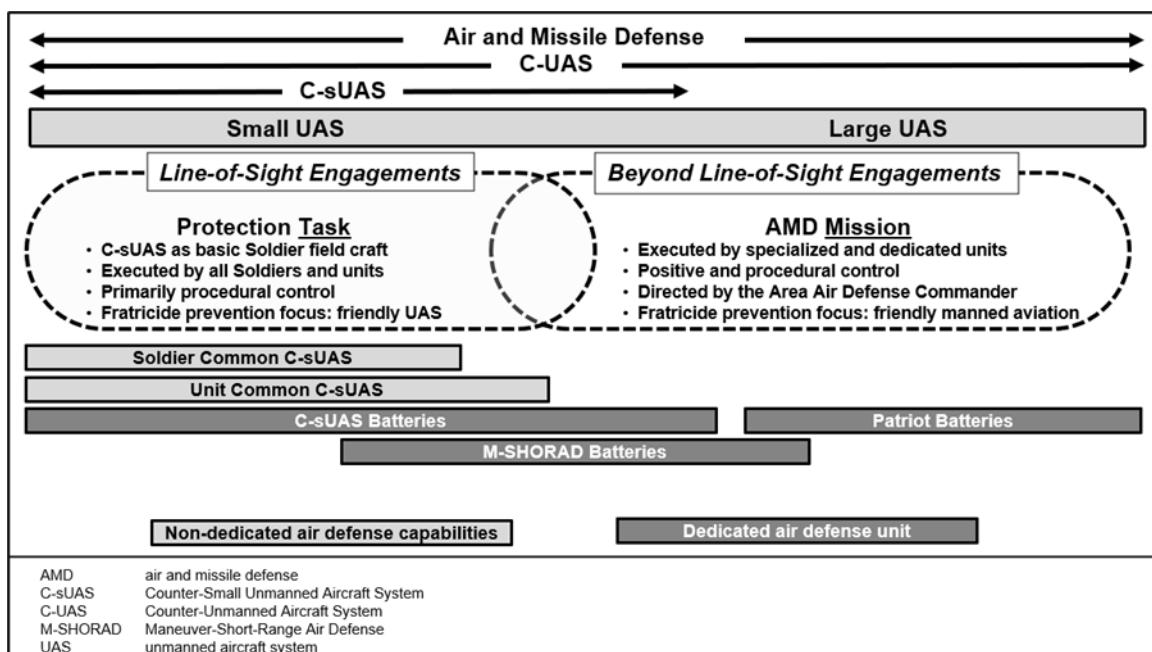
Figure 2-1. Doctrinal framework for counter-unmanned aircraft systems

2-151. Maneuver forces in the close area use their organic weapons to engage surveilling or attacking rotary- or fixed-wing aircraft and UASs. Crew-served weapons are more capable against fixed-wing aircraft, rotary-wing aircraft, and sUAS; small arms are generally better against the group 1 UASs. All such efforts are considered self-defense actions. Threat systems that transit a unit's area of operation, but which are not attacking that unit, can also be engaged; however, they are more likely allowed to continue transiting given the relative short ranges and limited AMD effectiveness of maneuver force weapons. Transiting threats should be reported for early warning of and potential engagement by other units.

2-152. The C-sUASs have also been fielded to divisional units. These systems currently include the Bal Chatri, Modi, Smart Shooter, and Drone Buster.

- Bal Chatri is a passive, individually carried detection and alerting device used to detect and identify threat sUAS. The system employs a software-defined radio that can be configured for body-worn detection capability or for a small, fixed site location. It can be used to alert various other devices.

- The Modi system is a dismounted, man-portable electromagnetic warfare system that is used to disrupt/jam communications. Modi systems can be employed in a dismounted configuration on a fixed site or in a mounted configuration (dismounted when required).

- Smart Shooter is a rail-mounted, electro-optic for the M16 family of rifles. It enables a Soldier to defeat group 1 sUAS threats. When employed, it performs target lock, track, and fire control actions to kinetically defeat sUAS.

- Drone Buster is a lightweight, handheld, battery operated, dismounted, electronic attack device specifically designed to detect and defeat groups 1 and 2 sUASs. It exploits weaknesses in drone communication protocols, enabling the operator to jam the control signal. It operates strictly line-of-sight. The Drone Buster requires one person and is a standalone system.

SPACE

2-153. Army space operations, duties, and responsibilities are centered on eight codified joint space capabilities: space situational awareness; position, navigation, and timing; space control; satellite communications; satellite operations; missile warning; environmental monitoring; and space-based intelligence, surveillance, and reconnaissance. The distinct space capabilities, effects, and products used by Army, joint, and multinational forces are planned, developed, prepared, and made available to the force by Soldiers conducting Army space operations and space-enabled operations. Space elements are organic staff participants in theater armies, corps, and divisions.

2-154. While all eight functions support AMD operations, the two most relevant for ADA are positioning, navigation, and timing and missile warning.

- Assured positioning, navigation, and timing information is a mission-essential element in ADA weapon systems. This information is provided by a constellation of Earth orbiting satellites and associated ground control stations that form the Global Positioning System. Global Positioning System signals enable precision targeting and engagements by ADA units, with increased lethality and reduced collateral damage. They enable precise movements and extended-range communications. These enablers also foster extended operational reach, control of the operational tempo, and enhanced C2 (FM 3-14).

- Missile warning is the ability to detect missile launch events, track launch-related objects, discriminate specific objects as a threat, and have a high degree of certainty the trajectory or impact location is a threat to the U.S. homeland, territories, and other designated areas (FM 3-14). Theater ballistic missile warnings are provided by the Space Force's deployed Joint Tactical Ground Stations. ADA C2 nodes use missile warning to cue active and passive defenses against incoming enemy ballistic missiles. Information provided in the warnings includes the identification of the missile type, predicted impact point and time, and the estimated launch point. Identifying the missile type can help to determine the missile warhead—whether high explosive or containing chemical, biological, radiological, and nuclear effects—and appropriate protection measures. Predicting the impact point supports ADA fires. ADA weapons can be cued to the incoming missile threat and conduct timely, accurate engagements. Predictions can also facilitate threat warnings to affective units (those nearest that point) to take protective actions, while allowing others to continue normal operations. Estimating the launch point provides data that can support attack operations. Field artillery and other attack options may dynamically target enemy launcher sites to destroy the launchers and supporting infrastructure.

CYBERSPACE AND ELECTROMAGNETIC WARFARE

2-155. AMD operations are enhanced by electromagnetic warfare actions, specifically electronic attack and electronic protection, conducted by cyber operations specialists. Electronic attacks, for instance, can deceive

or confuse enemy operators in C2 nodes at the tactical through strategic levels; they can also adversely impact an enemy's ability to surveil using UASs. Electronic protect involves actions taken to protect personnel, facilities, and equipment from any effects of friendly or enemy use of the electromagnetic spectrum that degrade, neutralize, or destroy friendly combat capability. This can include limiting the electromagnetic signatures of radars to reduce an enemy's ability to locate these systems.

2-156. Electromagnetic deception and intrusion devices and activities are designed to mislead or deceive the threat. These devices can deny, defeat, or exploit the link between the UAS and its ground control station. Deny activities are executed through jamming with little to no operator interaction; defeat is the deliberate measure to render the link ineffective and requires man-in-the-loop interaction; and exploit is the deliberate effort to employ deception measures and is exercised by an operator.

2-157. ADA staff personnel should work with their counterparts in the supported force to coordinate electromagnetic spectrum use for ADA units. ADA G-6/S-6/signal officers should synchronize frequencies with the spectrum manager. Spectrum managers coordinate frequency allocation, assignment, and usage and assist in deconflicting the use of friendly frequencies to prevent or mitigate frequency interference to the radios and sensors used by other friendly forces (FM 3-12). ADA G-3/S-3 officers should also coordinate with their counterparts and supporting electromagnetic warfare elements to synchronize active defense (lethal/non-lethal) actions against aerial threats. Synchronization efforts include ensuring that the electromagnetic warfare elements are aware of the positions and frequencies used by ADA sensors and do not inadvertently or mistakenly conduct attack operations against them.

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Chapter 3

Air Defense Artillery and the Operations Process

Be audacious and cunning in your plans, firm and persevering in their execution, determined to find a glorious end.

<div align="right">Clausewitz</div>

This chapter articulates how ADA contributes to the Army's operations process. It discusses the Army's operations process and how ADA subject matter experts and sections support this process throughout planning, preparation, execution, and assessment. It outlines roles, responsibilities, inputs, and expected outputs of the ADA force. This all leads to ensuring that the AMD output (products) can best portray the arrayal of ADA units and AMD plan (Annex I [Air and Missile Defense]) in support of the supported commander's mission and desired end state.

SECTION I – OPERATIONS FRAMEWORK

3-1. The Army's framework for organizing and exercising C2 is the operations process. The operations process is the major command and control activities performed during operations: planning, preparing, executing, and continuously assessing the operation (ADP 5-0).

3-2. Categorization as planning, preparing, executing, and assessing provides a framework to assist in defining and establishing responsibilities and conducting activities. However, not all activities or tasks clearly fit within one of these categories; many activities and tasks overlap and recur as circumstances demand. While planning can start at the beginning of the operations process, it does not stop with the production of an operation order. A commander and staff continuously revise the plan based on changing circumstances. Preparation for a specific mission begins early in planning and continues well into execution. Execution puts a plan into action and involves adjusting the plan based on METT-TC (I). Assessment is continuous and influences the other three activities.

3-3. Higher ADA echelon staffs typically focus on planning and preparation activities, while lower echelons focus on execution. Figure 3-1 on page 56 depicts these foci; the two curves represent the traditional activity level of the ADA echelons as they carry-out the AMD fight. Planning, preparation, and execution activities for ADA units are described in greater detail in chapter 4.
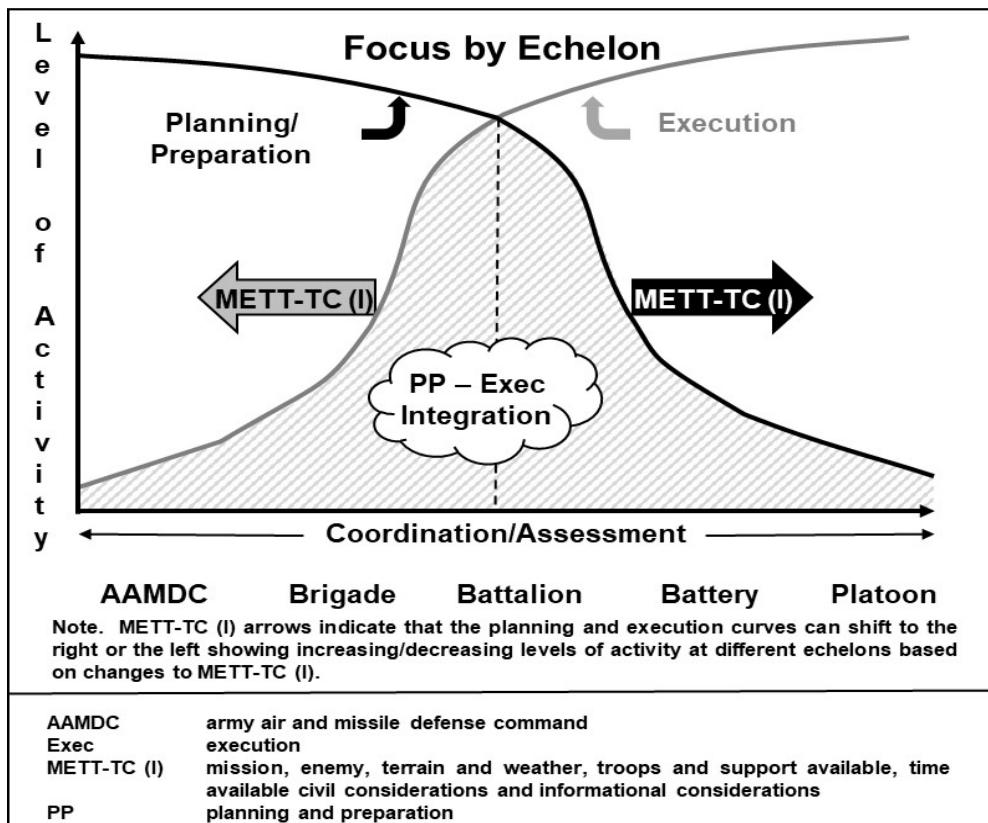
Figure 3-1. Planning/preparation versus execution

3-4. ADA commanders, staffs, and subordinate leaders employ the operations process to organize and synchronize efforts to accomplish missions. This includes integrating numerous processes and activities, such as harmonizing the MDMP of a divisional air defense (DIVAD) battalion with its parent division, coordinating AMD with supported forces and other key assets, positioning forces to best support a maneuver commander's scheme of maneuver, and executing engagements of aerial targets in accordance with AMD directives and control measures.

SECTION II – PLANNING

"In preparing for battle, I have always found that plans are useless, but planning is indispensable."

President Dwight D. Eisenhower

3-5. Planning is a continuous process that starts with the receipt of a mission and the commander's guidance and is done as thoroughly as time allows. Successful planning requires an appreciation of the simultaneous nature of operations, awareness of the mission, anticipation of future events, and an understanding of the operational framework. An outcome of planning is a plan or order that serves as a framework of anticipated actions that guide subordinates through each phase of an operation (FM 5-0).

3-6. ADA commanders and staffs use Army integrating processes to synchronize efforts throughout the operations process. An integrating process consists of a series of steps—some conducted sequentially and some simultaneously—that incorporate multiple disciplines to achieve a specific end. ADA planners primarily use the IPOE process and MDMP to develop suitable plans for AMD operations.

INTELLIGENCE PREPARATION OF THE OPERATIONAL ENVIRONMENT

3-7. *Intelligence preparation of the operational environment* is the systematic process of analyzing the mission variables of enemy, terrain, weather, and civil considerations in an area of interest to determine their effect on operations (FM 2-0). IPOE is an integral part of the MDMP process, supporting each of its steps. IPOE results in intelligence products that are used to develop friendly courses of action and decision points for the commander.

3-8. The ADA intelligence staff (G-2/S-2) is a primary source for the ADA commander and the supported commander in identifying, collecting, and analyzing threat aerial capabilities and performing the air IPOE. ADA G-2/S-2s in the army air and missile defense command (AAMDC) and ADA brigade can access databases and information from strategic- and operational-level intelligence agencies and air awareness data from joint and multinational AMD sensors and provide that information to theater and corps forces. DIVAD battalions and subordinate units use their organic ADA sensors to gain and sustain an air picture of the area of operations. Sensor information from higher headquarters supplements that provided by DIVAD's organic ADA radars.

3-9. ADA commanders must ensure that ADA sensors are recognized by supported commanders as key inputs to the understanding of the air environment and thus must be included in the supported units' information collection plan. ADA sensors provide information on the vertical dimension of the area of operations to complement that of other intelligence, surveillance, and reconnaissance assets focused on the horizontal dimensions. Information collected by the sensors identifies friendly, enemy, and neutral aircraft entering, transiting, and/or exiting the area of operations and extending to the area of interest.

3-10. While the IPOE process is generally conducted by staff elements in ADA battalions and higher echelons, other ADA leaders provide IPOE inputs and products to their supported commanders. ADA officers in the air defense support element (ADSE) and corps/division AMD sections are responsible to help characterize enemy aerial capabilities, limitations, and employment tactics. The air defense support officer (ADSO) in a BCT provides the BCT commander and staff with localized threat aerial information from any available ADA sensors and supporting or in-vicinity ADA unit. The ADSO can gain additional aerial information through friendly aviation elements and by observation reports of threat air by BCT personnel—threat types, capabilities, potential operating areas, and avenues of approach to the area of operations. ADA battery commanders and platoon leaders also provide their supported commanders with information about potential air threats to their forces, using information from ADA higher headquarters, organic ADA sensors, and localized observations to identify and classify the threats and analyze potential threat tactics.

3-11. There are four steps in the IPOE process: define the operational environment, describe operational effects on operations, evaluate the threat, and determine threat courses of action. (See ATP 3-01.16 for more information on ADA doctrine). Each of these steps are inherent sub-steps of the MDMP. The IPOE analysis and conclusions serve to inform commanders and staffs in their MDMP deliberations. Figure 3-2 on page 58 reflects the synergy between the two processes.

3-12. All actions taken and products produced by ADA staffs are in support of the supported unit. The supported unit leads the IPOE process with inputs from ADA subject matter experts, rather than an ADA staff executing a separate process.
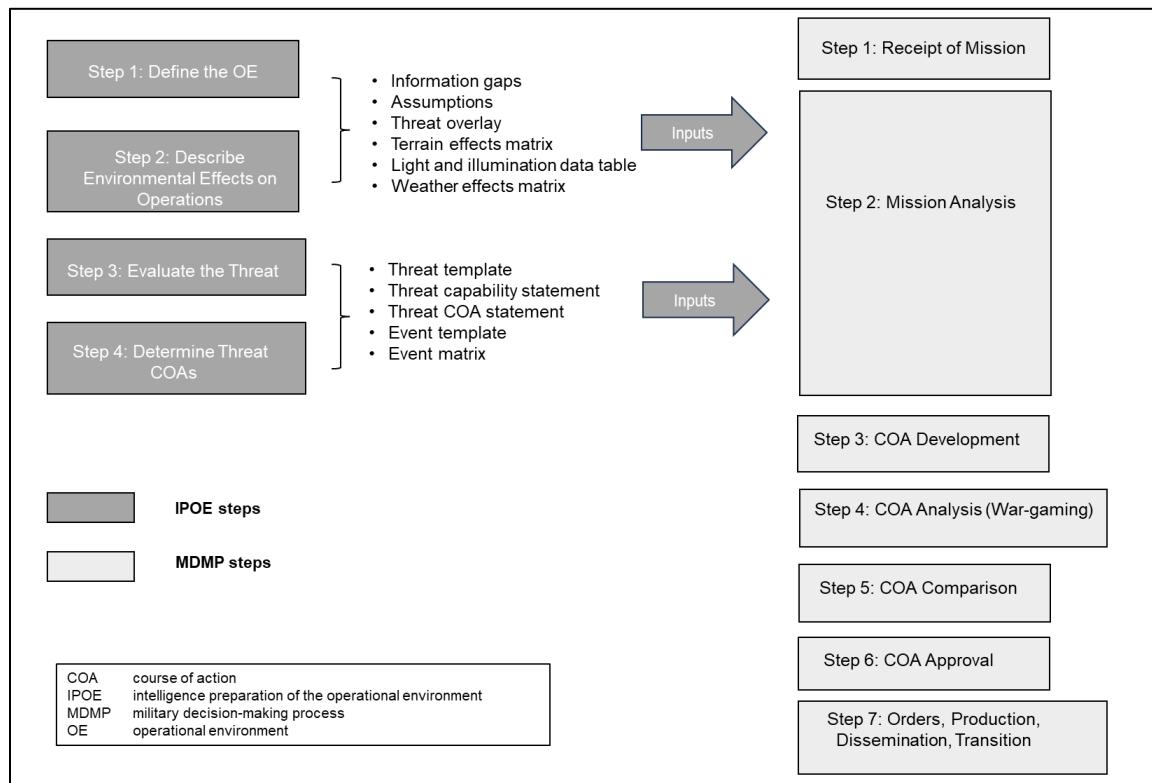
Figure 3-2. Synergy of the Two Processes

STEP 1. DEFINE THE OPERATIONAL ENVIRONMENT

3-13. During this step, the ADA G-2/S-2 staff identifies for further analysis the significant characteristics of or activities within the operational environment that can influence friendly and threat courses of action and command decisions, as well as the physical space the mission will occupy.

3-14. The physical space encompasses the area of operations, area of influence, and the area of interest.
- An *area of operations* is an operational area defined by a commander for the land or maritime force commander to accomplish their missions and protect their forces (JP 3-0). An AMD area of operations defines the area where an ADA commander can affect the battle with assigned weapon systems.
- The *area of influence* is an area inclusive of and extending beyond an operational area wherein a commander is capable of direct influence by maneuver, fire support, and information normally under the commander's command or control (JP 3-0). For ADA units, it is the operational area within the maximum detection and engagement ranges of available AMD sensors and weapons.
- An *area of interest* is that area of concern to the commander, including the area of influence, areas adjacent to it, and extending into enemy territory (JP 3-0). It includes the airspace above the geographic area from which information and intelligence assessments are required to facilitate planning or successful conduct of the commander's operation. For ADA units, it extends to the limits from which information must be collected about enemy forces which could affect friendly forces and typically includes the locations and capabilities of threats which can affect ADA systems or assets, and the locations where threats may move.

3-15. Table 3-1 on page 59 presents the major sub-sets in defining the operational environment. These are followed by key actions that ADA units should take and the resulting outputs from those actions.

Table 3-1. Define the operational environment

STEP 1: DEFINE THE OPERATIONAL ENVIRONMENT		
Sub-Steps	*Key ADA Actions*	*ADA Outputs*
• Identify the limits of the commander's area of operations. • Identify the limits of the commander's area of interest. • Identify significant characteristics of the area of operations and area of interest for further analysis. • Evaluate current operations and intelligence holdings to determine additional information needed to complete the IPOE. • Initiate processes to acquire the information needed to complete IPOE.	• Define the area of operations, area of influence, and area of interest. • Update air defense running estimates; coordinate with higher, lower, and adjacent ADA units. • Evaluate current operations, existing databases, and identify intelligence gaps. • Provide inputs during formulation of the commander's initial guidance and initial warning order.	• Specified area of operations, area of influence, and area of interest to be used in the threat analysis*.* • Information gaps. • Assumptions in lieu of information gaps. • Requests for information and information collection.
ADA air defense artillery IPOE intelligence preparation of the operational environment		

STEP 2. DESCRIBE OPERATIONAL EFFECTS ON OPERATIONS

3-16. Step 2 of the IPOE process determines how significant characteristics of the operational environment can affect friendly and threat operations. The staff begins evaluation by analyzing existing and projected conditions in the area of operations and area of interest and then determining effects on both friendly and threat operations. Although detailed analysis of threat forces occurs during steps 3 and 4 of the IPOE process, the type of threat force and its general capabilities must be defined during step 2. This places the threat force in context with other variables in order to understand its relative importance as a characteristic of the operational environment.

3-17. The ADA G-2/S-2 staff collects information on the air threat and begins to catalog the information using threat overlays and the threat description table. The ADA G-2/S-2 staff conducts terrain analysis to determine and describe how the terrain can affect ADA and threat air operations. Terrain analysis consists of the collection, analysis, evaluation, and interpretation of geographic information on natural and man-made terrain features to ascertain the effect of the terrain on military operations. ADA units and threat air will use the terrain to their best advantage. Key elements of terrain analysis are observation, field of fire, avenue of approach, key terrain, and cover and concealment. Key ADA actions and outputs in step 2 are reflected in table 3-2 on page 60.

Table 3-2. Describe the environmental effects on operations

STEP 2: DESCRIBE ENVIRONMENTAL EFFECTS ON OPERATIONS		
Sub-Steps	*Key ADA Actions*	*ADA Outputs*
• Describe how the threat can affect friendly operations. • Describe how terrain can affect friendly and threat operations. • Describe how weather can affect friendly and threat operations.	• Collect and catalog information on the air threat. • Conduct terrain and weather analysis to describe how these can affect threat/ADA operations. • Conduct analysis of the electromagnetic spectrum with assistance from cyberspace electromagnetic cyber cells. • Surveil the airspace. • Identify ADA fields of fire. • Identify, evaluate, and prioritize air avenues of approach.	• Threat overlay. • Threat description table. • Terrain effects matrix. • Operational climatology/weather forecast analysis chart. • Light and illumination data table. • Weather effects matrix. • Electromagnetic spectrum effects matrix.
ADA air defense artillery		

STEP 3. EVALUATE THE THREAT

3-18. Step 3 of the IPOE process determines threat force capabilities and the doctrinal principles and tactics, techniques, and procedures that threat forces prefer to employ. Evaluating the threat should begin with identifying all threats based on their characteristics and ultimately creating the threat model. Evaluations should also consider the threat's targeting cycle for the employment of each projected air and missile capability. Key ADA actions and outputs in step 3 are reflected in table 3-3.

Table 3-3. Evaluate the threat

STEP 3: EVALUATE THE THREAT		
Sub-Steps	*Key ADA Actions*	*ADA Outputs*
• Identify threat characteristics. • Create and refine threat models. • Identify threat capabilities.	• Identify and analyze air threat characteristics, such as order of battle, strength, and capabilities and limitations. • Conduct a target value evaluation.	• Threat data files. • Threat template. • High-value target list. • Threat capability statement.
ADA air defense artillery		

3-19. The ADA and supported commanders' understanding of the air threat is based in part on the ADA G-2/S-2's research and analysis of the threat characteristics. The G-2/S-2 staff considers broad characteristics when analyzing the threat, such as composition, disposition, strength, combat effectiveness, doctrine and tactics, support and relationships, electronic technical data, capabilities and limitations, current operations, and historical data.

3-20. The ADA G-2/S-2 staff develops a threat model, an analytical tool that assists staff analysts in developing situation templates. ADA threat models accurately portray how threat aerial forces normally execute operations and how they have reacted to ADA defended areas/points in the past. The ADA G-2/S-2 staff develops threat situation templates to graphically portray how the threat might use its air assets to execute actions required to accomplish its objectives. Threat templates are tailored to the needs of the ADA commander, supported commander, and ADA G-2/S-2 staff.

3-21. Step 3 also requires an evaluation of a potential target's value to determine which assets are to be labeled as high-value targets. A *high-value target* is a target the enemy commander requires for the successful completion of the mission (JP 3-60). The ADA commander, staff, or subordinates—the ADSO, battery commander, and platoon leader—participate with the supported commander's staff to identify the most

critical assets in the command. A prioritized high-value target list is ultimately developed by protection cell elements within corps and divisions.

STEP 4. DETERMINE THREAT COURSES OF ACTION

You will find that the enemy has three courses of action to him, and of these he will adopt the fourth.

Helmuth von Moltke

3-22. Step 4 of the IPOE process identifies and describes threat courses of action that can influence friendly operations. A *course of action* is a scheme developed to accomplish a mission (JP 5-0). Developing a threat course of action requires an understanding of the threat characteristics, as well as the effects of terrain and weather on operations. Key ADA actions and outputs in step 4 are reflected in table 3-4.

Table 3-4. Determine threat courses of action

STEP 4: DETERMINE THREAT COURSES OF ACTION		
Sub-Steps	*Key ADA Actions*	*ADA Outputs*
• Develop threat COAs. • Develop the event template and matrix.	• Identify all valid COAs. • Prioritize the COAs from most likely to least likely. • Determine the information and indicators to identify which COA the threat may implement. • Brief the commander on the recommended COA. • Approve a plan to counter the most likely COA.	• Situation template. • Threat COA statement. • Event template. • Event matrix.
ADA air defense artillery COA course of action		

3-23. The ADA G-2/S-2 staff identifies the task, purpose, method, and objective for each potential air threat course of action for each projected threat capability. By identifying these for each course of action, the staff can better determine the chosen threat course of action during the conduct of operations.

3-24. After identifying the full set of potential threat courses of action, the ADA G-2/S-2 staff develops matrices and templates that document requisite information and indicators to determine which course of action the threat may implement. The ADA G-2/S-2 staff determines all valid threat courses of action and prioritizes them from most likely to least likely. These are analyzed and war gamed during step 4 of the MDMP.

MILITARY DECISION-MAKING PROCESS

3-25. The *military decision-making process* is an iterative planning methodology to understand the situation and mission, develop a course of action, and produce an operation plan or order (ADP 5-0). The process helps commanders and staffs apply critical and creative thinking to analyze a mission; develop, analyze, and compare alternative courses of action; select the best course of action; and create the plan or order.

3-26. The MDMP is designed to develop shared understanding through collaborative interactions between the ADA commander, staff, subordinate commanders, higher AMD headquarters (Army or joint), and the supported commander. This iterative interaction allows for a concurrent, coordinated effort that facilitates continuous information sharing. Within the ADA unit, the interaction allows the staff to receive guidance from the ADA commander, identify challenges to AMD operations, and resolve issues. It further enables synchronized staff efforts that produce a coordinated AMD plan. The ADA unit also uses the MDMP to share information with and receive information from a supported command. The ADA commander must be cognizant of the supported commander's intent and scheme of action or maneuver. ADA commanders and staffs at echelon coordinate efforts with supported commanders to develop air defense products for the supported commanders' MDMP actions. ADA planning is conducted in parallel with that of the supported

commander's staff. Specific air defense products for each step of the MDMP are identified in the MDMP tables.

3-27. The process should be as detailed as time, resources, experience, and the situation permit. A full MDMP is resource intensive in both time and effort. Therefore, tailor planning and preparations in accordance with METT-TC (I). For more information, see FM 5-0.

3-28. There are seven steps of the MDMP process:
- Step 1 - Receipt of mission.
- Step 2 - Mission analysis.
- Step 3 - Course of action development.
- Step 4 - Course of action analysis.
- Step 5 - Course of action comparison.
- Step 6 - Course of action approval.
- Step 7 - Orders production, dissemination, and transition.

STEP 1. RECEIPT OF MISSION

3-29. The MDMP begins upon receipt of a mission from higher echelon headquarters or in anticipation of a new mission. Commanders often initiate a planning effort based on their visualization and changes to the situation without a formal directive from their higher headquarters. The purpose of this step is to establish conditions for successful planning. Table 3-5 identifies the subordinate ADA actions and outputs in this step.

Table 3-5. Air defense actions during the receipt of mission

STEP 1: RECEIPT OF MISSION		
Sub-Steps	**Key ADA Actions**	**ADA Outputs**
• Alert the staff and other key participants. • Gather tools. • Update running estimates. • Conduct initial assessment. • Prepare commander's initial guidance. • Prepare the initial WARNORD.	• Obtain higher ADA and supported HQ OPLAN/OPORD, maps, current IPOEs, and running estimates. • Update the running estimate, with inputs from higher, lower, and adjacent ADA units. • Conduct an initial assessment of time and resources available to plan, prepare, and begin execution of an operation. • Support the formulation of the commander's initial guidance and initial WARNORD.	• Updated running estimate. • Updated facts forwarded to higher, lower, and adjacent HQ. • Inputs to IPOE and reconnaissance and surveillance taskings. • Initial tasks assigned to subordinates (WARNORD).
ADA air defense artillery HQ headquarters IPOE intelligence preparation of the operational environment	OPLAN operation plan OPORD operation order WARNORD warning order	

Running Estimates

3-30. Actions and activities throughout planning, preparation, execution, and assessment, are informed through running estimates. A *running estimate* is the continuous assessment of the current situation used to determine if the current operation is proceeding according to the commander's intent and if planned future operations are supportable (ADP 5-0). Running estimates should continuously address and update—
- Facts.
- Assumptions.
- Friendly status, including location, activity, and combat power of subordinate units from two levels down.

- Enemy status, including composition, disposition, and strength.
- Civil considerations.

3-31. Accurate and timely running estimates, maintained by a staff or subordinate leaders, assist the ADA and supported commanders in understanding situations and making decisions. AMD running estimates consider such factors as—

- The higher headquarters specified and implied tasks.
- Capabilities and limitations of ADA systems and projected air and missile threats, to include quantities and operational status.
- Task organization of subordinate ADA units and their missions.
- Arrayal of ADA capabilities and projected threat air launch sites and areas.
- Air threat inputs to the IPOE process.
- Impact of terrain and weather on friendly and enemy operations.
- Commander's information requirements (commander's critical information requirements and essential elements of friendly information).
- Information collection plan support and requirements.
- Identification of critical assets.
- ROE impacts on operations.
- Transit routes/lines of communication.
- Sustainment support requirements.
- Communication requirements, reliability, spectrum, and ranges.
- Movement and emplacement times.
- Operational/ready-to-fire times.

WARNING ORDER

3-32. The commander issues an initial warning order to subordinate forces that provide them the commander's intent and critical information to allow subordinates to start necessary planning and preparation activities. The warning order is clear and concise.

3-33. The warning order may contain the assigned mission, an update of the situation, and timelines. It may also address the area of operations, ADA organization for combat, communications, and sustainment. Additional warnings orders are issued throughout the MDMP process as more information becomes available.

STEP 2. MISSION ANALYSIS

3-34. The commander and staff conduct mission analysis to better understand the situation and problem, and identify what the command must accomplish, when and where it must be done, and most importantly why— the purpose of the operation. Based on this understanding, commanders issue their initial commander's intent and planning guidance.

3-35. The ADA commander and staff drive this analysis for AMD. The staff analyzes all aspects of the mission and the supported/higher headquarters' plan and begins to identify required actions and outputs in parallel with those of the supported/higher headquarters. These are presented in table 3-6 on page 64.

Table 3-6. Air defense actions during mission analysis

STEP 2: MISSION ANALYSIS		
Sub-Steps	*Key ADA Actions*	*ADA Outputs*
• Analyze higher headquarters' OPLAN/OPORD. • Perform IPOE. • Determine specified, implied, and essential tasks. • Identify resource shortfalls. • Determine constraints. • Identify critical facts and develop assumptions. • Begin risk management. • Develop initial CCIRs and EEFIs. • Develop the initial information collection plan. • Update the plan for use of available time. • Develop a proposed problem statement. • Develop a proposed mission statement.	• Develop the air IPOE. • Obtain and understand the next higher HQ's operations and AMD plans. • Review area air defense plan and special instructions. • Identify and distribute for understanding information on friendly C2 networks, sensor capabilities, and multinational partner capabilities in combined operations. • Continue developing/refining the running estimate; organize and analyze facts. • Identify ADA specified and implied tasks. • Identify available ADA units—their composition, capabilities, and limitations. • Identify joint and multinational system impacting AMD operations in a unit's area of operations. • Review established ROE and identify air defense restrictive areas (such as UAS operating areas). • Support initial risk analyses to identify the criticality and vulnerability of the supported commander's key assets. • Draft inclusive essential tasks and associated purposes. • Develop CCIRs and EEFIs to respond to gaps in information. • Support the information collection plan with ADA radar data and aerial indicators of threat potential actions. • Draft inputs for the commander's restated mission, intent, and guidance, and to the WARNORD.	• IPOE products, to include threat overlays, terrain effects matrix, threat data files, HVT list, and situation and event matrices. • Refined running estimate. • Approved essential tasks. • ADA force matrix, identifying systems, locations, support relationships, and current operational status. • Air defense directive. • ACMs in the area of operations. • List of required information for collection. • ADA input to the mission analysis brief. • ADA inputs to the commander's planning guidance and WARNORD. • Updated operational timelines for supporting ADA units. • Commander's WARNORD.
ACMs airspace coordinating measures ADA air defense artillery CCIRs commander's critical information requirements EEFI essential elements of friendly information HQ headquarters HVT high value target	IPOE intelligence preparation of the operational environment OPLAN operation plan OPORD operation order ROE rules of engagement WARNORD warning order	

3-36. The commander and staff conduct an initial assessment of time and resources available to plan, prepare, and begin execution of an operation. The assessment also facilitates the commander's and staff's

identification of when to initiate actions to ensure ADA units are prepared to execute the mission. Key considerations in the assessment are—

- Time available from mission receipt to mission execution.
- Time needed to plan and prepare for the mission for both headquarters and subordinate units.
- Guidance on a planning approach.
- Time required to position launchers, radars, and C2 nodes.
- External units/headquarters elements to contact and obtain information to support the assessment.
- Other preparations the commander, staff, or subordinate units need to conduct before beginning planning.

Concept of Operations

3-37. The *concept of operations* is a statement that directs the manner in which subordinate units cooperate to accomplish the mission and establish the sequence of actions the force will use to achieve the end state (ADP 5-0). When developing the concept of operations, commanders ensure their concept is synchronized with that of their higher headquarters and supported command.

3-38. The ADA concept of operations describes how arrayed, task-organized ADA units will accomplish the mission. It envisions how subordinate ADA units will execute their assigned tasks to achieve the supported commander's intent and objectives. The scheme of AMD (see paragraph 3-57 on page 70) is an integral part of the concept of operations.

Mission Analysis Briefing

3-39. The mission analysis briefing informs the commander and staff of the results of the staff's analysis of the situation. It helps the commander further understand and visualize the mission. The staff members present a summary of their running estimates from their respective areas and discuss how their findings impact or are impacted by other areas. Throughout the mission analysis briefing, the commander, staff, and other partners discuss the various facts and assumptions about the situation and develop a shared understanding of the mission requirements.

3-40. The mission analysis briefing may include—

- Mission and commander's intent of the headquarters two echelons higher than the unit.
- Mission, commander's intent, and concept of operations of the headquarters one echelon higher than the unit.
- Review of the commander's initial guidance.
- Initial IPOE products that impact the conduct of operations.
- Specified and implied tasks.
- Pertinent facts and assumptions.
- Constraints.
- Forces available, including known command and support relationships and resource shortfalls.
- A proposed problem statement.
- A proposed mission statement.
- Proposed commander's intent for approval or commander's intent issuance.
- Proposed commander's critical information requirements and essential elements of friendly information.
- Initial information collection plan.
- Initial risk assessment.
- Recommended collaborative planning sessions.
- Updated timeline.
- Review or issue commander's planning guidance.

3-41. At the conclusion of the briefing, the commander approves the mission statement and commander's critical information requirements and issues guidance to the staff for continued planning. The commander then develops and issues the initial commander's intent and planning guidance.

Commander's Intent and Planning Guidance

3-42. Commanders drive the operations process through understanding, visualizing, describing, directing, leading, and assessing operations (ADP 5-0). The *commander's intent* is a clear and concise expression of the purpose of the operation and the desired military end state that supports mission command, provides focus to the staff, and helps subordinate and supporting commanders act to achieve the commander's desired results without further orders, even when the operation does not unfold as planned (JP 3-0). It should be nested with that of the higher commander/supported commander's intent and concept of operations. As such, the ADA commander and staff must clearly understand the higher/supported commander's intent and expectations for AMD. The supported commander must also understand the capabilities and limitations of the supporting ADA force. This must be conveyed by the supporting ADA commander or supported unit's resident ADSO. The ADA commander's intent succinctly describes the broader purpose of the unit's operation in relationship to the higher commander/supported commander's intent and concept of operations. It informs the staff and provides the requisite guidance to the staff in its mission analysis and course of action development. The initial commander's intent drives course of action development. Figure 3-3 provides an example of a nominal division commander's intent and the complementary intent of the DIVAD battalion commander.

222th Armored Division Commander's Intent
Purpose: Clear enemy forces from the vicinity of the city of Austopac in order to reestablish friendly control.
Key Tasks:
- Attack enemy forces at Objectives Sally and Mustang through rapid and aggressive maneuver.
- Synchronize fire and maneuver effects to deny the enemy freedom of action.
- Establish secure areas around the city of Austopac once enemy forces have been defeated.
End State: Reestablished friendly government in and stability around the city of Austopac.

222th Armored Division Air Defense Commander's Intent
Purpose: Defend the 1st and 2d Bdes from aerial attacks and surveillance to enable their freedom of maneuver.
Key Tasks:
- Conduct an IPOE to identify the enemy's potential air avenues of approach and forward area aerial operating bases.
- Identify and nominate enemy forward area aerial operating bases for attack by division artillery and aviation assets.
- Emplace sensors to sense and detect aerial threats at extended ranges, before they are capable of attacks or surveillance.
- Position ADA systems to deny the enemy knowledge of the operation and force movements.
- Coordinate ADA force arrayal and AMD operations with the supported brigade commanders and ADSOs.
- Identify, engage, and defeat all potential FW, RW and sUASs threats in accordance with the ROE.
- Synchronize support to the Bde commanders to identify suitable passive defense measures.
End state: Air threats to the brigades are mitigated; the Bdes capture the two objectives.

ADA	air defense artillery	IPOE	intelligence preparation of the operational environment
ADSO	air defense support officer	ROE	rules of engagement
AMD	air and missile defense	RW	rotary wing
Bde	brigade	UAS	unmanned aircraft system
FW	fixed wing		

Figure 3-3. Nominal commander's intent

3-43. The commander's intent may include key tasks and conditions that define the end state. *Key tasks* are those significant activities the force must perform as a whole to achieve the desired end state (ADP 6-0). Key tasks can be specified or implied. A *specified task* is a task specifically assigned to a unit by its higher headquarters (FM 5-0). An *implied task* is a task that must be performed to accomplish a specified task or mission but is not stated in the higher headquarters' order (FM 5-0). A generalized list of key tasks that should be performed in each type of operation is presented in table 1-3 on page 13. The end state expresses the commander's desired conditions at the conclusion of the mission.

3-44. ADA commanders provide planning guidance along with their initial commander's intent. Initial planning guidance broadly describes when, where, and how the commander intends to employ ADA units to

accomplish the mission within the supported commander's intent. This guidance provides the baseline for the development of a detailed concept of operations. The initial planning guidance may outline specific courses of action the commander directs the staff to analyze. Commanders continue to issue planning guidance as required during subsequent MDMP activities.

STEP 3. COURSE OF ACTION DEVELOPMENT

3-45. A *course of action* is a scheme developed to accomplish a mission (JP 5-0). Further, it is a broad potential solution to an identified problem. After receiving the restated mission, commander's intent, and updated commander's planning guidance, the staff develops courses of action for the commander's approval. The course of action development step generates options for subsequent analysis and comparison that satisfy the commander's intent and planning guidance. During development, planners use the problem statement, mission statement, commander's intent, planning guidance, and products developed during mission analysis. The ADA staff drafts AMD course of action in parallel and consistent with those developed by the supported commander's staff. Required ADA actions and outputs during course of action development are summarized in table 3-7 on page 68.

3-46. Each COA must meet the following screening criteria:
- Feasible: the COA allows mission accomplishment within the established time, space and resource limitations.
- Acceptable: the COA balances cost and risk with the advantage gained.
- Suitable: the COA can accomplish the mission in accordance with the commander's intent and planning guidance.
- Distinguishable: each COA must differ significantly from the others.
- Complete: the COA must describe all subordinate operations that lead to mission accomplishment.

Table 3-7. Air defense actions during course of action development

STEP 3: COURSE OF ACTION DEVELOPMENT		
Sub-Steps	**Key ADA Actions**	**ADA Outputs**
• Assess situation. • Generate options. • Array forces. • Refine concept. • Assign headquarters. • Prepare statement and sketch. • Conduct COA briefing. • Select or modify COAs or analysis.	• Update the current friendly and enemy situations in coordination with higher ADA HQ and the supported force. • Review and refine (as necessary) essential AMD tasks to meet the supported commander's intent and CONOPS. • Determine the relative ADA combat power needed to accomplish each task. • Examine each COA to determine if it meets the screening criteria. • Develop scheme of AMD for each COA and assess risk. • Update locations of air and missile NAIs and TAIs. • Identify air defense and airspace coordinating measures. • Develop the initial concept of operations for each COA; express in both narrative and graphic forms. • Prepare a COA statement and update supporting COA sketches. • Coordinate and integrate plans with the supported force. • Identify COAs for further analysis. • Brief the ADA COAs.	• Selected COAs w/COA statement and sketch. • Critical asset list/protection prioritization list. • Air defense estimate. • Scheme of AMD. • Draft AMD execution matrix. • Draft ADA input to the supported force's airspace management plan. • Updated ADA unit/supported asset locations. • ADA radar data incorporated in supported unit's information collection plan. • Refined air defense and airspace coordinating measures. • Updated running estimates and IPOE. • Updated assumptions. • ADA/Joint AMD data link plan. • Draft Annex I (Air and Missile Defense).
ADA air defense artillery AMD air and missile defense COA course of action CONOPS concept of operations	HQ headquarters IPOE intelligence preparation of the operational environment NAI named area of interest TAI target area of interest	

Identification and Prioritization of Critical Assets

3-47. Joint and Army commanders at all echelons (to include ADA commanders) identify their key assets that require defense. Nominations can include high-value military assets across all deployed forces as well as political and geographic assets. After receiving all recommendations for defense, the importance of each asset is ranked based on its criticality, vulnerability, and the threat.

3-48. Criticality is the degree to which an asset or area is essential to mission accomplishment. It is determined by assessing the impact that damage to or destruction of the asset will have on the success of the operation or campaign. Damage to an asset can prevent, significantly delay, or have no impact on success of the plan. Criticality can change over the course of a campaign. For example, early entry can place a higher value on a limited number of access points, but, as the theater matures and more access points are opened, the criticality of a particular access point can diminish significantly:

- The assessment of criticality is driven by the analysis of the probability of occurrence and the severity of the adverse impact. Probability of occurrence ranges from unlikely to continuous/regular, and severity from negligible to catastrophic.
- Table 3-8 displays overall assessments when evaluating probability and severity. Aspects of each of the terms are also included. For more information on criticality and risk levels, see ATP 5-19.

Table 3-8. Risk assessment matrix

	Probability (Expected Frequency)				
	Frequent: Continuous, regular, or inevitable occurrences	*Likely: Several or numerous occurrences*	*Occasionally: Sporadic or intermittent occurrences*	*Seldom: Infrequent occurrences*	*Unlikely: Possible occurrences but improbable*
Severity (Expected Consequence)					
Catastrophic: Mission failure, unit readiness eliminated, death, unacceptable loss or damage	EH	EH	H	H	H
Critical: Significantly degraded unit readiness or mission capability, severe injury, illness, loss, or damage	EH	H	H	M	L
Moderate: Somewhat degraded unit readiness or mission capability, minor injury, illness, loss, or damage	H	M	M	L	L
Negligible: Little to no impact unit readiness or mission capability, minimal injury, loss, or damage	M	L	L	L	L
EH extremely high H high L. low M medium					

3-49. Vulnerability assesses an asset's susceptibility and recoverability. Susceptibility is the degree an asset is susceptible to surveillance, attack, or damage. It includes such factors as the asset's or force's hardness, and the asset's or force's ability to disperse or displace to another position. Recoverability is the degree and ability to recover/reconstitute from inflicted damage in terms of time, equipment, and manpower and to continue the mission. It also includes the replication of an asset elsewhere should it be damaged beyond repair.

3-50. Threat assesses the likelihood that an asset will be targeted for surveillance or attack by a credible and capable threat. Types and quantities are considered. Information provided by intelligence estimates, past adversary surveillance and attack methods, and enemy doctrine are all useful in evaluating threats to assess probability and determine requirements. ADA commanders and staffs propose AMD systems as critical

assets and participate in the analysis and prioritization efforts conducted by the supported commander. The ADA commander and staff inform the supported commander and staff of air threats.

3-51. The combined assessments result in a theater-level critical asset list/Army-echelon protection prioritization lists. Commanders/leaders at all Army echelons and in all Services identify their most critical assets that require protection. The *critical asset list* is a prioritized list of assets or areas, normally identified by phase of the operation and approved by the joint force commander, that should be defended against air and missile threats (JP 3-01). The critical asset list is focused on AMD. The protection prioritization list fulfills the same function as the critical asset list, but is broader, as it encompasses threats in and from all domains. Both lists can change repeatedly throughout the conflict continuum, given changes in missions or phases of operations.

Air Defense Estimate

3-52. An air defense estimate is initiated upon receipt of the mission and continuously updated. The ADA commander and staff develop the estimate in concert with the supported force commander and staff. They gather and analyze facts and makes assumptions in the absence of facts. They use these facts and assumptions to develop logical courses of action that are synchronized with those of the supported commander.

3-53. The estimate must be constantly reevaluated to keep it current in accordance with the METT-TC (I) factors. The degree of detail presented in the estimate depends on the planning time available. However, all elements of the estimate must be considered to make valid recommendations.

3-54. The air defense estimate follows the basic staff estimate format. It provides information regarding AMD supportability of the supported commander's proposed courses of action. It also presents a scheme of AMD. This information forms a basis for Annex I (Air and Missile Defense) to the supported commander's operation plan/order.

Annex I (Air and Missile Defense)

3-55. Annex I presents the AMD plan for the supported commander. It is developed by the primary ADA staff officer at echelon (AMD chief at corps/division and ADSO in BCTs) in coordination with and heavily informed by the air defense coordinator—the ADA commander. The ADA commander and staff express the commander's intent and details for the operation, respectively, to support the annex development.

3-56. Annex I is organized and presented using the standard Army operations plan/order template. Key points of discussion in the execution section include the scheme of AMD, priorities for defense, engagement and identification authorities, support relationships, and airspace management. Coordinating instructions may include such topics as ROE, coordinating altitude, firing doctrine, and support by non-dedicated air defense elements. See appendix A for the detailed template.

Scheme of Air and Missile Defense

3-57. The scheme of AMD is an inclusive part of Annex I. It delineates the employment of ADA units in concert with the supported commander's plan. ADA commanders develop a scheme of AMD to support each of the supported commander's directed courses of action. The scheme of AMD must be concise but specific enough to clearly state what ADA units are to accomplish in the operation. It must answer the "who, what, when, where, and why" of the ADA units to be provided; subordinate commanders are empowered to decide the "how". AMD items to address are noted in the boxed description.

Annex I (Air and Missile Defense) Scheme of AMD. Describe how the commander intends to use AMD to support the concept of operations. State the priorities for, allocation of, and restrictions on ADA by phase. This must provide the flexibility necessary for subordinate commanders to determine how to develop their AMD plans while ensuring necessary procedural and positive controls. Include a general narrative for the entire operation that addresses ADA support tasks, allocation of assets, positioning guidance for ADA units, identification, and engagement authorities (by area, type of aerial threat, or phase of the operation) and ROE. Refer to Annex C (Operations), Annex D (Fires), and Annex I (Air and Missile Defense) as required.

Commander's Guidance for Air and Missile Defense

3-58. The ADA commander and staff coordinate with the supported commander to obtain guidance for AMD employment. Depending on the phase of the operation, ADA units can be directed to deter, defeat, or destroy threat aerial platforms.

- Deter means to turn aside, discourage, or prevent from acting (Merriam-Webster Dictionary).
- Defeat is to render a force incapable of achieving its objectives. (ADP 3-0).
- Destroy is a tactical mission task that physically renders an enemy force combat-ineffective until it is reconstituted. (FM 3-90).

3-59. Deterring air threats is normally a condition during competition, though it can also be a consideration during crisis. Defeat and destroy are typically execution tasks during large-scale combat operations. Destroy may be considered a sub-set of defeat. However, ADA systems destroy enemy aerial platforms through physically demolishing them, while other systems used to counter enemy air can, for instance, defeat them by jamming the signal between the air platform and its controller.

3-60. After receiving the guidance, the ADA commander and staff must have a complete understanding of supported commander's intent and vision for ADA and convey that understanding to subordinate ADA commanders. Mission orders for ADA units should include the supported commander's intent, concept of operations, inherent tasks, priorities for defense, and coordinating instructions.

STEP 4. COURSE OF ACTION ANALYSIS AND WAR GAMING

A commander must accustom his staff to a high tempo from the outset, and continuously keep them up for it. If he once allows himself to be satisfied with norms, or anything less than an all-out effort, he gives up the race from the starting post, and will sooner or later be taught a bitter lesson.

Erwin Rommel

3-61. Course of action analysis enables commanders and staffs to identify potential problems, challenges, and probable consequences of planned actions for each course of action being considered. It helps them to synchronize combat power and resources, identify and mitigate risk, exploit opportunities, reduce friction, and improve courses of action. Course of action analysis assesses the quality of each course of action and influences how commanders and staffs understand a problem, how they understand enemy strengths and weaknesses, and how they determine if the courses of action can achieve the desired end state. Required actions and outputs during course of action development are summarized in table 3-9 on page 74.

Table 3-9. Air defense actions during course of action development

STEP 4: COURSE OF ACTION ANALYSIS (WAR GAMING)		
Sub-Steps	**Key ADA Actions**	**ADA Outputs**
- Issue guidance. - Gather tools. - List friendly assumptions. - List known critical events and decision points. - Select war gaming method. - Select a method to record. - Execute war game and assess. - COA analysis (war game) brief (optional).	- Actively participate in all phases of war gaming. - Collect and use tools, materials, and data, such as ADA C2 planning tools, computer simulations, maps, running estimates, and event templates. - Identify known critical events and decision points. - Confirm the availability of ADA. forces/systems to support each COA. - Validate relevant facts and assumptions. - Update/refine the AMD execution matrix as required. - Identify evaluation criteria to measure the effectiveness of the ADA contributions to each COA. - Evaluate each friendly move to determine the assets required to defeat the enemy.	- Refined threat air COAs. - Situation template and threat COA statement. - Refined scheme of AMD. - Refined draft AMD execution matrix. - Potential branches and sequels to each COA. - Updated running estimates. - Updated assumptions. - Event template. - Event matrix. - Refined draft air defense and airspace coordinating measures. - Refined draft NAI and TAIs. - Synchronization matrix to record wargame results. - Enhanced draft Annex I (Air and Missile Defense) and appendices.

Table 3-9. Air defense actions during course of action development (continued)

STEP 4: COURSE OF ACTION ANALYSIS (WAR GAMING)		
Sub-Steps	**Key ADA Actions**	**ADA Outputs**
	• Determine threat air capabilities available. • Consider all possible forces to include enemy forces outside the area of operations. • Identify all COAs available to the threat. • Identify high-value targets for each COA. • Evaluate and prioritize each threat COA from most likely to least likely. • Identify the most dangerous and most likely enemy COA. • Analyze and evaluate the strengths and weaknesses of each COA. • Record and display results via a synchronization matrix. • Identify air and missile NAIs, TAIs, decision points, and intel requirements to support them. • Develop synch matrix, decision support template and matrix, info collection plan and graphics, ADA supporting plan. • Execute the war game and assess the results.	
ADA air defense artillery AMD air and missile defense C2 command and control	COA course of action NAI named area of interest TAI target area of interest	

Evaluation Criteria

3-62. Evaluation criteria are standards the commander and staff use to measure the relative effectiveness and efficiency of one course of action relative to other courses of action. Evaluation criteria address factors that affect success and those that can cause failure. Criteria must be clearly defined and understood by all staff members before starting the course of action analysis.

3-63. A course of action is evaluated against two sets of criteria. The first set is the screening criteria presented in paragraph 3-46 on page 67. This second set is intended to identify which COA, among those that passed the first test, is best based on an analysis of the criteria developed. These criteria are developed by the ADA commander (as the air defense coordinator) and staff, with the ADA staff officer and ADSO. This second set of criteria allow the ADA commander and staff to identify the AMD advantages and disadvantages of each of course of action. These criteria for ADA units may include—

- Defeat/destruction of enemy air platforms by type.
- Level of protection requirements.
- Availability of non-dedicated air defense assets.

- Logistic supportability.
- Force protection support.
- Timeliness.

STEP 5. COURSE OF ACTION COMPARISON

3-64. Course of action comparison is an objective process to evaluate each course of action against the evaluation criteria approved by the ADA commander. The goal is to identify the advantages and disadvantages, costs, and operational benefit of each course of action and compare them to determine which one enables the highest probability of success.

3-65. The course of action comparison begins with ADA staff members' analysis and evaluation of the advantages and disadvantages of each of the supported commander's courses of action from their perspectives. Staff members present their individual findings to the other ADA and supported commander's staff members for their consideration. Using the ADA evaluation criteria developed during mission analysis and refined during course of action development, the staff records the AMD benefits, drawbacks, and challenges for each course of action. Staff officers use analytical tools, such as a decision matrix, to develop those key outputs and recommendations that assist the supported commander in making the best decision. The end product is the recommended course of action to be pursued by the commander. Required actions and outputs in the course of action comparison are summarized in table 3-10.

Table 3-10. Air defense actions during course of action comparison

STEP 5: COURSE OF ACTION COMPARISON		
Sub-Steps	*Key ADA Actions*	*ADA Outputs*
• Conduct advantages and disadvantage analysis. • Compare COAs. • Develop COA decision brief.	• Update air defense capability estimates. • Participate with the supported commander's staff in comparing the advantages and disadvantages of each COA. • Assess each COA using the ADA evaluation criteria. • Develop an ADA decision matrix. • Conduct and brief the air defense analysis of each COA. • Refine the ADA running estimate. • Refine the assumptions. • identify the best COA from an ADA perspective.	• Threat air analysis. • ADA inputs to the recommended COA. • Initial draft defended asset list. • Final drafts of the scheme of AMD and Annex I (Air and Missile Defense) and appendices, to include designated rules of engagement and Identification/Engagement authorities. • Updated running estimate. • Updated assumptions. • Air defense and airspace coordinating measure recommendations.
ADA air defense artillery	AMD air and missile defense	COA course of action

3-66. After completing its analysis and comparison, the supported commander's staff identifies and recommends its preferred course of action to the commander. The staff then delivers a decision briefing to the commander. The decision briefing includes—

- The commander's intent of the higher and next higher echelon commanders.
- The status of the force and its components.
- The current IPOE.
- Each course of action considered, with supporting information and analysis.
- The recommended course of action.

3-67. The ADA commander and applicable staff members attend the briefing and advise the supported commander of the AMD considerations in the recommended course of action for approval. The ADA commander summaries the AMD concept of operations, scheme of AMD, most suitable task organizations for the ADA force, best command and support relationships, or anticipated challenges for the ADA force in supporting the operation.

Step 6. Course of Action Approval

3-68. After the decision briefing, the supported commander approves the course of action to best accomplish the mission. The commander issues the final planning guidance. The final planning guidance includes a refined commander's intent (as necessary); new commander's critical information requirements to support execution; priorities for resources needed to preserve freedom of action and ensure continuous sustainment; and additional guidance on priorities for supporting forces, orders preparation, rehearsal, and other preparatory actions. Required actions and outputs for the course of action approval are summarized in table 3-11.

Table 3-11. Air defense actions in the course of action approval

STEP 6: COURSE OF ACTION APPROVAL		
Sub-Steps	*Key ADA Actions*	*ADA Outputs*
Commander approves the COA with any modifications.	• Participate in the COA approval briefing. • Support the commander in the development of the refined commander's intent and planning guidance. • Identify assets that can be defended with available ADA assets. • Task organize and allocate ADA units to the designated assets. • Array ADA units • Identify non-dedicated air defense capabilities to complement ADA units. • Determine the potential need for additional ADA assets. • Prepare an ADA WARNORD. • Develop the air defense portion of the supported commander's OPORD. • Conduct air defense rehearsals/participate in the supported commander's rehearsals.	• Commander's final planning guidance. • Refined commander's intent, CCIRs and EEFIs. • Defended asset list. • Specified support relationships. • Task-organized/mission focused force. • Refined scheme of AMD. • Refined Annex I (Air and Missile Defense) and appendices. • NAIs and TAIs. • Air defense and airspace coordinating measure recommendations, to include designated rules of engagement and Identification/Engagement authorities.
ADA air defense artillery AMD air and missile defense CCIRs commander's critical information requirements COA course of action EEFI essential elements of friendly information	NAI named area of interest OPORD operation order TAI target area of interest WARNORD warning order	

Defended Asset List

3-69. Once the supported commander approves the course of action, the ADA commander and staff identify which of the commander's prioritized critical assets can be actively defended by available ADA units and allocate forces to assets. A defended asset list is developed through the process of applying the criticality, vulnerability, and threat methodology, ADA resources, and defense plans to the critical asset list while identifying the risk. Missions and threats are analyzed, and forces are sized, matched, and allocated accordingly. The resulting linkage of ADA units to designated critical assets constitutes the *defended asset list*—a listing of those assets from the critical asset list prioritized by the joint force commander to be defended with the resources available (JP 3-01). While the term doctrinally refers to a theater list, it is also used by Army echelons to refer to their commander's priority critical assets that must be defended.

3-70. The ADA commander and staff, supported by the deputy air defense coordinators (such as the chief of the AMD operations section and ADSO), determine the best allocation of ADA assets to defend the most critical assets, based on METT-TC (I) and in accordance with the supported commander's required level of protection. In the joint environment, the joint force commander defines the required level of protection. For ballistic missile defense, for instance, the levels range from level 0 (no active defense; accept risk) to level 4

(near leak-proof defense requiring upper and lower tier systems operating in an integrated defense). Army commanders may require a task-organized battery of mixed ADA systems, such as Maneuver Short-Range Air Defense (M-SHORAD) and Mobile-Low, Slow, Small Unmanned Aircraft System Integrated Defeat Systems (known as M- LIDS), or more than one ADA battery to achieve the level of protection they demand. Non-dedicated air defense capabilities, in particular Stinger man-portable air defense (MANPAD), can also be used by the supported commander to supplement supporting ADA units and enhance asset defense.

3-71. The defended asset list, like the supported commander's prioritized asset list (the critical asset list at theater level or protection prioritization list at corp and below), is subject to change throughout an operation. Changes to the defended asset list should be anticipated due to expected and unexpected changes in the operational environment which drive modifications of the AMD priorities. Planning considerations include the supported commander's scheme of maneuver, the enemy's capabilities and tactics, loss of ADA assets, inventory depletion, or the arrival of additional ADA units.

Command Relationships

3-72. Army command relationships define superior and subordinate relationships between unit commanders and identify the degree of control of the gaining commander. The Army defines five types of command relationships: organic, assigned, attached, operational control, and tactical control (FM 3-0).

- *Organic* are those [units or elements] assigned to and forming an essential part of a military organization as listed in the table of organization for the Army, Air Force, and Marine Corps, and are assigned to the operating forces for the Navy (JP 1, Volume 2).
- Assigned. *Assign* is to place units or personnel in an organization where such placement is relatively permanent and/or where such organization controls and administers the units or personnel for the primary function, or greater portion of the functions, of the unit or personnel (JP 3-0).
- Attached. *Attach* is the placement of units or personnel in an organization where such placement is relatively temporary (JP 3-0).
- *Operational control* is the authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission (JP 1, Volume 2).
- *Tactical control* is the authority over forces that is limited to the detailed direction and control of movements or maneuvers within the operational area necessary to accomplish missions or tasks assigned (JP 1, Volume 2).

4-73. For more details on each of the relationships, see FM 3-0. For the application of the command relationships to ADA organizations, see paragraph 4-43 on page 98.

Support Relationships

3-74. Support relationships define specific arrangements and responsibilities between supporting and supported Army units. Though traditionally focused on Army missions, these relationships are also applicable to ADA support of joint and multinational forces. There are four support relationships: direct support, general support, general support-reinforcing, and reinforcing. Commanders specify and change support relationships through task organization.

- *Direct support* is a support relationship requiring a force to support another specific force and authorizing it to answer directly to the supported force's request for assistance (FM 3-0).
- *General support* is support given to the supported force as a whole and not to any particular subdivision thereof (JP 3-09.3).
- *General support-reinforcing* is a support relationship assigned to a unit to support the force as a whole and to reinforce another similar type unit (FM 3-0).
- *Reinforcing* is a support relationship requiring a force to support another supporting unit (FM 3-0).

3-75. Responsibilities for the coordination, positioning, liaisons, communications linkages, and engagement authorizations for each of the support relationships with respect to ADA units are presented in table 4-3 on page 99. For more information on each support relationship, see FM 3-0.

Task Organizing

3-76. *Task-organizing* is the act of designing a force, support staff, or sustainment package of specific size and composition to meet a unique task or mission (FM 3-0). Task-organizing results in a *task organization*— a temporary grouping of forces designed to accomplish a particular mission (ADP 5-0). METT-TC (I) provides the basis for analyzing and selecting the right capabilities to be deployed and employed.

3-77. Knowing the mission, threat, and operational environment allows ADA commanders to identify and plan for an optimal capability package. Deployment considerations must factor in the availability of strategic lift—the deployment carriers—and a suitably packaged ADA force to enable an operational defense as rapidly as possible. Employment considerations include command and support relationships that foster coordinated efforts between the ADA task-organized unit and the supported force. For more information on the task organization of ADA units, see paragraph 4-56 on page 101.

STEP 7. ORDERS PRODUCTION, DISSEMINATION, AND TRANSITION

3-78. AMD plans present the commander's intent, concept of operations, and tasks for subordinate units. Formal plans are developed at the AAMDC, ADA brigade, ADA battalion/task force, and ADA battery levels. Those developed by the ADA brigade, battalion/task force, and battery are presented as annexes (Annex I) to a corps, division, or brigade operation plan.

3-79. AMD plans are written using the standard operation plan format. Plans should be as thorough and comprehensive as time and the situation permits. Various actions/coordinating instructions delineated in the plan may require detailed appendices and possibly subordinate plans that add further specifics. Such specifics may include resupply of missiles and air defense ammunition, refueling operations, sensor networking, and early warning and communications networking. Required actions and outputs in orders production, dissemination, and transition are summarized in table 3-12 on page 78.

Table 3-12. Air defense actions in orders production, dissemination, and transition

STEP 7: ORDERS PRODUCTION, DISSEMINATION, and TRANSITION		
Sub-Steps	*Key ADA Actions*	*ADA Outputs*
- Complete the plan. - Issue the order. - Ensure understanding by subordinates, supporting units, and higher headquarters. - Transition from planning to preparation.	- Develop Annex I. - Brief the DAL to the supported commander for approval - Integrate Army non-dedicated air defense capabilities and potential joint/multinational AMD contributors. - Confirm specific command and support relationships. - Assign air defense missions. - Identify additional information collection requirements. - Brief subordinate commanders and staffs - Assist subordinate staff/units with planning and coordination. - Conduct air defense rehearsals/participate in the supported commander's rehearsals - Issue a WARNORD to subordinate ADA units and supporting AMD elements.	- DAL briefing. - The scheme of AMD for the supported commander's OPORD. - Annex I (Air and Missile Defense) and appendices. - ADA WARNORD.
ADA air defense artillery AMD air and missile defense DAL defended asset list	OPORD operation order WARNORD warning order	

TARGETING PROCESS

3-80. *Targeting* is the process of selecting and prioritizing targets and matching the appropriate response to them, considering operational requirements and capabilities (JP 3-0). Targeting begins in planning and continues throughout the operations process. Targeting uses lethal and nonlethal actions to create desired effects. The Army's targeting process consists of four steps: decide, detect, deliver, and assess (see figure 3-4 on page 79). The decide function is initiated during planning. The detect function occurs during preparation and execution. The deliver function occurs primarily during execution. The assess function occurs throughout the operations process; it is most intense during execution.

IPOE   intelligence preparation of the operational environment   TVA   target value analysis
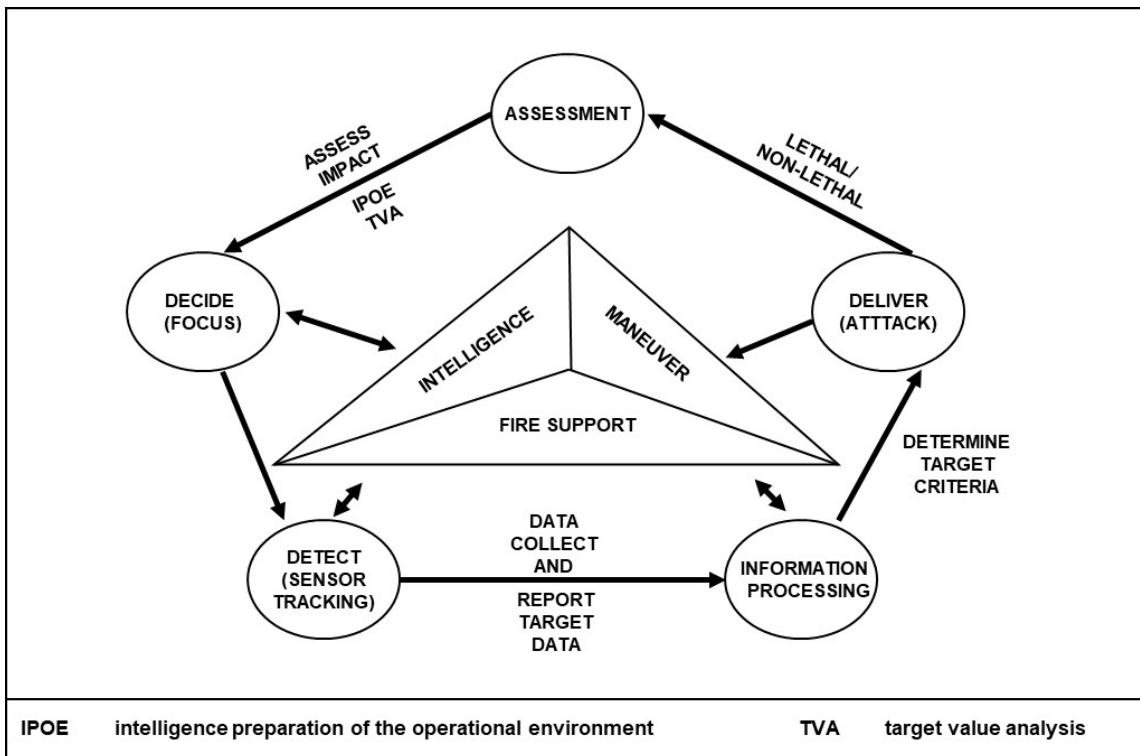
Figure 3-4. The Army targeting decision process

3-81. Targeting is a multidiscipline effort that requires coordinated interaction between the fire support coordinator, fire support staff elements, and other Army/joint staff members, at echelon, that together form the targeting working group. The working group, led by the fire support officer, collectively determines which targets to engage and how, where, and when to engage them. AMD chiefs in corps/divisions and ADSOs in BCTs are typically members of the working group. They nominate known or projected threat air and missile launch sites and operating bases as target areas of interest.

3-82. The ADA staff develops named and target areas of interest for an enemy's aerial launch sites and supporting infrastructure. A *named area of interest* is the geospatial area or systems node or link against which information that will satisfy a specific information requirement can be collected, usually to capture indications of enemy and adversary courses of action (JP 2-0). A *target area of interest* is the geographical area where high-value targets can be acquired and engaged by friendly forces (JP 2-0). Named areas of interests project the enemy locations or suspected locations. Target areas of interest are confirmed locations within the named area of interest that can be attacked using offensive counterair capabilities, primarily fire support and aviation assets. Target areas of interest are identified during the course of action development and refined during wargaming and the targeting integrating process. For more information, see FM 3-09.

3-83. For more information on targeting and the targeting process, see FM 3-09 and FM 3-60. For more information on ADA actions in support of the targeting process, to include the AAMDC's participation in joint targeting, see paragraph 4-109 on page 119.

SECTION II – PREPARATION

If I always appear prepared, it is because before entering on an undertaking, I have
meditated for long and have foreseen what may occur. It is not genius that reveals to me
suddenly and secretly what I should do in circumstances unexpected by others; it Is
thought and meditation.

Napoleon I

3-84. *Preparation* consists of activities that units and Soldiers perform to improve their abilities to execute an operation (ADP 5-0). Preparation helps the force transition from planning to execution. Preparatory actions, however, should begin during the planning phase and continue through execution.

3-85. Coordination with supported and supporting forces, initially conducted during the planning phase, must increase to facilitate situational understanding and integrated efforts. A supporting ADA commander must understand the friendly and enemy ground situation, and the supported commander must be informed of the friendly and enemy air situation. Situational understanding includes who is operating where, when, and in what strength. The ADA commander must also recognize sustainment requirements beyond the capabilities of the ADA unit and coordinate for assistance with the supported commander and other appropriate sustainment entities.

3-86. Commanders share and synchronize plans, commanders' intents, and operational concepts. The more frequent and thorough the interplay between the supported and supporting commanders, the more likely the potential for mission success.

RECONNAISSANCE

> *You can never do too much reconnaissance.*
>
> George S. Patton

3-87. During planning and preparation, commanders take every opportunity to improve their situational understanding prior to execution. Commanders often direct information collection (to include reconnaissance operations) early in planning that continues in preparation and execution. *Reconnaissance* is a mission undertaken to obtain information about the activities and resources of an enemy or adversary, or to secure data concerning the meteorological, hydrographic, geographic or other characteristics of a particular area, by visual observation or other detection methods (JP 2-0). Reconnaissance focuses on the terrain and the enemy.

3-88. Available preparation time and resources determine to a large extent the level of intensity of reconnaissance activities and therefore influence the choice of reconnaissance type. There are three types of reconnaissance: map, aerial, and ground.

MAP RECONNAISSANCE

3-89. Map reconnaissance is the fastest way to conduct a reconnaissance and always precedes any other type of reconnaissance. When geographical limitations hamper physical reconnaissance, map reconnaissance is the only way. ADA sensor and weapon system positions are plotted on a map and represent the best locations for providing AMD. Detailed physical and digital maps provide specific information on terrain, buildings, and other terrestrial and man-made features. The most current and detailed digital and physical maps can be requested from the unit's space element. The reconnaissance officer must consider the AMD employment tenets and METT-TC (I) in the initial reconnaissance. After the sensor and weapon positions are plotted on a map, check points and primary and alternate routes are selected and plotted. Alternate positions should also be identified at this time. The reconnaissance officer identifies a reconnaissance route to the proposed area. Positions selected by map reconnaissance must be confirmed by additional reconnaissance if the tactical situation allows.

AERIAL RECONNAISSANCE

3-90. If time is limited and an aircraft is available, an ADA commander or the reconnaissance officer can conduct an aerial reconnaissance of the terrain. Aerial reconnaissance provides the fastest way to see the terrain. However, few ADA units have access to aircraft.

3-91. Even when available, aerial reconnaissance has significant limitations. For example, fields of fire, ground conditions, and local threats cannot be determined from the air. In addition, UAS and other aircraft surveillance activities can expose friendly interest in a particular area.

GROUND RECONNAISSANCE

3-92. Ground reconnaissance is an on-site examination of the terrain. Ground reconnaissance is the most accurate and desirable type of reconnaissance, though the slowest method. The route can be evaluated for

road worthiness, obstacles, choke points, and key terrain. Firing positions, fields of fire, and air avenues of approach can be analyzed. However, ground reconnaissance is time-consuming and dangerous. Map reconnaissance is an important part in the preparation for the actual ground reconnaissance as it enhances overall awareness of the area.

3-93. Ground reconnaissance is performed to select the best positions, march routes, start points, release points, checkpoints, sensor positions, and communications sites. The ADA commander or leader should coordinate with the supported commander and S-3 to determine what areas the supported units plan to occupy. When in support of a fixed asset, the commander should coordinate with the on-site commander and base defense operations center to identify the best locations for sensors and weapon systems.

3-94. Preparatory actions for a ground reconnaissance include the following. They represent key actions but are not inclusive.

- Determining in detail the elements, positions, areas, routes, and related terrain considerations.
- Determining the priority order of the elements to be emplaced and setting up the timeline accordingly.
- Determining the products that must be developed as a result of this reconnaissance; products can include a list of sensor and weapon locations; sketches of these locations, the areas and routes, and sectors and primary target lines; and identification of restrictive terrain locations.
- Developing and issuing a reconnaissance plan/order with all of the above information.

TRAINING DURING PREPARATIONS

3-95. Training is a fundamental part of preparations and the means to the successful conduct of rehearsals and, ultimately, missions. ADA commanders maintain rigorous training programs to sustain individual and unit proficiencies in AMD-related and fundamental Army activities. They focus unit efforts to optimize available time, ensuring their units train in the right tasks to meet mission requirements and to support the next higher commander's intent. Commanders determine the essential collective tasks in which their Soldiers must be trained to sustain proficiency. This places a premium on early and continuous teamwork that builds the cohesion essential for mission success.

3-96. ADA units must train with their supported joint or Army elements to ensure continuity of efforts. Commanders must train leaders and units to operate as part of the team. Training should focus on missions and conditions they expect to encounter in operations. Adherence to the principles of training discussed in chapter 1 is essential.

REHEARSALS

A well-rehearsed operation can make up for poor planning...but even a great plan will likely fail without rehearsals...Rehearsals will teach the organization synchronization, tactical patience, and adjacent coordination.

Lieutenant Scott Ginther

3-97. A *rehearsal* is a session in which the commander and staff or unit practices expected actions to improve performance during execution (ADP 5-0). Rehearsals are based on a completed operation order. They focus on specific aspects of the maneuver plan, associated AMD tasks in support of this plan, and the supporting AMD plan (Annex I). Rehearsals must be planned, prepared, and executed.

3-98. ADA units must continue to train to standard and to rehearse throughout the conduct of operations as time, the threat, and other conditions permit. ADA commanders and leaders must be intimately involved in rehearsals with their units and with supported units. Rehearsing key actions allows participants to become familiar with the operation, visualize the plan, and ensure that plans and actions are synchronized. Rehearsals assist units in orienting themselves to their environment and to other units during execution. They provide an opportunity for subordinate leaders to analyze and dialogue to facilitate better understanding of the plan. They also provide a forum to "proof" the plan, which validates its feasibility, logic, and adequacy of the control measures.

3-99. Commanders and leaders should use the following guidelines in planning, executing, and evaluating rehearsals:
- Establish a standard for successful rehearsal.
- Emphasize critical actions and key events that trigger friendly actions.
- Use a decision support matrix and a decision support template as guides. Include all information from the operations overlay, such as known and suspected enemy positions, airspace coordinating measures, and names of key terrain features.
- Practice critical actions in an operation.
- Use rehearsals to identify problem areas, develop contingency actions, and enhance coordination.

3-100. There are four types of rehearsals: the backbrief, combined arms rehearsal, support rehearsal, and the battle drill or standard operating procedure rehearsal. For more information, see FM 6-0.

BACKBRIEF

3-101. A *backbrief* is a briefing by subordinates to the commander to review how subordinates intend to accomplish their mission (FM 6-0). The backbrief is the first engagement between the supporting and supported commander to ensure the supporting commander understands the supported commander's intent, desired end state, priorities, and special guidance. An ADA commander articulates how ADA executes that intent. ADA staff members and subordinate leaders also brief their commanders or leaders on their understanding and proposed execution of the ADA intent. Commanders and leaders should conduct backbriefs with subordinates after the subordinates have formulated their concepts of operations, but before they issue operation orders. This ensures subordinate plans are consistent with the commander's intent.

3-102. A backbrief should include the—
- Commander's AMD guidance.
- Initial scheme of AMD.
- Priorities for active AMD.
- Command and support relationship recommendations.

COMBINED ARMS REHEARSAL

3-103. A *combined arms rehearsal* is a scripted event involving the commander, staff, and units used to identify and solve problems (FM 6-0). A combined arms rehearsal enables the supported commander, staff, and subordinate units to synchronize plans, actions, and responsibilities.

3-104. Key ADA participants in a combined arms rehearsal vary by the echelon of the supported command. They include the supporting ADA commander (as the air defense coordinator), deputy air defense coordinator, ADSO, subordinate and supporting ADA commanders, and primary ADA staff members.

3-105. The AMD plan must be an integral part of the rehearsal to ensure synchronization of efforts between the ADA force and the supported command. Elements of the plan that should be briefed are—
- Air threat capabilities.
- Named areas of interest, target areas of interest, and potential air avenues of approach.
- Essential AMD tasks.
- Supported commander's most critical assets for active defense.
- Available ADA systems and capabilities.
- Allocation of ADA systems to defend the commander's most critical assets.
- Available non-dedicated air defense resources (such as Stinger MANPAD teams).
- Sensor plan.
- Communications plan/interoperability with the supported unit.
- Early warning measures and procedures.
- AMD measures in effect (such as ROE, air defense warning conditions, and weapon control status).
- Air defense and airspace coordinating measures that affect the area of operations.
- Trigger points by phase that inform changes to AMD plans.

SUPPORT REHEARSAL

3-106. A support rehearsal is an event focused on synchronizing functions with the overall operation. Support rehearsals and combined arms rehearsals complement preparations for the operation. An AMD rehearsal should occur before the combined arms rehearsal and address the actions, events, and products that ADA commanders should execute in support of the supported commander's concept of operations. In that sense, the AMD rehearsal is more detailed and exhaustive than the combined arms rehearsal.

3-107. Participants should include all of those cited in the combined arms rehearsal as well as additional ADA staff members and subordinate leaders as required by the commanders and staffs. Subordinate ADA leaders must attain a completed understanding of the supported commander's intent and guidance for AMD, scheme of AMD, and ROE.

3-108. Discussion items that should be addressed and comprehended include—
- Projected air and missile threats, to include types, capabilities, quantities, and organization.
- Establishment and locations of target areas of interest and named areas of interest.
- Task organizations of ADA units.
- Defended assets and the allocation of ADA units.
- Arrayal of ADA units and other AMD elements in/adjacent to the supported commander's area of operations.
- Available non-dedicated air defense capabilities.
- Employment considerations in defending the critical assets.
- Coordination efforts and timelines in executing the AMD missions.
- Designated ROE and Identification/Engagement authorities.
- Sustainment points and delivery methods.
- Required and controlled supply rates.
- C2 locations.
- Communications plan, to include the command net; early warning net; and primary, alternate, contingency and emergency (known as PACE) plan.
- Sensor plan, to include sensor locations, capabilities, and scanning/detecting areas.
- Required/implemented air defense and airspace coordinating measures, such as position areas for air defense, air defense engagement areas, no-fly zones, low-level transit routes, and the coordinating altitude.
- Procedures for operating above and below the coordinating altitude (clearance of fires).

3-109. A *battle drill* is rehearsed and well understood actions made in response to common battlefield occurrences (ADP 3-90). It consists of actions that units collectively and rapidly execute without applying a deliberate decision-making process. A battle drill or standard operating procedures rehearsal ensures that all participants understand a technique or a specific set of procedures. While capable of being executed as independent rehearsals, battle drills provide better understanding when included as inherent parts of a support or combined arms rehearsal, such as fire support rehearsal. In this regard, the AMD section at corps/division and ADSE in BCTs ensure the supported commander and subordinates are cognizant of the intent of the AMD battle drill procedures and objectives. Notable battle drill procedures address AMD employment techniques and operations below the coordinating altitude (clearance of fires).

3-110. There are several methods for executing rehearsals (see figure 3-5 on page 84). For more information on each method, see FM 6-0. Considerations for determining the appropriate rehearsal technique include—
- The amount of time required to plan, prepare, execute, and assess the rehearsal and make changes to the plan if gaps are identified.
- The number of units/echelons that will participate in the rehearsal.
- Risks to operations security (known as OPSEC) due to unprotected friendly critical information observed by the enemy that can be exploited to affect the operation.
- The amount of area needed for the rehearsal.
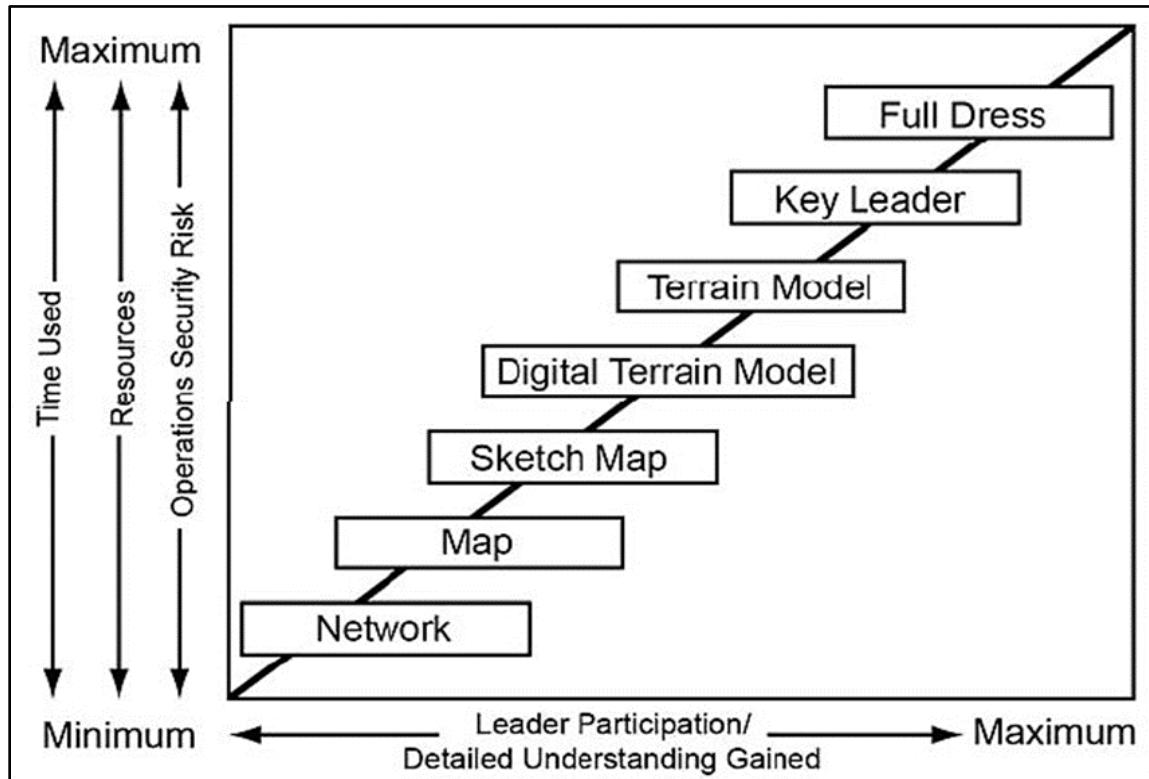
Figure 3-5. Rehearsal methods

3-111. In addition to the above, ADA commanders use operation center drills, engagement drills, and movement techniques to further enhance Soldier/unit proficiencies. Combat requirements should be anticipated and rehearsed in the form of operation center and command post drills. Examples of these battle drills include the receipt and dissemination of operation orders, warning orders, and fragmentary orders; reports of engagements, casualty evacuations, and combat losses; and requests for resupply. ADA fire units and sensor teams should rehearse their engagement drills in their assigned position or in terrain like their expected position. This allows them to adapt their operations to the existing conditions. ADA fire units and sensor teams should rehearse the movement techniques they expect to use in an operation. These rehearsals should be conducted with supported units as well to synchronize all the moving pieces in an operation.

3-112. Planning, preparation, and execution guidelines for SHORAD unit rehearsals are detailed in FM 3-01.44. Many of these guidelines, to include the step-by-step process in conducting a rehearsal, are applicable to all ADA units.

SECTION III – EXECUTION

3-113. *Execution* is the act of putting a plan into action by applying combat power to accomplish the mission and adjusting operations based on changes in the situation (ADP 5-0). AMD planning is normally centralized at higher joint and Army AMD headquarters (such as the air operations center and the AAMDC headquarters), while execution is decentralized at lower echelon ADA units appropriate to the situation. Decentralized execution is imperative in lower echelon ADA units because the number of activities associated with AMD operations prevents any one commander from effectively controlling all ADA units and actions. Decentralized execution also enables ADA units to employ their systems to meet the stringent engagement timelines of air and missile threats.

3-114. In AMD, execution entails operations that address engagements of air and missile threats, support to targeting, and sustainment functions. **AMD execution is focused on the engagement of aerial threats**. See

Chapter 4 for additional information on the directives that govern joint and Army aerial engagements, inherent terminology, and the components of an AMD engagement sequence.

ENGAGEMENT OPERATIONS

3-115. *Engagement operations* **are functions and activities required to execute the air, missile, and counter-surveillance battle.** Engagement operations include establishing an air picture, determining the classification and identification of all tracks, evaluating the threat these tracks pose to the defended assets, and exercising engagement control over subordinate units.

3-116. AMD ground- or air-based sensors, or combinations of both when available, perform surveillance of the airspace and provide focused early warning to at-risk forces. The sensors provide engagement authorities the time to employ weapon systems that deny threat platforms the ability to see or impact the defended assets, and for early warning of a possible attack to be passed to at-risk units or assets.

3-117. AMD weapon engagements are controlled by joint and Army authorities. Joint engagements are conducted in accordance with directives issued by the area air defense commander (AADC) as the engagement authority or the AADC's representatives, a regional or sector air defense commander when so delegated. Engagement authorizations are directed by the engagement authority and typically transmitted by an air and missile defense fire coordination officer (ADAFCO) to Patriot and Terminal High Altitude Area defense (THAAD) units. ADA commanders in divisions and BCTs control engagements using ROE approved by the joint force commander. Engagements are typically decentralized to fire unit level.

AIRSPACE COORDINATION AND MANAGEMENT

3-118. *Airspace control* is the exercise of delegated authority over designated airspace and users through control procedures and coordination measures to maximize operational effectiveness (JP 3-52). Airspace control relies upon airspace management capabilities provided by airspace control elements.

3-119. Competing airspace users balance the demands for and integrate their requirements for airspace. To help balance these demands, the joint force commander usually designates an airspace control authority. The *airspace control authority* is the commander designated to assume overall responsibility for the operation of the airspace control system (JP 3-52). 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 airspace control authority, working with the other components of the joint force, develops policies and procedures for all airspace users. The airspace control authority uses the airspace control plan, airspace control order, and air tasking order to transmit the policies and procedures.

- The *airspace control plan* is the document approved by the joint force commander that provides specific planning guidance and procedures for the airspace control system for the joint force operational area (JP 3-52). An airspace control plan details the broad policies and procedures for airspace control within the joint force commander's operational area.
- The *airspace control order* is an order implementing the airspace control plan that provides the details of the approved requests for airspace coordinating measures (JP 3-52). An airspace control order directs the use of joint airspace and details the approved requests for airspace coordinating measures. The airspace control order implements coordinating measures for specific times, activating them to support missions at the times required. The airspace control order activates and deactivates procedural control measures and updates positive control procedures.
- An air tasking order is the daily operation order listing all component aviation assets directed by the joint force commander or made available to the joint force commander for joint force air component commander's taskings (FM 3-52). The order shows all missions operating in theater. The special instructions (known as SPINS) section of the air tasking order provides supplemental, corrective, or exact amplification to the general mission tasking of the specific air tasking order period. SPINS often include ROE and combat identification criteria for air defense. SPINS are published as a baseline, weekly, and daily (FM 3-52).

3-120. When delegated control authority by the airspace control authority, the Army procedurally controls assigned airspace. Division-assigned airspace, for example, is a volume of airspace in which the airspace control authority has delegated the responsibility for control of that volume, in accordance with the airspace control plan and airspace control order, 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. 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. Positive control requires sensors to locate and identify airspace users in real-time and communications, to maintain continuous contact with the user (JP 3-52). See paragraphs 4-7 through 4-21, beginning on page 90, for more information on procedural and positive control.

> *Note*. The coordinating altitude and other airspace coordinating measures are included in the airspace control plan and distributed via airspace control orders. **Army echelons should include the airspace control plan guidance and integrate the airspace control order, area air defense plan (AADP), special instructions, and air tasking order into their unit airspace plans and operation orders** (FM 3-52). The unit airspace plan is the integrated set of airspace coordination measures to support Army operations submitted to the airspace control authority through the battlefield coordination detachment for integration into a future airspace control order (ATP 3-52.1).

3-121. Army elements and cells within the corps, divisions, and brigades exercise control, coordination, and/or management of their organizations' airspace. The AMD operations section and ADSE are part of an airspace control element, consisting of ADA, field artillery, aviation, and other service representatives at corps, division, and brigade levels that facilitate airspace coordination and clearance of fires. Their responsibilities for airspace management vary dependent upon echelon. The corps AMD operations section, for instance, is more involved with planning airspace usage and coordinating that usage with joint air planners. Divisional and brigade AMD operations sections and ADSEs focus on the execution of airspace usage, such as deconfliction and clearance of fires. Divisional airspace control is conducted by the joint air ground integration center (known as JAGIC). The JAGIC provides the division with the capability to control joint airspace delegated by the airspace control authority in accordance with the airspace control plan and the airspace control order. The JAGIC's control of airspace allows the division to effectively integrate fires and airspace control during operations with appropriate flexible and timely actions.

CLEARANCE OF FIRES

3-122. Airspace must be cleared to allow uncontested operations by the multitude of airspace users, avoiding time and space conflicts. Airspace coordination elements, such as the air-ground integration element and ADSE at division and brigade levels, maintain contact with the joint air ground integration center for clearance. At corps and above, the coordination elements are linked to various airspace control agencies, including the Air Force control and reporting center, radar approach control, and air traffic control agencies. Responsibilities of these agencies are generally defined by the established coordinating altitude.

3-123. Most fires exceed the coordinating altitude and therefore must be cleared by the control and reporting center and radar approach control. Clearance must be obtained from the control and reporting center because it controls tactical military aircraft, and from the radar approach control because it has control of commercial and nontactical military aircraft.

3-124. Army air traffic service units control limited airspace below the coordinating altitude, specifically around airfields, forward arming and refueling points, and tactical assembly areas. All Army elements involved in airspace management must coordinate their efforts to ensure that air operations are synchronized, potential fratricide of aircraft are mitigated, and interruptions to ongoing operation are minimized. Army airspace coordinators must be cognizant of the locations, plans, and activities of other users to enable the greatest use of the airspace with minimal conflicts. The positions of land-based airspace users (such as ADA units, field artillery units, and aviation operating bases) and Army aviation transit routes must be displayed in common air pictures and updated continuously. The common air picture should also include airspace coordinating measures, such as any restrictive operating measures, in effect in the area of operations. Once appropriate agencies clear their airspace, the ADSO, fire support officer, or aviation officer can acknowledge that the airspace is cleared for the designated operation.

SUSTAINMENT OPERATIONS

3-125. Sustainment is vital to AMD operations and must be vigorously and continuously conducted throughout the battlefield. Sustainment planning and execution should embody the principles of responsiveness, flexibility, and initiative. Commanders should anticipate needs and not wait to react. This is accomplished through constant coordination and detailed planning between commanders and organizations from which they will draw support.

3-126. Sustainment operations should be conducted in coordination with a supported element, a sustainment command, or other enabling command. Sustainment requirements presented in the ADA plans must be synchronized with the requirements of the supported force or asset. To meet the challenges of sustainment, ADA commanders require well thought-out plans.

3-127. Sustainment activities focus on how, when, and where to accomplish the functions of manning, arming, fueling, fixing, and moving. ADA commanders must be deliberate in their planning, identifying projected needs. For example, ADA units can require maintenance support by a support maintenance company and signal support by the expeditionary signal battalion. ADA units should formulate recovery and retrograde plans for damaged ADA equipment to facilitate the rapid regeneration of combat capability. Required supply rates are transmitted to ADA higher headquarters and/or coordinated with the supported command. Ammunition and fuel requirements are critical. Delivery and distribution procedures must be established and executed expeditiously. These can entail using assets from the echelon-specific transportation assets, higher ADA headquarters, or the ADA unit. ADA higher headquarter and the supported command must be continuous aware of and understand needs and statuses.

3-128. Sustainment planning, preparation, and execution increase in importance as Army and joint operations increase in complexity and intensity. Should the sustainment operation fall short, the ADA commander must improvise to meet unanticipated situations.

3-129. Reconstitution activities must also be considered by higher ADA headquarters and supported forces early in the planning process and executed expeditiously. Reconstitution activities, including regeneration and reorganization, are conducted to restore an ADA unit or its supporting forces to a desired level of combat effectiveness commensurate with mission requirements and available resources. Activities must be implemented when combat effectiveness has been degraded as a result of enemy activity, battlefield damage, or other environmental factors and hazards. Regeneration involves rebuilding the unit through large-scale replacement of personnel, equipment, and supplies, including the reestablishment or replacement of essential C2 personnel and equipment and the conduct of mission-essential training. Reorganization involves the shifting of internal resources within the unit to increase its level of combat effectiveness.

SECTION IV – ASSESSMENT

3-130. *Assessment* is the determination of the progress toward accomplishing a task, creating a condition, or achieving an objective (JP 3-0). Assessments precede and guide the other activities of the operations process. During planning, assessments focus on understanding the operational environment and considering all the factors required to draft an operation plan. During preparation, assessments are used to identify changes in the situation and the force's readiness to execute operations. During execution, assessments are continuously conducted of operational progress, any impediments to that progress, and any changes required to sustain or reattain progress. Assessments during execution assist commanders determining whether changes in the operation are required. **Assessments occur at all echelons, and commanders must be involved in all assessments.**

3-131. Commanders are the central drivers for assessments as the ultimate stakeholders in the success of their commands' activities. Assessments shape the commander's understanding of the progress of the operation through conversations with senior and subordinate commanders and staffs, key leader engagements, and battlefield circulation. This enables the commander to methodically identify changes in the operational environment, identifying risks and opportunities, and formally providing recommendations to progress towards mission accomplishment. Assessments should be included into the organization's planning and operations battle rhythm to best support the commander's decision cycle (JP 5-0).

3-132. Assessment is a key component of the commander's decision cycle, helping to determine the results of operations, activities, and investments in the context of the overall mission objectives and providing recommendations for the refinement of plans and orders (JP 5-0). The staff is integral in shaping these assessments through applying their subject matter expertise and understanding. The ADA staff provides varied perspectives and broad expertise that are necessary in developing credible assessments. Assessments are inherent actions in all staff activities and facilitate the ADA commander's decision making. Air defense coordinators/deputy coordinators participate in the supported corps, division, and brigade commanders' planning and assessments. They coordinate with the supported commanders' staffs, injecting information from the air IPOE, ADA positions and statuses, and aerial engagement results. The AMD information supports the continuance of the supported commander's plan or suggests potential changes.

3-133. Assessment indicators are used to drive assessments. An *indicator* is, in the context of assessment, a specific piece of information that infers the condition, state, or existence of something, and provides a reliable means to ascertain performance or effectiveness (JP 5-0).

- Indicators should be relevant (bear a direct relationship to a task, effect, object, or end state condition), observable (collectable so that changes can be detected and measured or evaluated), responsive (signify changes in the operational environment in time to enable effective decision making), and resourced (collection assets and staff resources are identified to observe and evaluate) (JP 5-0).
- AMD indicators of relevance to the ADA and supported commanders include enemy air platform and missile availability, aerial employment tactics, launch points and airfields, and capabilities to continue concerted attacks. Such indicators allow the ADA and supported commanders to understand the effectiveness of the AMD plan or make necessary adjustments to the plan to facilitate success.

3-134. *Operation assessment* is a continuous process that measures the overall effectiveness of employing capabilities during military operations in achieving stated objectives; determination of the progress toward accomplishing a task, creating a condition, or achieving an objective (JP 5-0). An operation assessment results in recommendations to make operations more effective. An operational assessment integrates relevant, reliable feedback into planning, preparations, and execution, thus supporting the commander's decision-making regarding plan development and refinement. The ADA staff integrates assessments into the planning cycle to assure the ADA commander that the operational approach remains feasible and acceptable in the context of higher headquarters directives and orders. During execution, ADA commanders must be able to detect, analyze, and adapt to changes in the operational environment. Operational successes, failures, and challenges must be analyzed to understand what occurred or might occur and what applicable actions are required to enable an efficient and effective AMD environment.

3-135. *Combat assessment* is the determination of the overall effectiveness of force employment during military operations (JP 3-60). For ADA, combat assessments are integral parts of an AMD engagement sequence (see paragraph 4-102 on page 116 for information on the engagement sequence). After an air threat has been engaged, a fire control officer or gunner, depending on the ADA weapon, evaluates the success of the engagement. If the engagement were successful and the air threat has been destroyed, the fire control officer or gunner, as directed, can begin firing on a new target. If the air threat was damaged but still potentially capable of attacking friendly assets, the fire control officer or gunner can reengage, or another ADA system may be directed to engage that threat. Maximum friendly decision space—that is, directing engagements at optimal weapon ranges and allowing time for reengagements as necessary—is a constant consideration.

Chapter 4

Army Air and Missile Defense Operations

Air defense would have been the last part of the maneuver plan to come together when [I]was in command of the 3rd Infantry Division. But the increased threat of long-range fires means air defense will have to be included earlier in the planning process. If you're a young air defender, I think you've got to demand your seat at the table in the maneuver discussion.

General James E. Rainey

This chapter expands on the discussions of AMD planning, preparation, execution, and assessment presented in chapter 3. Whereas chapter 3 dealt extensively with planning, chapter 4 provides extended discussions of capabilities, actions, and guiding control and coordinating measures in preparation and execution. Chapter 4 describes how ADA units, at echelon, perform AMD operations in support of a higher headquarters scheme of AMD and supported commander's concept of operations. It addresses additional considerations in performing the various tasks inherent in each of the elements of the operational process.

SECTION I – INTRODUCTION

4-1. The role of air defense artillery is to defeat aerial threats, through surface-to-air fires and effects, and provide early warning to enable supported commanders to complete their missions in multidomain operations.

4-2. ADA, regardless of echelon, provides dedicated AMD to designated Army, joint and multinational commanders. AMD is the supported commander's principle means of defeating the full range of enemy air and missile threats encountered by friendly forces operations. ADA leaders are responsible for the planning, preparation, and execution functions of AMD. Supporting ADA commanders and their staffs must participate in planning and execution activities of their supported commanders to deliver AMD fires during strategic-, operational-, and tactical-level fights.

4-3. ADA commanders lay the groundwork for employing ADA units using the Army's operations process of plan, prepare, execute, and assess to integrate AMD into their supported commander's scheme of action and maneuver. AMD planning is conducted by ADA commanders, their staff sections, and select personnel, considered subject matter experts at echelon, who participate in the unit's operational planning activities, IPOE data collection, and mission analysis during MDMP. AMD mission requirements are articulated as AMD tasks and driven by functions in time and space through higher headquarters' operation plans and orders. The mission analysis considers threat strengths and vulnerabilities, organizations and equipment capabilities and limitations, tactics, and time as it relates to the operation and required supporting tasks. ADA commanders and planners compare these factors against various operational, environmental, and information factors related to the current fight and expected future battlefield situation. Intelligence products used during MDMP include inputs collected from available reports, sensing, intelligence requirements from higher headquarters data productions techniques, and surveillance to produce the AMD IPOE. The ADA commander and staff's mission analysis and planning outcomes ultimately aid the supported commander's decisions on appropriate force allocation, defense plan, and when to transition from planning to execution.

4-4. AMD planning and requirements must be coordinated and synchronized to meet the supported commander's intent. AMD planning initiates allocation, positioning, and the integration of the right combination or mix of trained, equipped, and ready ADA units and capabilities to provide supported commanders with an appropriate ADA task-organized force. The ADA task-organized force consists of single or composite sensors, weapons, C2 components, and processes that enable ADA formations to execute their functions and tasks from tactical to strategic areas. See table 1-3 beginning on page 13 for additional details on ADA functions and subordinate tasks.

SECTION II – PLANNING

No plan survives contact with the enemy.

Helmuth von Moltke

4-5. ADA commanders and staffs develop AMD plans based on the guidance from their higher headquarters and in accordance with their supporting or supported relationships. Planning considers all AMD operational elements, as appropriate, across the levels of war. Planning considerations at the operational level can be more extensive than those at the tactical level as the integration of joint and multinational AMD capabilities normally occurs at the operational level. Planning at the tactical level is nevertheless necessary to develop appropriate defenses against air platforms that may threaten maneuver units. Plans must consider the entirety of the aerial threat, as small unmanned aircraft systems (sUASs), fixed-and rotary-wing aircraft, cruise missiles, and ballistic missiles may threaten a division and corps and theater rear areas. See appendix C for additional information on expected theater level air and missile threats.

- At the operational level, the army air and missile defense command (AAMDC) normally lead the joint and multinational AMD planning effort for the area air defense commander (AADC). The AAMDC commanding general, serving the theater army air and missile defense coordinator, directs ADA planning priorities and force apportionment. The AAMDC, in coordination with the AADC's staff and joint and multinational partners, supports the development and coordination of the theater area air defense plan (AADP), and provides planning guidance to deployed ADA units. The result of this planning process is an integrated defense plan that leverages all available joint and multinational AMD capabilities to effectively and efficiently defeat aerial threats in accordance with the AADC's concept of operations and directives.
- At the tactical level, much of the planning resides with the divisional air defense (DIVAD) battalion and is executed in coordination with the division's AMD section and the BCT's ADSE. The AMD section and ADSE identify priority assets which may require active AMD. The DIVAD battalion commander, serving as the division's air defense coordinator, leads the planning effort to formulate a divisional AMD plan to meet the air threat. The divisional AMD plan should account for any higher echelon ADA capabilities while leveraging all available dedicated and non-dedicated, SHORAD systems to defend maneuver forces. ADA personnel in ADSEs assist the brigade commanders and their staffs in integrating any supporting ADA units into the BCT's scheme of maneuver. The supporting ADA unit commander is ultimately responsible to formulate an AMD plan to meet the BCT commander's needs.

4-6. AMD planning involves joint, multinational, and Army units including Service or functional component commands, AAMDCs, ADA brigades, and ADA battalions. Defense planning and decision support tools are available in an array of planners, ranging from Command and Control Battle Management and Communications planner at the strategic level to the air and missile defense workstation. The Terminal High Altitude Area Defense (THAAD) portable planner and Patriot tactical planning workstation at the operational and tactical levels provide automated means to develop effective plans and alternative plans and to respond to dynamically changing tactical situations. These design tools are domain specific (such as the Command and Control Battle Management and Communications in ballistic missile defense planning) or system specific—THAAD portable planner for THAAD planning, Patriot tactical planning workstation for Patriot AMD planning, and the air and missile defense workstation for general defense planning and specific M-SHORAD and Avenger planning—thus inducing a strong hierarchical planning structure.

POSITIVE AND PROCEDURAL MEASURES OF CONTROL

4-7. AMD fires are controlled through positive and procedural means and measures. Positive control is a method of airspace control that relies on positive identification, tracking, and detection of aircraft within an airspace, conducted with electronic means, by an agency having the authority and responsibility therein (JP 3-52). Positive control is enabled by a common air picture that synthesizes data from multi-Service intelligence and AMD sensors, correlates air tracks, and identifies them based on an integrated airspace control plan and established identification criteria. Positive control is exercised through fire control orders. 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 controls include air defense warning conditions, ROE, published identification criteria, and weapons control status.

4-8. ADA units are normally governed by a mix of positive and procedural controls that can vary by weapon system. For example, aircraft engagements by Patriot are typically positively controlled by engagement orders passed through voice and data links from the engagement authority, while those by M-SHORAD can be positively controlled, but are, more commonly, procedurally controlled—initiated at the fire unit based on established identification criteria (electronic or visual identification), weapons control status, and engagement directives issued by the joint engagement authority.

4-9. Regardless of the echelon, positive and procedural control are exercised through fire control elements, which are subsets of the current operations section in ADA units; they are responsible for air battle management, airspace C2, and engagement operations. The composition of a fire control element is echelon and mission-variable dependent. Its manning crew accomplishes five functions: fire control, surveillance, identification, weapons control, and information control. A single manned position can execute more than one function; this is typical of a SHORAD unit. In HIMAD units, a single manned position can execute more than one function when the pace of combat operations permits. Conversely, some functions may require distribution across more than a single manning position or possibly across multiple C2 nodes.

- Fire control function encompasses the overall management of the air battle and engagement decisions.
- Surveillance function provides for clarity in the air picture.
- Identification function focuses on proper combat identification. The identification and fire control functional positions can be combined into a single manned position during light to moderate levels of combat operations.
- Weapons control function addresses actions from receipt of an engagement decision from the fire control officer to execution of that engagement. Depending upon span of control and pace of combat operations, more than one weapon control position may need to be manned. Allocation between control positions for multiple weapons may be based on threat type (for example, one position for the ballistic missile fight and one for the air fight), a geographical division (for example, one controlling all engagements occurring in the northern sector of the defense and one controlling those occurring in the southern sector), or along system type lines (for example, one controlling Patriot fires and one controlling Avenger fires).
- Information control function addresses the maintenance of networks and information flow across the task force and with higher, adjacent, and supported units.

Note. The term "fire control element" is used generically throughout the ensuing chapters to address those elements, sections, and centers (such as fire direction centers in Patriot battalions, air battle management operations centers in SHORAD battalions, and fire control elements in THAAD batteries) that manage or control AMD engagements.

ALERT STATES

4-10. An alert state is a condition that prescribes the number of resources required to achieve a ready-to-fire status and desired radar emissions, and which specifies manning requirements and equipment configurations. Alert states are METT-TC (I)-dependent and are determined by the senior ADA commander at theater level, in coordination with the AADC and regional/sector air defense commander. The resident ADA commander, organic to or supporting a corps or division, establishes the alert states in coordination with the supported unit commander.

4-11. The senior ADA commander uses alert states to govern subordinate units' readiness levels. In addition, alert states provide maintenance and training opportunities for subordinate units.

AIR DEFENSE WARNING CONDITIONS

4-12. An *air defense warning condition* is an air defense warning given in the form of a color code corresponding to the degree of air raid probability with yellow standing for when an attack by hostile aircraft

or missiles is probable; red for when an attack by hostile aircraft or missiles is imminent or is in progress; and white for when an attack by hostile aircraft or missiles is improbable (JP 3-01).

4-13. Warning conditions are a procedural control used to posture units based on the assessed threat. The AADC will establish the baseline air defense warning condition for the joint force during the planning stage. A condition can be different for an air threat and a missile threat. Subordinate AMD commanders may issue higher, but not lower, conditions for their region or sector. Air defense warning conditions are disseminated though C2 channels to all AMD elements, ADA fire units, and supported assets.

4-14. Local air defense warnings parallel the air defense warning conditions and reflect the local air and missile threat. Local air defense warnings are designed to alert a particular unit, several units, or an area of the battlefield. There are three local warnings: lookout which is comparable to yellow, dynamite which is comparable to red, and snowman which is comparable to white. A local warning can be higher, but not lower, than the air defense warning condition for a region or sector.

RULES OF ENGAGEMENT

4-15. *Rules of engagement* are directives issued by competent military authority that delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered (JP 3-84). ROE should be timely, appropriate, current, responsive to change, and not excessively specific or restrictive. The joint force commander approves the theater rules. These established rules enable the AADC to retain control of the air battle by prescribing the exact conditions under which engagements can take place. ROE apply to all warfare participants in the theater and are disseminated to all echelons of air, land, and sea forces. There are six AMD ROE categories: right of self-defense, identification criteria, fire control orders, weapons control status, levels of control, and modes of control.

4-16. Commanders at all echelons must take whatever action is necessary to defend their forces and equipment against air or missile attack. **When under attack, the right of self-defense is inherent to all ROE and weapons control procedures** (JP 3-01).

4-17. The employment of ADA weapon systems requires early identification of friendly, neutral, or hostile aircraft and missiles to maximize extended-range engagement and avoid fratricide. The problem of distinguishing friendly, neutral, and hostile air objects, while employing various weapon systems against the enemy, is a highly complex task; the same type of aircraft may be flown by friendly and enemy countries. However, since ballistic missiles have a distinct flight profile, ROE for this threat should be based on the trajectory profile. The AADC and the airspace control authority establish measures and procedures within the airspace control system to positively identify all airborne assets and permit the execution of AMD operations. These measures and procedures reduce delays in operations and prevent fratricide. Positive identification of tracks is normally the preferred method of operation. Positive identification is an identification derived from observation and an analysis of target characteristics including visual recognition, electronic support systems, non-cooperative target recognition techniques, identification friend or foe systems, or other physics-based identification techniques (JP 3-01). In the absence of positive identification, procedural identification is used; procedural identification employs previously established and promulgated airspace coordinating measures and rules. Procedural identification separates airspace users by geography, altitude, heading, time, and/or maneuver. Generally, some combination of positive and procedural identification is used.

- Hostile criteria are a description of conditions under which air platforms or missiles may be identified as hostile for engagement purposes. For AMD units, hostile criteria are basic rules that assist in distinguishing between friendly and enemy aerial objects. For example, air platforms such as fixed-wing and rotary-wing aircraft may be declared hostile if they begin to attack an asset, appear to be in an attack posture, or are not providing an appropriate friendly identification code; sUASs may be declared hostile if they are surveilling a friendly asset or force; and ballistic missiles and indirect fires are generally considered hostile, allowing for engagement based on the current ROE.

- Commanders having identification authority use hostile criteria to determine the identification of detected air targets. Identification authority is the authority to assign an identity classification to an unknown contact, if possible (JP 3-01). The highest echelon capable of managing engagement

operations normally retains identification authority. Upon target detection, fire units with near-real-time data transmission capability assist the engagement authority by forwarding target information. The engagement authority makes final targeting decisions based on identification (for example, classification and kinematic evaluation) and can delegate the authority to engage. Delegation of engagement and identification authorization to lower echelons is normal for SHORAD units.

4-18. Fire control orders are commands that are used to exercise positive control over engagements on a case-by-case basis and can be transmitted electronically or verbally. They are given to direct or inhibit firing by surface-to-air weapons units based on the ROE and rapidly changing tactical situation (JP 3-01). However, not all of the fire control orders can or will be used by every type of ADA unit. See table 4-1 for information on the types of fire control orders.

Table 4-1. Fire control orders

Terms	Definitions/Descriptions	Additional Information
Engage	A fire control order used to direct or authorize units and/or weapon systems to attack a designated target (JP 3-01).	N/A.
Hold Fire	An emergency fire control order used to stop firing. If technically possible, missiles already in flight must be prevented from intercepting (JP 3-01).	Use to protect friendly air platforms or avoid intercepts of neutral tracks.
Cease Engagement/ Cease Fire	Cease engagement or cease fire directs units to stop the firing sequence against a designated target; however, units may continue to track, and missiles already in flight are permitted to continue to intercept (JP 3-01).	Issue to preclude engagement of the same track by two or more weapon systems.
Engage Hold	**A fire control order which prevents automatic engagement of the specified target by the system when the system is operating in the automatic mode**. Missiles in flight are allowed to continue to intercept.	• This order is only applicable to Patriot and THAAD systems. • Use to prevent initiation of a redundant engagement during the time period when an engagement has been initiated until its completion.
Cover	**In air and missile defense, a fire control order that instructs a unit to assume a posture that will allow engagement of a target.**	• Use for targets that are presently being engaged by another fire unit or for targets that have yet to become significant threats. • To execute this command, must report tracking and ready-to-fire to higher echelons.
Note: Definitions for which this publication is the proponent are bolded.		
THAAD Terminal High Altitude Area Defense		

4-19. A *weapons control status* is an air and missile defense control measure declared for a particular area and time by an area air defense commander, or delegated subordinate commander, based on the rules of engagement, that establish conditions under which fighters and surface air defense weapons are permitted to engage threats (JP 3-01). Weapon control statuses—weapons hold, weapons tight, and weapons free—can be applied to weapon systems, volumes of airspace, or types of air platforms. They prescribe the relative control of AMD fires. The degree or extent of control varies depending on the tactical situation (JP 3-01).

● **Weapons hold**: the most restrictive status. Units may only fire in self-defense or when ordered by proper higher authority (JP 3-01).
● **Weapons tight**: the normal status. Units may only fire on targets identified as hostile in accordance with current ROE (JP 3-01).
● **Weapons free**: the least restrictive status. Used to indicate when any target not positively identified as friendly in accordance with current ROE [and the law of armed conflict] may be engaged (JP 3-01).

4-20. Levels of control. Levels of control describe the AMD commander/echelon permitted to authorize engagement of an air or missile threat (JP 3-01). This can be the AADC, regional air defense commander, sector air defense commander, ADA battalion, ADA battery, ADA platoon, or ADA team. Different levels of control can be established for ballistic missiles, UASs, fixed-wing aircraft and rotary-wing aircraft, and indirect fires.

4-21. Modes of control. There are three modes of control: centralized, decentralized, and autonomous. The mode of control selected depends upon the capabilities of the C2 system and weapons employed and both the friendly and enemy air situations.

- **Centralized control mode**. In this mode, a higher echelon must authorize target engagements by fire units. The ADA executing element seeks permission to engage targets by requesting authorization from that higher authority. Centralized control is used to minimize the likelihood of engaging friendly manned aircraft while permitting engagements of hostile aircraft and missiles only when specific orders are issued to initiate those engagements.
- **Decentralized control mode**. In this mode, a higher echelon monitors ADA unit actions, making direct target assignments on a management by exception basis, to ensure proper fire distribution, prevent engagement of friendly air platforms, and prevent simultaneous engagements of hostile air targets. Decentralized control is used to shorten decision cycles and increase speed of action, thereby increasing the likelihood that a hostile aircraft or missile is engaged as soon as it comes within range of an ADA weapon system.
- **Autonomous operations.** Autonomous operations are initiated when a firing unit has lost all communications (voice, data link, and tactical chat) to higher tactical headquarters. The fire unit commander assumes full responsibility for control of weapons and engagement of hostile targets in accordance with existing ROE, weapons control status, and previously received directives. In this mode, the unit commander bears the full weight and responsibility of the unit's actions or inactions with regard to fire control.

OPERATION PLAN

4-22. The end results of the mission analysis, coordination, and other staff activities is an initial operation plan. An operation plan is complete and detailed plan containing a full description of the concept of operations, all annexes applicable to the plan, and a time-phased force and deployment list (JP 5-0). The plan enacts the commander's intent based on the mission selected courses of action.

4-23. The foundational planning document for joint air operations is the theater AADP. ADA units operating at corps and below develop AMD plans that are guided by their higher headquarters scheme of maneuver and integrated with the plans supporting their forces to enable freedom of action. Without such integration, the air defense effort is not unified, incidents of fratricide may increase, and chances for mission success could decrease.

AREA AIR DEFENSE PLAN

4-24. The theater-level AADP is the core joint planning document for AMD and is the responsibility of the AADC. The AADC uses operational planning tasks to develop the plan in coordination with the joint force commander's component commanders, such as the joint force land component commander and joint force air component commander, and multinational partners. The AAMDC commander and staff are also active participants in the joint planning process for developing the AADP and may be tasked to lead the development of the plan and other AADC planning and control documents.

4-25. The plan prescribes the integration of active AMD and passive AMD measures, supported by a C2 system, to provide a comprehensive approach to defending against air and missile threats. The plan addresses command relationships, the enemy and friendly situations, the AADC's intent and concept of operations, logistics and C2 requirements, as well as detailed weapon and sensor positioning guidelines and control and engagement procedures. See JP 3-01 for an example of the AADP format.

AIR AND MISSILE DEFENSE PLANS

4-26. Initial AMD plans establish the ADA commanders' intent, concepts of operations, and tasks required for subordinate units. Initial planning sets the stage for future operations. AMD plans should allow the

greatest possible latitude for subordinate leaders to participate in the process and facilitate shared understanding and expertise across the force. Plans must be developed with sufficient flexibility to permit subordinate leaders to seize opportunities consistent with a commander's intent.

4-27. Formal plans are developed at the AAMDC, ADA brigade, ADA battalion/task force, and ADA battery levels. Those developed by the ADA brigade, battalion/task force, and battery are presented as annexes to a corps, division, or brigade operation plan. The responsibilities for defense planning and execution of the plans extend to ADA leaders at platoon, crew, and team levels.

4-28. AMD plans (for example, Annex I [Air and Missile Defense]) are written using the standard operation plan format. See appendix A for an illustration of Annex I. Plans should be as thorough and comprehensive as time and the situation permits. They should include ADA command and support relationships, enemy and friendly situations, the supported commander's intent and desired end state of the operation, and the supported commander's concept of operations. Various actions/coordinating instructions delineated in the plan can require detailed appendices and possibly subordinate plans that add further specifics. Such specifics can include logistical requirements for sustaining operations over time, such as resupply of missiles and air defense ammunition and refueling; reconnaissance methods to move forces; detailed weapons and sensor positioning guidelines; early warning and communications networking; airspace contributions and control measures; firing methods and restrictions; and engagement procedures.

PLANNING DEFENSES

4-29. Defenses are created to optimize the protection of designated assets in compliance with the initial AMD plan. Defense plans are developed to maximize available ADA capabilities against the expected threat, thereby allowing for the greatest probability of engagement success. Ideally, defenses should incorporate dedicated and non-dedicated requisite capabilities to overmatch threat capabilities and deny an enemy surveillance and attack options. The threat's weapons, speed, altitude, and delivery techniques must be determined or estimated. Information collected by ADA and Army G-2/S-2 personnel is used to build intelligence estimates. The defense is then implemented so as to provide balanced effectiveness against those combinations of weapons and techniques that are known to be available to the enemy in meaningful quantities and are evaluated as likely to be employed.

4-30. Integrated defenses are developed for the joint force commander's or Army forces commander's designated assets and planned in detail to defeat all aerial threats before enemy ordnance can impact a defended asset. AMD systems can be mixed with other ADA systems or sensors, such as Avenger with Patriot, or paired with the AMD systems of another Service or multinational partner (for example, the U.S. Navy's Aegis and the United Kingdom's Sky Sabre) to achieve layered defenses. Integrated active AMD measures are established and executed concurrently with attack operations and passive defense capabilities across echelons using a combined arms approach.

4-31. In implementing defense plans, commanders apply the AMD principles and employment tenets and consider the technical capabilities of the systems. (For more information on the principles and tenets, see the definitions and descriptions beginning on page 6; also, see additional discussions throughout this chapter). Defenses that have two or more types of ADA systems, with different weapons and sensors, are developed by emplacing the longest-range system first, based on its employment guidelines. Other ADA systems are deployed according to their guidelines, with emphasis on filling gaps in the coverage of the longer-range systems. Such defenses are typical of those activated for fixed sites.

4-32. In support of maneuver forces, the defense plan must be synchronized with the supported commander's scheme of maneuver. ADA commanders should participate in and use the same types of planning processes used by the supported force to integrate their capabilities into the maneuver operations. Coordination with the supported commander and staff sections must be continuous throughout the operations process to facilitate understanding and integration requirements of the supporting AMD system. AMD principles and employment tenets are adapted to the types of operations conducted by the supported maneuver force and changed as required to mitigate operational risk to the friendly forces and adjust priorities. Considerations for the defense planning should also include the quantity, capabilities, and potential locations of non-dedicated air defense teams. Interspersing these teams with ADA systems, such as M-SHORAD and Avenger, will further enhance defenses.

SUMMARY

4-33. A summary of the key planning tasks for AMD is presented in table 4-2 on page 96. The tasks are representative of those that are conducted across the ADA force, though not necessarily by each of the ADA echelons. Discussions addressing each of these are presented in chapters 3 and 4 and, in some cases, are start points for preparation activities.

Table 4-2. Air and missile defense planning tasks

Plan	- Coordinate with the supported commander. - Coordinate with joint and multinational forces. - Initiate a MDMP or troop leading procedures. - Conduct AMD IPOE. - Perform criticality, vulnerability, and threat assessments. - Provide AMD running estimates. - Support development of the CAL and protection prioritization list. - Assess availability of AMD assets. - Allocate AMD assets. - Develop initial AMD plans. - Develop supporting scheme of maneuver. - Develop sensor and communication plans. - Propose a DAL/AMD scheme of maneuver to the supported commander. - Request additional AMD resources if necessary. - Plan engagement zones. - Develop rules of engagement/identification matrix. - Develop a deception plan. - Establish command and support relationships for subordinate units. - Nominate targets for attack operations in support of offensive counterair development. - Support refinement and adjustment of the CAL/DAL/AMD priorities/scheme of maneuver. - Develop AMD plans/AMD annexes to OPLANs.

AMD	air and missile defense	MDMP	military decision-making process
CAL	critical asset list	OPLAN	operation plan
DAL	defended asset list		
IPOE	intelligence preparation of the operational environment		

SECTION III – PREPARATION

Know the enemy, know yourself; your victory will never be endangered. Know the ground; know the weather; your victory will then be total.

Sun Tzu

4-34. ADA commanders and staffs prepare for operations by developing their AMD concepts of operation based on initial plans and conducting unit rehearsals to organize subordinate forces, assigning tasks to missions, and integrating the unit's organic capabilities into a supported commander's AMD plan. The type or method of rehearsal can vary; however, the end state remains the same. The rehearsal provides commanders with a means to ensure the staff and subordinate leaders have mutual understanding of the supported commander's concept of operations and intent. Rehearsals focus the staff on the mission requirements and depth of the operation.

4-35. Upon receipt of mission orders from higher headquarters, ADA commanders identify and prioritize critical events and timing. Commanders review the supported commander's concept of operations, IPOE and other intelligence products, and begin coordinating their initial planning estimates with their higher headquarters to integrate operations by phase and synchronize follow-on activities prior to employment.

Initial planning and preparation at the tactical level is based on current operations and the most relevant threat information available at the time of receipt of mission orders. AMD planning requirements are continuously assessed by the commander, staffs, and subordinate leaders and updated throughout the unit's operations process. Plans and supporting activities are rehearsed both internally at the unit and briefed to supported commanders and higher headquarters. Plans may change as preparation activities progress or during the execution phase as friendly and enemy tactics alike will change over time.

4-36. Planning estimates and support requirements (for example, prioritized logistical resupply) must be coordinated between supporting and supported headquarters to ensure operations are sustainable and future operations are synchronized in time and purpose. A supported commander's priorities for active AMD may shift between the main and supporting efforts. Informing the higher headquarters or supported commander of changes to an operation requires the supporting unit or select personnel from the unit's staff to brief the supported headquarters of the change and assessments of any impacts to mission accomplishment. At the division and below echelons this is normally accomplished through unit level rehearsal of concept (known as ROC) drills or mission briefings to the supported commander. For detailed information on the types of rehearsals, see the paragraphs beginning with 3-100 on page 82.

4-37. ADA commanders task organize forces and capabilities consistent with guidance from their higher headquarters and in accordance with their support relationships. Coordinated planning is conducted between the commander, staff, supporting and supported headquarters, and multinational partners during war-gaming efforts, scenario developments, and combined arms rehearsals. This coordination allows the commanders to identify potential issues or concerns across the force and plan the way ahead.

4-38. ADA units are positioned to provide early warning surveillance by employing organic sensors to detect air and missile threats and disseminate attack warnings to supported forces and, where appropriate, civilian populations. ADA C2 nodes and elements establish and maintain tactical data linkages to integrate external sensor information and disseminate early warnings (and all clear) to only at-risk forces and, when appropriate, to at-risk populations. ADA weapons, C2 nodes, and data sharing platforms can be used to create mass effects against enemy surveillance and integrated fires complexes throughout a joint operations area.

COORDINATION

4-39. Coordination between the supported force and supporting ADA organization is essential to achieving common purpose and objectives prior to and throughout tactical operations. Cooperation between commanders and planning staffs during preparation is an integral part of a continuous process that extends from initial planning estimates through the execution of AMD operations. Coordination of AMD functions are actions conducted by ADA officers, liaison teams, and assisted by staff personnel in positions throughout organizations and elements at the various Army and joint echelons. For more information on air defense coordinators, ADAFCOs, AMD chiefs at corps/division/brigade, and liaison elements, see the discussions beginning with paragraph 2-9 on page 28.

4-40. Air defense coordinators and liaison personnel ensure that ADA plans and operations are synchronized with a supported commander's AMD priorities and integrated into their plans and operations throughout all phases of conflict and across all domains. Key coordination tasks (echelon dependent) include:

- Advise supported commanders and their staffs of the AMD capabilities, unit locations, and statuses.
- Assess air and missile threats and supported commander's priorities to optimize defense planning.
- Assist the fire support coordinator in integrating and prioritizing attack operations against air bases and missile launch sites into the force's targeting process.
- Assist the base defense operations center in planning for and coordinating engagements of sUASs and indirect fire threats.
- Request and disseminate AMD information, to include airspace coordinating measures or restrictions.
- Coordinate with the joint air ground integration center for use and defense of divisional airspace.
- Inform protection cells in corps and below of current operations and future AMD plans.
- Develop the AMD annex to the supported commander's operation plan/order.
- Assist in facilitating force protection and sustainment support for ADA units.

4-41. ADA commanders and staffs continually assess and refine defense plans and coordinate positioning and movement schemes to provide supported commanders with optimal coverage throughout an operation. ADA units provide early warning surveillance and detection of air threats operating in, near, or entering the airspace above the supported commander's ground operations. These indications inform and support a maneuver commander's tactical decisions as the commander conducts rapid identification, deconfliction, and clearance of fires within their designated volume of airspace up to the coordinating altitude. ADA fires, C2 nodes, and sensors are normally linked to Army and joint airspace controlling authorities that operate C2 networks across the land, air, and maritime domains. These authorities coordinate airspace use and facilitate kill chain activities across multiple domains and areas of operations.

AIR DEFENSE ARTILLERY COMMAND RELATIONSHIPS

4-42. There are five types of command relationships. These are defined in paragraph 3-72 on page 76.

4-43. The application of these relationships to ADA units are as follows:
- Organic. An ADA battalion, for instance, is organized with a specified number of ADA batteries based on its table of organization and equipment. Organic ADA units have command relationships with all other organic forces organized with the headquarters. Organic ADA units are positioned by their organic headquarters and have their priorities established by that headquarters.
- Assigned. Assigned ADA units have command relationships with the gaining unit, are assigned positions by that unit's commander, and have priorities established by that commander or by a subordinate commander if so delegated.
- Attached. Attached ADA units have command relationships with the gaining ADA unit and are assigned positions and have priorities established by that unit's commander.
- Operational control. Command relationships, positions, and priorities are established by the gaining ADA unit.
- Tactical control. Command relationships, positions, and priorities are established by the gaining ADA unit.

AIR DEFENSE ARTILLERY SUPPORT RELATIONSHIPS

4-44. ADA plans respond to higher headquarters mission orders and issuance of subordinate plans and orders. This establishes the ADA commander's role and support relationship with the supported organization. Support relationships are established based on the higher Army or joint commander's analysis of how best to support a maneuver unit or fixed asset. As cited and defined in paragraph 3-74 on page 76, ADA units can be assigned one of four support relationships. These are further described in the following paragraphs and summarized in table 4-3 on page 99).

4-45. ADA units in a direct support role provide dedicated support to a specific element of the force. Supporting ADA units coordinate their movement and positioning with the supported unit. The AAMDC is normally placed in direct support of the AADC to execute the theater AMD mission. The AAMDC may place an ADA brigade in direct support of a corps to ensure the corps commander's AMD priorities are met during maneuver operations. A M-SHORAD platoon may be placed in direct support of a mechanized task force. The platoon provides dedicated support to the task force, and the platoon leader positions the platoon in accordance with the task force commander's concept of operation. Regardless of the echelon of command, the ADA element, when placed in direct support to a unit, organizes its resource to defend the supported commander's designated priorities.

4-46. ADA units in a general support role provide support to the force as a whole and not to any subordinate echelon, unit, or element. ADA units in general support commonly defend theater, corps, or division level assets. General support ADA units might consist of Patriot, THAAD, Avenger, or Stinger man-portable air defense (MANPAD) systems. They are positioned by the ADA commander.

4-47. ADA units with general support-reinforcing missions provide support for the force as a whole and, secondarily, augment the support provided by other ADA units. ADA units must coordinate with the augmented ADA units to reinforce the coverage of assets in the area of operations.

4-48. ADA units in reinforcing roles augment the coverage of other ADA units and strengthen AMD capabilities of the force. Reinforcing ADA units are positioned to defend one or more of the reinforced units' priorities as specified by supported ADA unit commanders.

Table 4-3. ADA support relationships

Army support relationship	Coordinates with:	Positioned by:	Furnishes liaison officer to:	Establishes COMM with:	Conducts engagements
Direct Support	The supported unit.	The ADA commander with the approval of the supported commander.	The supported unit.	The supported unit.	• Per the engagement authority. • IAW ROE.
General Support	The supported unit.	The ADA commander in coordination with the local ground commander.	As required.	As required.	• Per the engagement authority. • IAW ROE.
Reinforcing	The supported unit.	The ADA commander with the approval of the reinforced ADA commander.	As required and the reinforced ADA unit.	As required and the reinforced ADA unit.	• Per the engagement authority. • IAW ROE.
General Support-Reinforcing	The supported unit.	The ADA commander in coordination with the reinforced ADA commander.	As required and the reinforced ADA unit.	As required and the reinforced ADA unit.	• Per the engagement authority. • IAW ROE.

ADA	air defense artillery	IAW	in accordance with
COMM	communications	ROE	rules of engagement

COMMAND AND CONTROL OF AIR AND MISSILE DEFENSE OPERATIONS

4-49. Control of joint and Army AMD fires is exercised by commanders designated as engagement authorities. These engagement authorities function as a vertically and horizontally integrated kill chain. Engagement decisions are made by the designated engagement authority in the kill chain (joint and Army), providing operational control of and, ultimately, directions to the weapon. Integrated sensors, weapons, and C2 networks allow for greatly increased engagement options. As such, engagement authorization must be delegated to the lowest level possible, in accordance with METT-TC (I).

4-50. The designated component commander, usually the joint force air component commander/AADC, is supported by ADA units. The designated component commander is granted the necessary authority (in this case tactical control) for controlling and directing ADA fires. Because ADA units are not typically assigned or attached to a commander of a different Service, tactical control provides sufficient authority for controlling and directing the application of force or tactical use of ADA assets within the assigned mission or task.

4-51. The AAMDC serves as an operational command supporting the ARFOR commander, or joint force land component commander, and joint force air component commander. The AAMDC C2 node links active defense, passive defense, and attack operations functions and provides timely assessment of the threat. It enables rapid dissemination of data fusion, tactical warning, mission assignment, cueing, targeting data, and post-strike assessment to the appropriate AMD element. AAMDCs are equipped with the Air and Missile Defense Planning and Control System and a THAAD portable planner. The Air and Missile Defense Planning and Control System is capable of exercising C2 functionality for force and engagement operations. The portable planner enables the AAMDC to plan and evaluate THAAD defenses. The AAMDC focuses on planning and preparation operations across the theater for deployed ADA units. The AAMDC participates in

engagement operations through its ADAFCO. As noted in chapter 2, an ADAFCO team is collocated with the designated engagement authority for air and missile threats.

4-52. Nominal AAMDC control relationships are illustrated in figure 4-1. The positions depicted for the ADA organizations do not necessarily imply their physical locations nor parallelism between ADA organizations and the Army maneuver echelons.
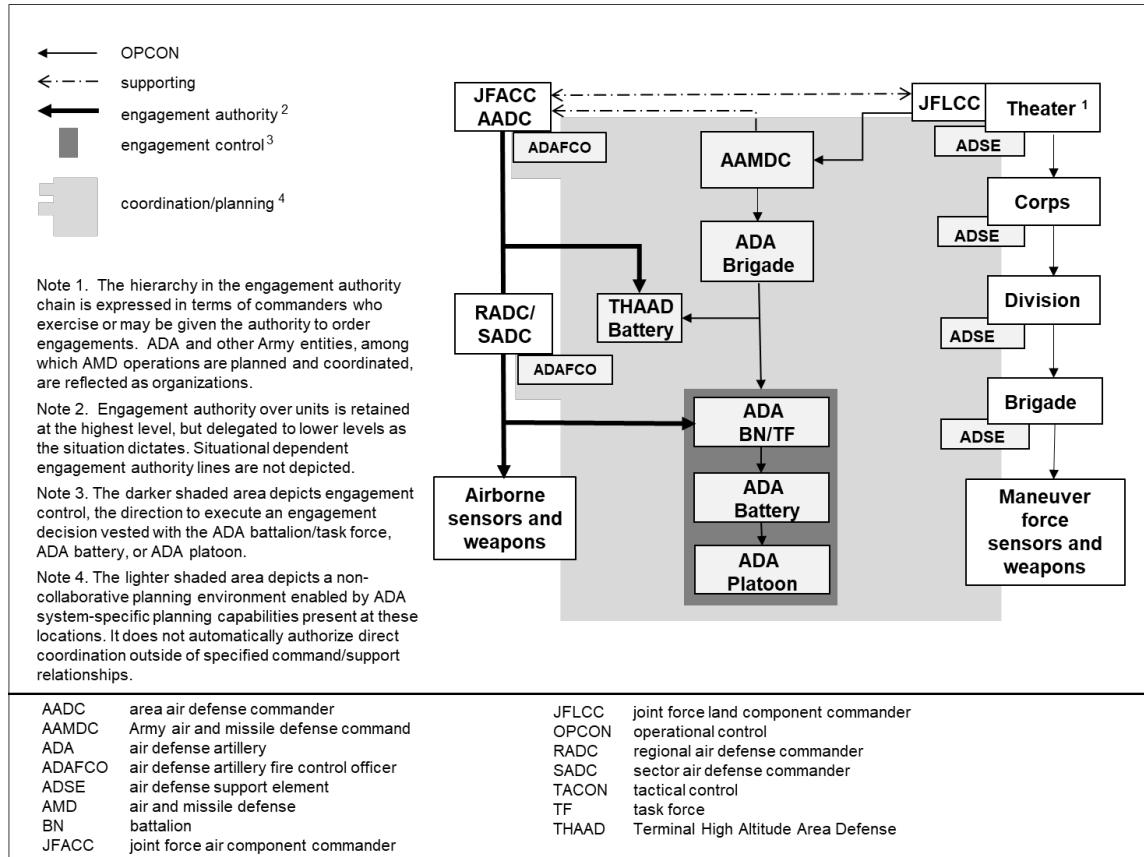
Figure 4-1. Army air and missile defense command control relationships

4-53. Tactical control/direct support and the near-real-time exercise of the joint kill chain, as depicted and described above, generally do not apply to divisional ADA elements, such as M-SHORAD and other SHORAD units. Engagements of threats, such as groups 2 and 3 sUASs and indirect fire threats, are very time sensitive and cannot wait for authorizations through the various elements comprising the joint kill chain. Their engagements are delegated to the lowest level as established by the ROE, fire control orders, and weapons control status. The employment of divisional ADA elements must fully exploit the capabilities of early warning systems in conjunction with a functional unit airspace plan to reduce risk to friendly aircraft while facilitating successful engagements. To ensure success, units must conduct in-depth planning and integration of the operation plan nested with the standing unit airspace plan at the appropriate echelon.

4-54. DIVAD battalions plan for the employment and sustainment of assigned and attached forces; execution is either at the platoon or weapons platform level for M-SHORAD and Avenger. The DIVAD battalion staff coordinates with the joint air-ground integration center, providing its members situational awareness of the airspace and knowledge/understanding of AMD unit/system capabilities, locations, status, and reports. Information is also shared with the protection cell. The senior ADA officer in the division AMD section and ADSE officer at brigade level provide air defense information to the ADA units and non-dedicated AMD elements to ensure situational awareness and early warning and employ procedural controls as required. Both can monitor engagements, but neither are involved in engagement operations.

4-55. Figure 4-2 depicts the C2 relationships for a DIVAD task force in support of maneuver forces. Defense planning and resource allocation are accomplished at the battalion level. Linkage of the firing elements to a higher headquarters engagement authority is accomplished through the operational control lines from the DIVAD battalion/task C2 node. A SHORAD unit normally deploys as a battery and fights as a platoon; execution is at the platoon or weapons platform level for M-SHORAD. Sentinel radars are under the control of M-SHORAD batteries as Sentinels normally support multiple platoons in the platoon areas of operations. Non-dedicated Stinger MANPAD teams are also controlled by M-SHORAD leaders when they are integrated with M-SHORAD units. (When operating as part of a maneuver formation, they are controlled by the maneuver force commander or designated representative.) Forward area air defense (FAAD) C2 provides air battle management functions, to include the development of a common air picture.
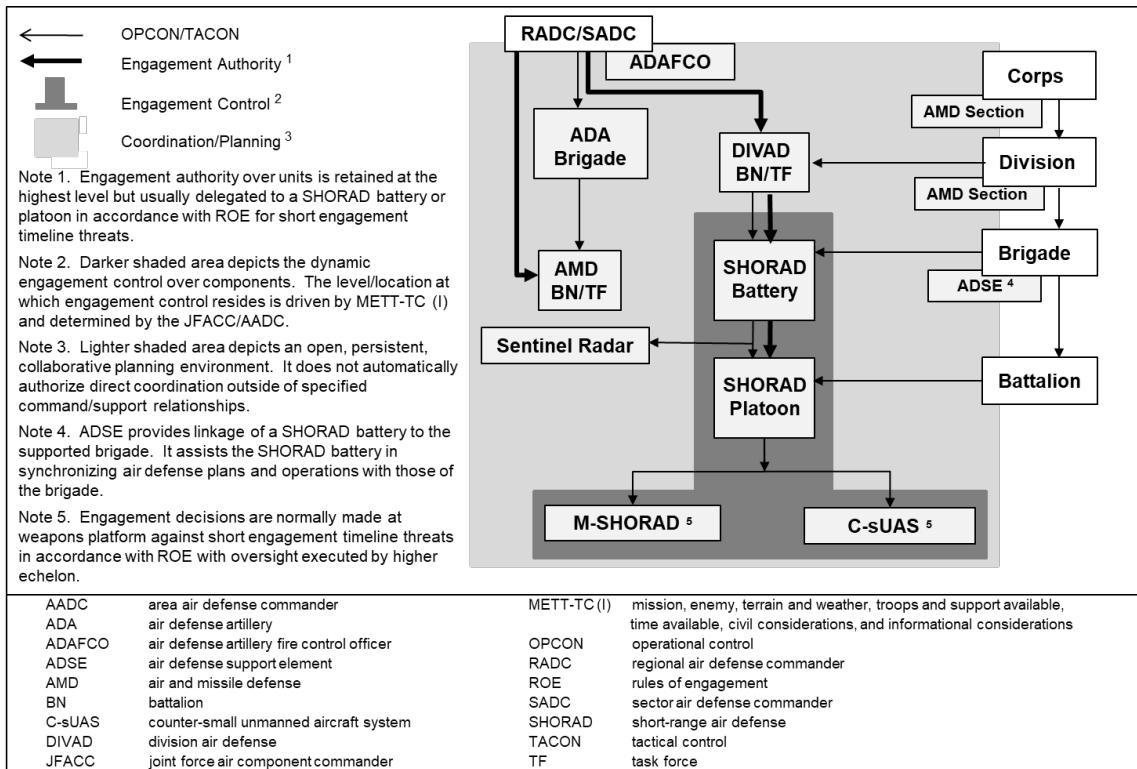
Figure 4-2. Divisional air defense task force control relationships

TASK ORGANIZATION

4-56. Task organizations are created based on planning factors identified during the planning phase. A *task organization* is a temporary grouping of forces designed to accomplish a particular mission (ADP 5-0). This package may consist of a complete battalion-level task force, a task-organized battery, or sub-sets of a battery. A mix of different weapon systems and often sensors are generally included in the package; however, a task-organized force may also be comprised of additional or decreased numbers of the same weapon and sensor systems. For AMD, task organization must consider elimination of exploitable seams in the defense coverage. Seams can be created in azimuth (for example, Patriot sectored coverage), in altitude (approaches below or above a sensor's coverage), and by threat capabilities (for example, use of a threat mixed package that includes platforms with capabilities that exceed those of the sensor or weapon in a defense).

4-57. The AMD principles must also be assessed and applied as ADA units are task organized. The principles facilitate organizational designs that are best suited to meet mission requirements. Task organizations are further enhanced by the addition of the Integrated Air and Missile Defense Battle Command System (IBCS) in some Patriot units.

MASS

4-58. Mass is achieved by assigning sufficient AMD firepower to successfully defeat enemy aerial capabilities arrayed against friendly forces and assets. To mass AMD combat power in one area, commanders may have to accept risks in other areas of the battlefield.

4-59. With IBCS's characteristic of enabling any available weapon to be paired with any appropriate sensor (any sensor, preferred shooter), combat power can be better distributed to support multiple assets rather than dedicated to the defense of a single asset. For example, a Patriot launch farm can be positioned with a primary mission of defending a critical asset remote from any available Patriot radar; however, it is also capable of defending both a primary and secondary radar's asset. In fact, with IBCS, both radars can be considered primary, with IBCS seamlessly selecting between the two of them for a particular engagement sequence. Interceptor on-target mass is achieved by selecting an appropriate method of fire to maximize defense effectiveness from all available weapons, irrespective of type of weapon or organizational affiliation within the task force.

MIX

4-60. Proper mix causes the enemy to adjust tactics, presenting a complex threat that directly impacts how the enemy's aerial assets are employed. Enemy tactics designed to defeat one system can make the enemy vulnerable to another system. For instance, an enemy aircraft flying low to avoid Patriot may be vulnerable to engagement by a M-SHORAD, Avenger, or Stinger MANPAD system. Mix is achieved by assigning multiple system-centric architectures within a defense plan, with each system controlled by its C2 architecture, and coordinating with other systems. The principle of mix addresses both threat susceptibilities and vulnerabilities and ADA system limitations. Complex integrated attacks by enemy forces seek to exploit ADA system limitations or defense planning activities with out-of-sector attacks. Out-of-sector refers to that part of the air and missile defense operating area which cannot be covered by a sensor or defended by an air and missile defense weapon. Some ADA systems can provide 360-degree coverage, while others are limited in azimuth (sectored). ADA systems have limitations with respect to altitude and range. Mixing ADA systems within a defense design enables defense planning options and provides a more comprehensive defense of designated assets.

4-61. IBCS integrates multiple sensors and joint data links to provide a common air picture. The IBCS network pairs fire control quality sensor data with AMD weapons to enable engagements. The IBCS network derives its data from multiple sensors, and the engaging weapon may never have the target under track with its organic sensor. Weapons are defense resources that are paired with sensor data of sufficient quality to enable an engagement, without regard to the sensor system providing the data. For instance, Patriot interceptors still require an uplink from a Patriot radar, but that radar does not have to be tracking the threat that is being engaged. Thus, IBCS allows for a move from a coordinated mix of individual system capabilities to an integrated mix of defense resources (any sensor preferred shooter). This enables the selection and use of the weapon(s) with the highest probability of mission success in the engagement sequence, rather than selection of a weapon(s) by organizational and system affiliations.

MOBILITY

4-62. M-SHORAD systems can match the cross-country mobility of maneuvering forces. Avenger systems can move with and maintain defense of the maneuver force's semi-fixed assets, but not of maneuvering forces. M-SHORAD and Avenger units can also bound their systems and sensors forward to maintain early warning and aerial situational awareness for supported maneuvering forces. Patriot and THAAD units have sufficient mobility to move from position to position to continuously extend defense of the supported force on the move. Mobility of ADA units greatly increase their survivability as well as enables maneuver units to maintain tempo and survivability.

4-63. The interchangeable "plug and fight" characteristics of the IBCS network changes movements from a Patriot battery to a Patriot component (a launcher or radar). Plug and fight is the ability of a system's subordinate functional components (weapons, sensors, and C2 elements), not the system itself, to move into designated positions, emplace, immediately establish communications, and seamlessly integrate into the defense.

INTEGRATION

4-64. The following three sub-elements must be considered:

- Functional integration activities are the basis for establishing both the information required and the means to acquire, produce, exchange, and distribute that information for planning, coordination, and execution purposes. Fielding of IBCS to maneuver force AMD elements, such as the BCTs' ADSE, will enable the exploitation of the IBCS integrated defense design tool to facilitate AMD planning, preparation, and execution activities with concepts of maneuver and operational and tactical AMD support needs. The integrated fire control network data distribution increases the fidelity (accuracy, completeness, consistency, and timeliness) of AMD data distribution to the maneuver force allowing ADA units to fully support the maneuver commander's needs.
- For operational integration, the integrated defense design tool features include distributed planning that incorporates all capabilities available to create an effective and efficient defense, thus promoting synchronization with and integration into the theater AADP. IBCS is equipped with the network means (hardware and software) to rapidly, effectively, and efficiently achieve interoperability with all theater AMD capabilities permitted by policy. (An IBCS hardware/software modification must be applied to all IBCS-enabled theater AMD capabilities to enable integration.) IBCS incorporates joint AMD capabilities directly into the execution of its assigned defense mission.
- For architectural integration, the primary design driver for IBCS was the architectural integration of task force capabilities. Thus, IBCS seamlessly integrates the functional capabilities of the components (individual weapon, sensor, and communications terminal/relay), irrespective of the system for which they were designed. This enables exploitation of these component capabilities across an entire task force.

FLEXIBILITY

4-65. The defense can be tailored, for the most part, to defeat a specific threat or to achieve a balance across the full threat set. However, balancing across the full threat set can result in less-than-optimal defense against a specific threat set. Likewise, SHORAD systems can optimize against a specific threat or attain balance across their full threat set. The Land-Based Phalanx Weapon System (LPWS) can defeat rockets, artillery, and mortars in the air. Optimization against mortars could result in some compromise with LPWS's ability to defeat larger caliber rockets. System architectures allow for some ability to tailor task forces. Additional launchers can be assigned to a battery or platoon to attain sufficient mass to defeat anticipated heavy attack scenarios. SHORAD systems at battery and platoon levels can also accept augmentation of sensors. Patriot requires one, and only one, radar per battery. Thus, if one radar is insufficient in accordance with METT-TC (I), an additional battery must be incorporated into the defense. Unique C2 capabilities and data link architectures within each of the systems limit task force tailoring across systems.

4-66. IBCS enables an adaptive force through distributed planning and rehearsal of plans, dynamic re-planning, and the capacity to place execution authority at a level appropriate with the pace of combat activities, from centralized at a higher authority than the task force to decentralized to the battery or platoon level. IBCS' plug and fight characteristics enhance flexibility and unprecedented task organization of ADA units. System paradigms, with specific associations between sensors, weapons (launchers and/or missiles), and C2 nodes, are no longer required by IBCS. IBCS allows a task force to be tailored by assigning specific missions to specific components. For example, one IBCS engagement operations center can control the entire task force in engagement operations, or engagement operations tasks can be parsed across multiple IBCS engagement operations center to avoid operator saturation and overload in any C2 node. One radar can be assigned a primary role in ballistic missile defense while a companion radar can be optimized for surveillance against low-altitude threats such as cruise missiles and sUASs.

AGILITY

4-67. Automated battle management aids in ADA systems enable operators to execute engagements in a timely manner in accordance with the AMD plan and its branches and sequels. Dynamic replanning to respond to unanticipated enemy avenues of ingress, however, is less responsive primarily due to system-centric architectures that do not allow cross-leveling of resources across ADA systems.

4-68. IBCS breaks the single-purpose system paradigm, allowing any interceptor to be paired with sensor data of adequate quality, the optimal engagement sequence can be planned to invoke the use of multiple sensor and weapon types, as appropriate, to eliminate seams across organizational and system boundaries. While Patriot interceptors still require uplink from a Patriot radar during mid-course guidance, this association with the IBCS architecture is determined at the time of engagement rather than pre-set by geographic location and organizational affiliation.

- Plug and fight enables entry or exit of components from the network without disruption of ongoing operations, allowing the task force to have high levels of graceful degradation and continuity of operations to adapt the defense to changing threat tactics.
- The distributed track manager within IBCS expands awareness into situational understanding through consistent, contiguous, accurate, and timely air picture development. The enhanced situational awareness allows for increased decision time to enable the ADA task force to see first, decide correctly, and act first, preventing hostile air threats from seizing the initiative.

MOVEMENT

4-69. Preparations for inter-theater deployments and intra-theater movements are initiated upon mission receipt. Deployment planning for inter-theater movements to an operational area must be synchronized with appropriate transport organizations. Movement is executed by the most expedient means needed, in accordance with the joint force commander's/ARFOR's requirements for AMD. Strategic lift may be designated to transport sub-sets of ADA batteries or entire ADA units. Due to the large size of many ADA components and systems, and when time is available, transportation by means of self-movement, rail movement, or sea vessels for overseas deployments is likely to be more economical and efficient. When such stationing or deployments cannot be achieved within a timely manner, the joint force commander relies on joint AMD assets to defend early entry assets until land-based ADA capabilities can be deployed.

4-70. Upon deployment to the area of operations, ADA brigade, battalion, and battery personnel refine movement plans to designated areas in accordance with assigned missions and in coordination with the supported commander directives. The repositioning of forces prior to execution makes up a significant portion of preparation activities. Commanders position or reposition units to the area to be defended before execution. Commanders integrate security measures with unit movements to ensure these movements do not reveal any intentions to the enemy. Reconnaissance is conducted along the route and in the defended area to identify potential locations for sensors, weapons, and command posts. Reconnaissance information and collection techniques regarding movement are normally coordinated with supported commanders through the scheme of AMD. This preparation task ensures that there is no conflict in positioning or relocating ADA equipment once the unit arrives.

4-71. Whenever possible, ADA units use multiple routes to move their subordinate forces. This reduces the length of columns, vulnerability to enemy air attack, and amount of time the routes are unavailable to other units. Multiple routes provide units with the flexibility to react to unexpected situations and permit more rapid concentration of combat power.

4-72. ADA units conduct tactical movements in defense of designated assets and for survivability measures. M-SHORAD and Avenger units move with their supported maneuver forces. Movements are conducted in synchronization with the scheme of maneuver, as the maneuver forces conduct offensive or defensive operations, and from primary to secondary and supplementary positions to mitigate aerial surveillance and attacks. Current Patriot system architectures require movement by organization—a battery moving as an entity, thus creating large gaps in defense coverage during movement. IBCS-equipped Patriot units have greater freedom in tactical movements. IBCS enables movement by component—individual weapon or sensor. This allows for the gradual shifting of coverage without creating major gaps in a defense.

POSITIONING

4-73. ADA units are forward deployed to an area of operations and positioned to best defend designated assets against the projected air and missile threats in accordance with detailed defense plans. Sensor and weapon placements are selected based on reconnaissance to maximize surveillance, tracking, and engagements. Sensors are positioned to provide surveillance and fire control tracking capability sufficient to defend assigned assets and prevent gaps in the coverage. Sensors are emplaced on terrain that provides the

best longest-range line-of-sight in all directions. Weapons are then positioned to optimize the defense of the defended assets, enabling lethal coverage over the assigned assets and extending firepower through as much of the defense coverage area as possible.

4-74. ADA commanders use the AMD employment tenets to position their fire units or system components to achieve the best defenses against the projected aerial threats. Considerations in applying the tenets and the enhancements provided by IBCS follow. Figure 4-3 on page 106 portrays the tenets.

- **Mutual Support**. Mutual support is critical for covering weapon dead zones. For guns, this dead zone is usually small. For missiles, the dead zone can be large, and mutual support is a critical element. Mutual support can also cover non-operational weapons or weapons at lower states of alert. Mutual support, when applied to sensors has the same connotation. The application of sensor mutual support is challenging due to the need to pair weapons and sensors by system and the scarcity of ADA systems. Weapons and sensors should be assigned primary and secondary target lines that are integrated, planned so that there are no gaps in a defense that air and missile threats can exploit. For more information on primary and secondary target lines, see paragraph 4-108 on page 119. With IBCS, mutual support is a defensive planning consideration and not a weapon system consideration. IBCS leverages the component capabilities of all elements in the defense, not just the components of a system within the design. Radar mutual support can be achieved by a mix of sensors, with the functional capabilities of each sensor exploited to support the defense plan.

- **Overlapping Fires and Overlapping Coverage**. Achieving overlapping coverage against ballistic threats is a challenge because of the need to orient primary target lines toward the enemy. This includes ballistic launch zones and the system architectures that require system-specific sensors to support system-specific weapons. Overlapping coverage against low altitude non-ballistic threats is challenged by terrain impacts on ground-based sensor visibility and the aforementioned system-specific limitations. With IBCS, system architecture constraints are relaxed, enabling better application of this tenet.

- **Balanced Fires**. Against cruise missiles and other non-ballistic missile threats, balanced fires is a desired characteristic of defense plan. IBCS's ability to use any weapon across the entire defense enables fires from weapons, positioned primarily to defend a specified asset, to support other assets within the defense. Thus, some positioning constraints are relaxed, and better-balanced fires are enabled.

- **Weighted Coverage**. Weighted coverage and balanced fires are not mutually achievable, requiring the defense planner to give up most aspects of one to achieve the other. IBCS facilitates both. It allows the positioning of distributed firepower to achieve balanced fires and the concentration of firepower, without repositioning, to achieve weighted coverage.

- **Early Engagement**. As with weighted coverage, early engagement is achieved at the expense of balanced fires. With IBCS, firepower positioned to achieve balanced fires can also be used to create early engagements along selected avenues of approach.

- **Defense in Depth**. ADA units can generate defense in depth with different ADA weapons and sensors or by adding and integrating complementary joint and multinational AMD systems to the defense. IBCS's ability to integrate ADA systems and/or components into a single cohesive, synchronized defense enables the mix of weapons and sensors to efficiently create defense in depth. Integrated firing doctrine will take full advantage of sensor and weapon capabilities irrespective of legacy system design.

- **Resilience.** ADA planners must understand the capabilities of the system(s) that are being deployed in a defense, and plan for deployment and employment of components to enable these capabilities to be exploited during mission execution. Resilience is a key determinant when considering which tenet (or tenets) to use in maintaining the defense. Resiliency is enhanced in force deployments where IBCS provides the C2 capability because of several key factors:
  - Every C2 node has identical capabilities. An entire task force can be controlled by a single IBCS engagement operations center, with any other center assuming the role of a non-operational one.

- The integrated defense design planning and communications network management tools embedded in the IBCS engagement operations center include algorithms that optimize resiliency in the defense plan.
- Dynamic re-planning, using the integrated defense design tool, can rapidly adjust a defense as the battlefield situation changes.
- Components on the network do not require specific association of sensor-weapon pairings until an engagement is initiated. Thus, loss of a sensor does not imply loss of firepower, although sensor coverage is impacted.

IBCS provides an integrated fire control network that is a self-forming, self-healing network that assures critical mission information is delivered accurately and timely. It uses standard auto-configuration protocols to form and maintain the network as individual nodes enter (are initialized into) or leave the network.
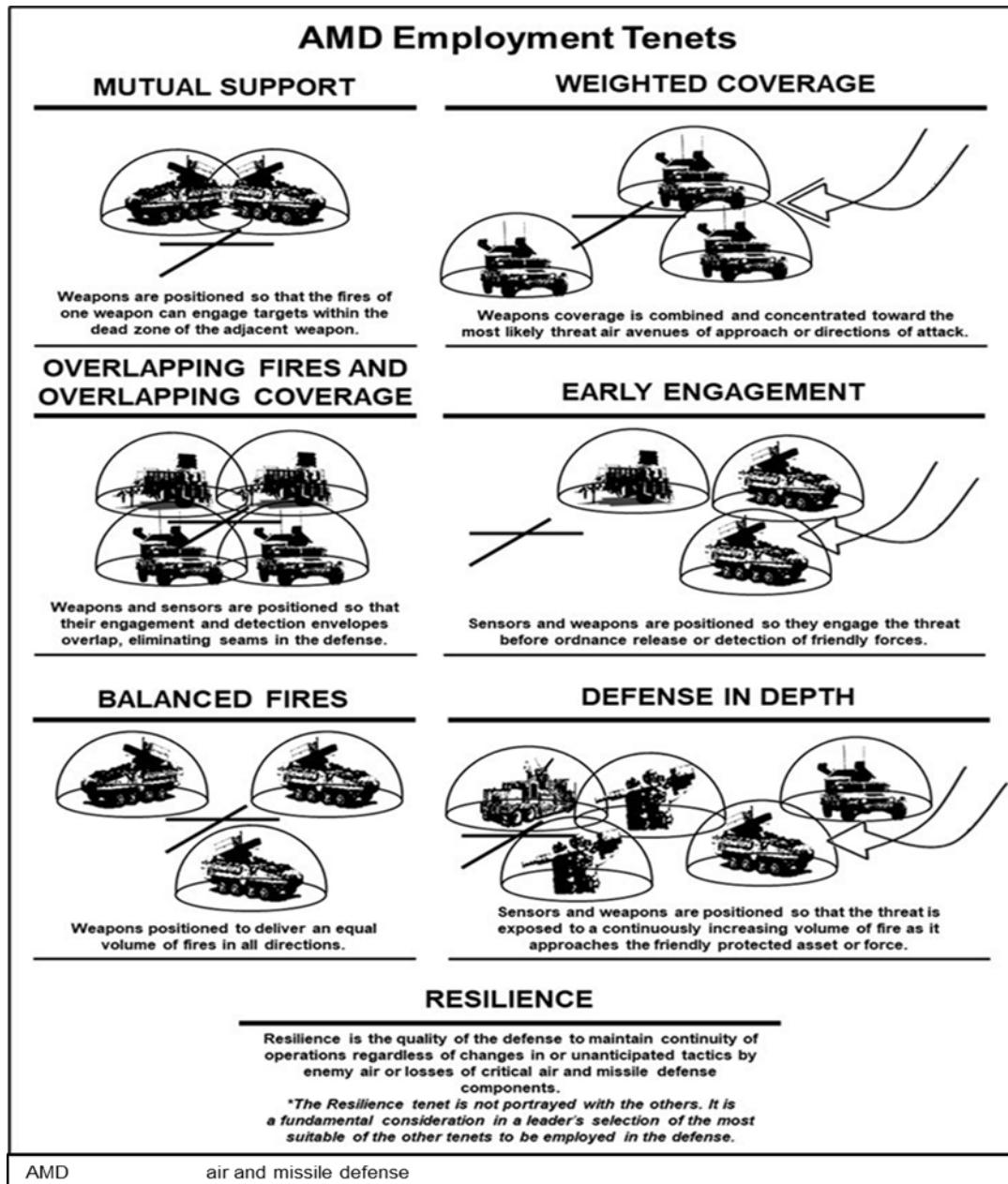

Figure 4-3. Employment tenets

4-75. The AMD employment tenets and latest intelligence reports inform the defense plan. Patriot and THAAD forces may use a weighted defense to counter ballistic missile threats from known locations or areas, or a balanced defense when there is a potential for multiple types of threats approaching from various directions. Because of the nature of their target set, SHORAD forces may be able to rely more heavily on the tendency of low-flying threats to be canalized by terrain due to their flight level and maneuverability. This may allow SHORAD forces to predict the air avenues of approach for enemy air threats and position forward of the defended asset, weight coverage, and achieve early engagement before the threat is able to reach its ordnance release line.

4-76. Communications assets interconnect weapons, sensors, and C2 nodes to enable an integrated defense. Tools embedded in C2 capabilities, such as the Patriot tactical planning workstation and air and missile defense workstation, enable automated support to defense planning and design to both optimize component emplacement and to evaluate defense alternatives. Software functionality is system specific, except for Patriot units equipped with IBCS, requiring manual steps to develop an integrated defense across a task force containing multiple system capabilities. IBCS has an integrated defense design tool built into the software to optimize sensor and weapon system positioning and employment, thus facilitating a better defense plan. When planning, positioning, and determining how often ADA units are required to conduct survivability moves, units should consider the range of enemy indirect fires.

4-77. Positioning ADA units with maneuver forces (generally the case for SHORAD units) or on or near installations (generally for HIMAD units) allows the units to take advantage of physical security measures and forces on those installations. ADA units have limited self-defense capabilities and thus must rely on others for that protection. Antiterrorism and force protection considerations are extremely important given the ever-present threat of terrorist attacks and the need to protect ADA units at all echelons from becoming targets of opportunity. ADA commanders, with the assistance of the AMD chief and ADSO, should identify protection/security requirements through the protection cell working group. Once in place, ADA units should implement passive defense measures, such as camouflage and protective works, and continuously improve them as long they remain at a location. Deception, camouflage, and concealment should be used as much as possible to deny or limit the ability of enemy surveillance assets to identify sensor, weapon, and C2 components and ultimately target them. Emission control measures should be initiated to reduce the electromagnetic signatures of the sensors and command posts.

DECEPTION

All warfare is based on deception.

Sun Tzu

4-78. During preparation, planners continuously refine the deception plan based on updated intelligence and friendly information. Deception plans are adjusted as assumptions prove valid or invalid, staffs confirm enemy perceptions, or the status of friendly units change (FM 3-13.4).

4-79. Deception operations are planned and conducted at the strategic, operational, and tactical levels. They are designed to mislead enemy decision makers by distorting, concealing, and falsifying friendly intentions, capabilities, and dispositions. The objective is to induce the enemy commander to conduct activities that unwittingly serve friendly purposes and create opportunities to achieve surprise and impede enemy targeting.

4-80. ADA units plan and conduct deception activities in conjunction with movements and passive defense operations to disguise friendly capabilities and counter enemy capabilities. Extensive use of camouflage, other concealment techniques, and dispersion of ADA system components may delude an enemy as to the ADA force composition.

4-81. ADA units conduct deception in support of operations security by emission control, "blinking" sensors, and employing counter-countermeasures. Emission control of sensors in the defense limits sensor radiation until the last moment in an engagement sequence, thus reducing or denying enemy targeting. Radiating multiple sensors in a defense at different times and different locations hinders potential lock-on by anti-radiation missiles. Employing counter-countermeasure capabilities mitigates the effects of enemy jamming or other electromagnetic deception. See FM 3-13.4 for additional information on Army military deception operation.

AIR AND MISSILE DEFENSE DIRECTIVES AND AIRSPACE COORDINATING MEASURES

4-82. Commanders acknowledge and implement AMD directives once their units are deployed. Information is distributed to the lowest level ADA unit and to supported forces and other assets. Information distribution ensures that all ADA personnel and others supporting air defense operations are cognizant of the rules, guidelines, and restrictions in effect. The ADA commander relays the designated air defense warning condition (red, yellow, or white), rules of engagement, and other directives/restrictions directed by the joint force commander/AADC or an ADA higher headquarters.

4-83. Operational airspace coordinating measures, such as coordinating altitudes and no-fly zones, and air defense measures, such as weapon engagement zones, are requested by the ADA and supported commander. Requests are approved, as appropriate by the airspace control authority. Any requirements for AMD weapon engagement zones are coordinated with the supported commander and AADC. The supported commander, in turn, forwards data about restricted operations zones, such as UAS operating areas. Additional discussions are presented in paragraph 4-90 on page 113 for coordination requirements on implementing ADA aerial engagement areas.

4-84. Table 4-4 identifies coordinating measures that are most applicable to AMD operations. Air defense coordinating measures (shown as ADM) are presented first, followed by type measures that address standalone airspace, restricted operating zones (shown as ROZ), and air corridors. The order of presentation does not imply any prioritization of effort or importance of the measure relative to all other measures. For more information on airspace coordinating measures, see FM 3-52.

Table 4-4. Airspace coordinating measures

Term/Type	Definition	Planning Considerations	Additional Information
Joint Engagement Zone/ ADM	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).	• Must depend on correct differentiation between friendly, neutral, and enemy aircraft (ATP 3-52.1).	• Initiated by an AMD element. • Established by the AADC.
High-Altitude Missile Engagement Zone/ ADM	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 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).	• Initiated by an AMD element. • Established by the AADC.

Table 4-4. Airspace coordinating measures (continued)

Term/Type	Definition	Planning Considerations	Additional Information
Low-Altitude Missile Engagement Zone/ **ADM**	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).		• Initiated by an AMD element. • Established by the AADC.
Short-Range Air Defense Engagement Zone/ **ADM**	Airspace of defined dimensions within which the responsibility for engaging air threats normally rests with short-range air defense weapons (ATP 3-52.1).	• Normally established for the local air defense of high-value assets. • May be established within a LOMEZ or HIMEZ. • Plan to employ decentralized control of SHORAD weapons within the SHORADEZ (ATP 3-52.1).	• Initiated by an AMD element. • Established by the AADC.
Base Defense Zone/ **ADM**	An air defense zone established around an air base and limited to the engagement envelope of SHORAD weapon systems defending that base.	• Established with specific entry, exit, and identification, friend or foe procedures (JP 3-52). • Airspace users are provided with the location of the ADA engagement zone around a base for planning purposes. • Primarily used for forward operating bases.	• Initiated by an AMD element. • Established by the AADC.
Coordinated Air Defense Area/ **ADM**	A mutually defined block of airspace between a 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.
Weapons Free Zone/ **ADM**	An air defense zone established for the protection of key assets or facilities, other than air bases, where weapon systems may be fired at any target not positively recognized as friendly (JP 3-52).	Normally used for high-value asset defense in areas with limited command and control authority.	• Initiated by an AMD element. • Declared by the AADC. • Established by the ACA.

Table 4-4. Airspace coordinating measures (continued)

Term/Type	Definition	Planning Considerations	Additional Information
Coordinating Altitude/ Standalone	An airspace coordinating measure that uses altitude to separate users and defines the transition between airspace control elements (JP 3-52).	• The commander's airspace control elements must be capable of controlling all airspace users (including nonmilitary users) within their assigned volume of airspace. • Airspace control below the coordinating altitude is conducted in accordance with the ACP and ACO. 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 joint operations area. • A significant counterair threat in the AO should result in a lower coordinating altitude in order to provide vertical maneuver room for the control of defensive counterair. Location of the coordinating altitude should not affect AMD fires 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 directives (FM 3-52).	• ACM initiated by division, corps or theater army airspace element, normally as part of the process of establishing division assigned airspace. • Established by the ACA. • A coordinating altitude allows the airspace control authority or airspace control entity to assign a volume of airspace to another control organization. • This delegation occurs as a result of a request from supported commanders to control airspace over their AOs. It has commonly occurred when the ACA assigned airspace control authority to a ground commander's airspace control element for below the coordinating altitude • 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).
No Fly Area/ Standalone	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).	Should verify operational requirements and the appropriate airspace volume size and shape prior to establishing a NOFLY (ATP 3-52.1).	• Initiated by an ADSE/AGIE or airspace element. • Established by the ACA.

Table 4-4. Airspace coordinating measures (continued)

Term/Type	Definition	Planning Considerations	Additional Information
High-Density Airspace Control Zone/ Standalone	Airspace in which there is a concentrated employment of numerous and varied airspace users (ATP 3-52.1).	• Used to restrict a volume of airspace from users not involved with ongoing operations. It restricts airspace use because of the large volume and density of fires supporting ground operations within the described geographic area. • Careful consideration of the volume of air traffic demands is required to limit the potential conflict among aircraft needed for mission-essential. operations within the HIDACZ and other airspace users. • In establishing a HIDACZ, consider the following: minimum-risk routes into and out of the HIDACZ and to the target area; air traffic advisory as required; procedures for expeditious movement of aircraft into and out of the HIDACZ; coordinating fire support and ADA weapons control orders or status within and in the vicinity of the HIDACZ; and locations of enemy forces inside and in close proximity to the HIDACZ (ATP 3-52.1).	• Initiated by an ADSE/AGIE or airspace element. • Established by the ACA. • 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 that outside the 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).
Close Air Support/ ROZ	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.	Initiated by an ADSE/AGIE or airspace element.
Unmanned Aircraft Area/ ROZ	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).	• 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.	• Initiated by ADSE/AGIE or airspace element. • Established by the ACA.

Table 4-4. Airspace coordinating measures (continued)

Term/Type	Definition	Planning Considerations	Additional Information
Low-Level Transit Route/ Air Corridor	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).	• Avoid weapons-free zones and base defense zones in creating LLTRs. • Coordinate with intelligence elements and use planning tools to ensure the route minimizes exposure to surface air defense threats.	• Initiated by an ADSE/ AGIE or airspace element. • Established by the ACA.
Minimum-Risk Route/ Air Corridor	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).	• Primarily used primarily for cross-FLOT operations. • MRRs are established based on known threats. • ADA weapons control status is normally "tight" in MRRs (ATP 3-52.1).	• Initiated by an ADSE/ AGIE or airspace element. • Established by the ACA.

AADC	area air defense commander	HIDACZ	high-density airspace control zone
ACA	airspace control authority	HIMAD	high-to-medium altitude air defense
ACM	airspace coordinating measure	HIMEZ	high-altitude missile engagement zone
ACO	airspace control order	JFC	joint force commander
ACP	airspace control plan	JP	joint publication
ADA	air defense artillery	LLTR	low-level transit route
ADM	air defense measure	LOMEZ	low-to-medium altitude engagement zone
ADSE	air defense support element	MRR	minimum risk route
AGIE	air-ground integration element	NOFLY	no-fly (area)
AMD	air and missile defense	ROZ	restricted operations zone
AO	area of operations	SHORAD	short-range air defense
ATP	army techniques publication	SHORADEZ	short-range engagement zone
FLOT	forward line of own troops	UAS	unmanned aircraft system

4-85. In addition to the above, ADA commanders also emphasize other AMD-relevant information that must be trained, rehearsed, and coordinated with supported organizations to ensure understanding and provide mission-capable individuals and units.

- Alert states, specifying the length of time their units are required to be at various states of readiness. Alert states are defined, scheduled, and implemented.
- Weapon control statuses imposed by joint AMD or Army ADA commanders are reviewed and instituted; statuses may be different for different types of aircraft and missiles.
- Rules of engagement, with an emphasis on identification criteria, are stressed to support successful engagements and minimize incidents of fratricide.
- Firing doctrine is established, and fire control orders are reviewed.

4-86. Leaders are briefed on the mode of control in effect (centralized or decentralized) and the ramifications of a change. The what's and how's are discussed, and specific responsibilities are identified and assigned. Special attention is given to the potential for autonomous operations. Primary, alternate, contingency, and emergency (known as PACE) communication procedures are reinforced.

4-87. Communication networks are implemented with the supported element.

- Effective communication is essential when operating in the complex and ever evolving AMD operational environment. Information exchange fosters shared situational awareness and force survivability, which are critical to mission success.
- The information being transmitted must be timely, relevant, and, most importantly, must equal the information being received. Command networks provide for the coordination of operations with the supported units. Early warning networks trigger alerts of potential air or missile surveillance or attacks.

4-88. Outages to networks must be addressed immediately. When outages do occur, established degraded communication procedures must be followed to ensure safe and effective continuity of operations until networks are restored. One way to deal with degraded communications is through primary, alternate, contingency, and emergency (known as PACE) communication planning. The PACE plan identifies the methods of communications, typically from higher echelons to lower echelons, to be used. A good plan establishes redundancy so that communications are always available.

NEW AIR DEFENSE ARTILLERY COORDINATING MEASURES

4-89. The introduction of M-SHORAD units into divisions has resulted in the need to consider additional air defense coordinating measures. Terms are being conceptualized that will establish increased coordination of air defense operations within SHORAD forces and with the supported force. The terms are similar to those used by other fires organizations to coordinate operations between fire support systems and with the supported force. In this case, the terms are used to coordinate air defense operations for SHORAD units, between SHORAD and other ADA units, and with the supported division or BCT.

4-90. These terms are—

- *Position Area for Air Defense* **is an area assigned to an air defense artillery unit where individual air defense artillery systems can maneuver to increase their survivability**. A position area for air defense is not an area of operations for the ADA unit occupying it.

- **An aerial engagement area** is a fluid control measure that identifies the engagement parameters of DIVAD units supporting maneuver formations. It can be considered a corollary to a short-range air defense engagement zone (known as a SHORADEZ) or low-to-medium altitude engagement zone (known as a LOMEZ). (See table 4-4 on page 108 for more information on these.) A SHORADEZ or LOMEZ is generally established around a fixed site, such as an air base or ports of entry. An aerial engagement area is established to defend semi-fixed and mobile elements, such as forward arming and refueling points (known as FARPs) and maneuver concentrations. An engagement area is bounded vertically by the coordinating altitude and horizontally by the kinematic range of the SHORAD weapon or weapons. It is generally a temporary area which is shifted as the defended asset moves or is no longer considered a priority for defense. Engagement areas must be authorized by the supported division or brigade commander. Engagement areas require extensive coordination with the supported asset, DIVAD headquarters, division staff, and airspace control/management elements in the area of operations before being executed.

- **An air defense coordination line** provides a forward boundary on the ground within which ADA units conduct engagements of air threats and beyond which other Army, joint, and multinational AMD entities may engage air threats, given proper authorizations. It adds a border to a coordinating altitude. The coordinating altitude provides a separation of authorities and requires coordination to execute fires that cross it. The air defense coordination line will help to create the same type of delineation of authorities and responsibilities as the coordinating altitude vertically as does a fire support coordination line, but in the horizontal plane. It is primarily focused on engagements conducted below the coordinating altitude and used to facilitate rapid target prosecution. The air defense coordination line can currently be used to coordinate engagements between Patriot and Avenger units in an ADA task force that may be placed in support of a corps. In this situation, the coordinating authority is the corps commander, as the airspace owner for that airspace below the coordinating altitude. The ADA task force commander, in concert with the corps commander, issues directives that delineate which system engages which target. However, in a high-density air threat environment where multiple enemy fast-moving manned aircraft are transiting below the coordinating altitude toward a defended asset, either Patriot or Avenger may need to engage first or both simultaneously. Coordination between the two units is required to ensure engagements, without redundancies and excessive missile expenditures. With the projected fielding of the Integrated Fire Protection Capability system in the next few years, the air defense coordination line will allow for the separation of engagements between Integrated Fire Protection Capability and DIVAD units, both of whose capabilities include beyond-line-of-sight engagements.

- **An air defense coordinated fires line** is a line beyond which conventional surface-to-air fires and effects may fire at any time within the boundaries of the establishing headquarters without additional coordination but does not eliminate the responsibility to coordinate the airspace required to conduct the mission. The air defense coordinated fires line extends up to the coordinating altitude vertically.

Note. The air defense coordination line and air defense coordinated fires lines are comparable to the fire support coordination line and coordinated fire line. For more information and graphics of these, see FM 3-09, pages B-1 through B-5.

AIRSPACE COORDINATION AND MANAGEMENT

4-91. Army airspace management and control functions involve identifying, coordinating, integrating, deconflicting, and regulating the use of Army and joint airspace. Army airspace management ensures that airspace users are synchronized in time, space, and purpose interdependently with joint and multinational forces. The ADSE, formerly known as air defense airspace management (ADAM) cells, are part of the airspace control element assigned to BCTs and AMD sections at the division and corps.

4-92. The ADSE is typically collocated with the air-ground integration element. The air-ground integration element works with field artillery, aviation personnel, and other Service representatives at echelon to facilitate airspace deconfliction and clearance of fires. The ADSE and air-ground integration element perform airspace management functions. The distinct and shared functions of each, as presented in FM 3-52, are displayed in table 4-5 below.

Table 4-5. Air defense support element and brigade aviation element functions

ADSE	*Shared*	*AGIE*
• Plan and synchronize AMD operations with the concept of operations. • Produce the integrated air picture. • Plan low-level sensor employment. • Develop and maintain ADA overlays, to include unit locations, weapon control status, and weapon system coverage.	• Plan for airspace use, execute near-real-time control during execution, and monitor operations of airspace users. • Analyze airspace use to determine and resolve conflicts. • Review immediate airspace coordinating measure requests for conflicts with current operations. • Request, maintain, and disseminate joint airspace coordinating measures. • Develop and coordinate the airspace control appendix.	• Plan and synchronize aviation with the concept of operations. • Advise and plan the use of UASs, reconnaissance, attack, assault, air movement, sustainment, and medical evacuation. • Standardize BCT UAS employment.
ADA air defense artillery ADSE air defense support element AGIE air-ground integration element	AMD air and missile defense BCT brigade combat team UAS unmanned aircraft system	

4-93. Responsibilities for airspace management vary dependent upon echelon, volume of airspace, and time. The corps AMD section for instance, is more involved with planning airspace usage and coordinating that usage with joint airspace planners. The divisional AMD section supports the planning and execution of divisional air operations as part of the joint air ground integration cell. The BCT ADSE is focused on the execution of airspace usage, such as deconfliction and clearance of fires.

4-94. Airspace must be cleared to allow uncontested operations by the multitude of airspace users, avoiding time and space conflicts. Air-ground integration element personnel contact the joint air ground integration center for clearance. These agencies include the Air Force control and reporting center, radar approach control, and air traffic control agencies. Responsibilities of these agencies are generally defined by the established coordinating altitude. Most fires exceed the coordinating altitude and therefore must be cleared by the control and reporting center and radar approach control. Clearance must be obtained from the control

and reporting center because it controls tactical military aircraft, and from the radar approach control because it has control of commercial and non-tactical military aircraft. Air traffic control agencies control their defined airspace below the coordinating altitude. Once each agency clears its airspace, the air-ground integration element /ADSE can acknowledge that the airspace is cleared for the designated operation.

4-95. Additional deconflictions of the airspace are conducted by ADA, aviation, and field artillery Soldiers to mitigate potential fratricide of aircraft and other friendly air users and minimize the interruption of ongoing operations. Such operations include aircraft transiting the area below the coordinating altitude, ADA units conducting engagements of air or missile threats, field artillery units executing fire support missions, and maneuver units conducting UAS surveillance missions. The ADSE maintains awareness of friendly UAS operations and keeps supporting ADA units informed of these. UASs at division and brigade levels tend to be used for multiple missions and need to be able to maneuver over the battlefield with relatively few restrictions. The ADA, aviation, and field artillery Soldiers, enabled by a common air picture, maintain situational awareness. They are cognizant of the locations, plans, and activities of other users to enable the greatest use of the airspace with minimal conflicts. Where potential conflicts might exist, the ADSE and air-ground integration element facilitate the commander's priority efforts.

SUMMARY

4-96. A summary of the key AMD operations tasks conducted during the preparation phase is presented in table 4-6. Like the tasks identified in the summary of planning tasks, the preparation tasks are representative of those that are conducted across the ADA force, though not necessarily by each of the ADA echelons.

Table 4-6. Air and missile defense preparation tasks

PREPARE	• Coordinate with the supported commander. • Coordinate with joint and multinational AMD forces. • Task organize forces. • Conduct reconnaissance of prospective positions and the routes leading to them. • Position radars and weapons. • Implement appropriate deception measures. • Establish sensor communications and early warning networks. • Implement identification and engagement authorizations, weapons control statuses, air defense warnings, and rules of engagement. • Implement airspace control orders and special instructions. • Implement alert states/readiness conditions. • Participate in and support management of the airspace. • Conduct ADA-specific rehearsals/ROC drills and coordinate activities with the supported force. • Conduct surveillance of the airspace. • Refine a defense plan and adjust positions as required. • Finalize the operation plan.
ADA air defense artillery	ROC rehearsal of concept
AMD air and missile defense	

SECTION IV – EXECUTION

In order to make assured conquests, it is necessary always to proceed within the rules, to establish yourself solidly, to advance and establish yourself again, and always prepare to have within reach of your army your resources and your requirements.

Frederick the Great

4-97. In AMD, execution entails operations that address engagements of air and missile threats, support to targeting, sustainment functions, and coordination and integration achieved through reports. AMD execution is focused on the engagement of aerial threats.

ENGAGEMENT OPERATIONS

4-98. *Engagement operations* **are functions and activities required to execute the air, missile, and counter-surveillance battle.** Ground- or air-based sensors, or combinations of both when available, enable engagement authorities to make timely decisions.

4-99. These engagement authorities function as a vertically and horizontally integrated kill chain. Engagement decisions are made by the designated engagement authority in the joint kill chain, providing operational control of and, ultimately, directions to the weapon. Integrated sensors, weapons, and C2 networks will allow for greatly increased engagement options. As such, engagement authorization must be delegated to the lowest level possible, in accordance with METT-TC (I).

4-100. Proactive engagements are conducted in accordance with theater-level ROE and complementary directives. Engagements are executed by the weapon that can best deliver the appropriate effects to achieve maximum attrition at the right time and place, and as far forward as possible, to ensure keep-out ranges and keep-out altitudes. A *keep-out range* **is the horizontal distance from a defended asset at which a successful engagement denies an adversary's desired weapons effects against the defended asset.** A keep-out range is a key defense planning consideration for cruise missiles and UASs. It allows ADA systems to counter enemy air surveillance and reconnaissance platforms beyond the range at which they can surveil an asset and beyond the engagement capability of a defending ADA system, contributing to the overall ability of friendly forces to see first. A *keep-out altitude* **is the vertical distance above a defended asset at which a successful engagement denies an adversary's desired weapons effects against the defended asset**. A keep-out altitude is a major planning consideration for ballistic missiles. Weapons may use different methods of fire, depending upon the type of system. (See table 4-8 on page 118 for descriptions of the methods). The method of fire can be stipulated in operation plans, directed by the joint kill chain, or influenced by the situation. Coordination is accomplished by ADA C2 elements to ensure the threats are overmatched by ADA weapons, facilitating their destruction while simultaneously mitigating the potential for fratricide of friendly and neutral aircraft.

4-101. Non-dedicated air defense constitutes another element of Army AMD that can provide vital defense against air threats and contribute to the freedom of maneuver for friendly forces. Maneuver forces can effectively engage groups 1 and 2 sUASs and hovering or slow-moving helicopters within their weapon systems' ranges. Stinger teams organic to maneuver formations further enhance this capability. The ADSE in a maneuver brigade supports the non-dedicated elements in understanding and implementing appropriate ROEs. Intelligence enables cyberspace and electromagnetic warfare elements to electronically attack air targets. Intelligence elements can also provide or assist in the surveillance, identification, and classification of air targets, facilitating early warning.

4-102. **The *engagement sequence* is the successive actions taken by all of the Services' air and missile defense systems in the engagement of aerial threats.** Terms in the sequence differ by Service but capture similar actions. The ADA engagement sequence terms are sense, track (to include identify), target, engage, and assess. These constitute the memory aid ST2EA. Table 4-7 presents descriptions of the terms.

Table 4-7. Engagement sequence

Terms	*Descriptions*	*Additional Information*
Sense	Sense provides for the systematic surveillance of the airspace by electronic, visual, or other means, primarily for the purpose of identifying and determining the movements of friendly and enemy aircraft and missiles in the airspace.	ADA radars, with complementary support by other Army and joint sensors, are the primary means in sensing the airspace.

Table 4-7. Engagement sequence (continued)

Terms	Descriptions	Additional Information
Track	• Track is the process of displaying or recording the successive positions of a moving object. • An inherent part of tracking is identification. • *Identification* is the process of determining the friendly or hostile character of an unknown detected contact (JP 3-01). Embedded with identification are distinct tasks dealing with classification and discrimination.	• Track reports are rendered by locations and headings. • ***Classification* is the process of characterizing a detected object by its type, model, variant, nationality, and any other distinguishing feature or attribute.** Classification, for instance, establishes a track as a cruise missile. • ***Discrimination* is the process to distinguish real objects of interest from other objects or phenomenon and military objects from those that are not.** For example, discrimination differentiates between an enemy air platform and a decoy.
Target	• Targeting includes threat evaluation and weapons assignment. • ***Threat evaluation* is the process of determining the threat's intended target, predicted impact point upon the defended asset, and arrival time.** • Weapons assignment provides the right unit and weapon (such as a missile or gun) to engage the threat paired to an appropriate sensor, if needed, to support the engagement.	• Weapons assignment can be based on the location of the ADA unit or system, preferred area where an engagement should be conducted, or an ADA system's capability. • Sensors may be able to support multiple types of weapons (for example, Sentinel can support M-SHORAD, Avenger, and counter-indirect fire systems' detection and acquisition) or may be designed to specifically support engagements of one weapon system, such as Patriot. • Weapons may need in-air engagement support from a sensor (such as the Patriot radar) or may be "fire and forget" (such as the Stinger missile), meaning that once the missile is launched it uses on-board guidance and homing capabilities to close with and intercept the air and missile threat.
Engage	• *Engage*, in air and missile defense, is a fire control order used to direct or authorize units and/or weapon systems to attack a designated target (JP 3-01). • Actions require authorizations issued by an engagement authority (such as the AADC, ADA task force commander, Air Defense Artillery Fire Control Officer where appropriate) or prescribed in ROE.	• Engage commences with the initiation of missile launch or trigger pull of a gun, or the activation of a non-kinetic weapon system; it concludes with the impact of a missile (hit-to-kill), bullets, or fragments from a detonating warhead (arming and fusing of the kill mechanism, explosion of the warhead, dispersal and travel of warhead fragments, and impact of fragments), or visible mission-defeating effects on the threat aerial system. • It can also encompass the commitment of non-dedicated air defense assets to attack air threats.
Assess	In the air and missile defense engagement sequence, the analysis of the effectiveness of the engagement and of the potential for reengagements.	Assess allows a fire control officer or gunner to determine if the target was incapacitated or destroyed. If not, the fire control officer or gunner may be authorized to reengage that target or directed to switch to a target of higher priority.
Note: Definitions for which this publication is the proponent are bolded.		
AADC area air defense commander ADA air defense artillery		M-SHORAD Maneuver Short-Range Air Defense ROE rules of engagement

METHODS OF FIRE

4-103. The operational environment, level of protection required, and time considerations to determine the method of fire used by ADA units during engagements. ***Methods of fire* are the firing options for ADA weapons employed against air and missile threats.** There are four methods of fire: shoot-new target-shoot, shoot-look-shoot, ripple, and salvo. The method of fire selected provides the statistical probability of achieving the desired defense goals, such as achieving less than 10-percent leakage.

4-104. Table 4-8 presents descriptions of the methods of fire.

Table 4-8. Methods of fire

Term	Description	Additional Information
Shoot-new target-shoot	A shot (missile launched or volley of gun rounds fired) is taken against one threat, and the weapon immediately is assigned to a different target without consideration of the effect of the preceding shot.	Apply this method of fire primarily to fire-and-forget weapons, such as Stinger, in heavy saturating attacks or when the engagement timeline does not permit a re-engagement of the threat just engaged.
Shoot-look-shoot	After the first shot has been fired, the operator/gunner/system evaluates the engagement. If the target is not destroyed and the operational environment and time permits, another shot is fired.	
Ripple	Two or more missiles or volleys of gun rounds are fired in predetermined intervals from the same or multiple launchers or guns based upon the threat.	Use this method of fire to achieve a desired probability of engagement effectiveness or to negate threat tactics; for example, one missile is fired against a ballistic missile at relatively high altitudes before aerodynamic maneuvers are likely, and one is fired at medium altitudes after aerodynamic maneuvers have likely been completed.
Salvo	Two missiles or volleys of gun rounds are fired near-simultaneously from different launchers or guns.	Use this method of fire if there is insufficient time for a shoot-look-shoot or ripple engagement and when multiple engagements are necessary to achieve the desired probability of engagement effectiveness.

FIRING DOCTRINE

4-105. ***Firing doctrine* is the application of the methods of fire to achieve the required level of engagement effectiveness.** It is implemented in accordance with the priority of the defended assets and the number of available interceptors relative to the number of attackers. It can have situational variations from the method of fire selected.

4-106. Patriot, for example, may select ripple fire against a ballistic missile that is part of a massed raid. The first shot of the ripple occurs in accordance with the selected method of fire. The second shot may be preempted by the need to shoot higher priority threats. THAAD may use shoot-look-shoot, but the first or the last shot may be ripple fire or salvo fire depending upon engagement timelines and supporting ballistic missile defense fires. M-SHORAD and Avenger systems, mounting Stinger missiles, typically use shoot-new target-shoot. M-SHORAD's gun system may also use this method, with firing conducted until the target is disabled or destroyed. Another example is, a composite unit, with multiple effectors, may use a layered approach to engage a threat. The first shot at a ballistic missile may be shoot - look -shoot from THAAD, Aegis, or both and the final shot(s) may be a ripple fire from Patriot. A composite unit may also choose to

use a specific effector based on capability against a particular threat type using a pre-planned response/firing doctrine.

SECTORS OF FIRE AND PRIMARY AND SECONDARY TARGET LINES

4-107. A *sector of fire* is that area assigned to a unit, a crew-served weapon, or an individual weapon within which it will engage targets as they appear in accordance with established engagement priorities (FM 3-90). Sectors of fire are specified by left and right limits in azimuth. Sectors are designated at ADA battalion level for Patriot and THAAD units and platoon level for SHORAD units. Sectors of fire are a part of a comprehensive sensor and weapon plan that provides optimum radar coverage of the defined area and effective use of available ADA weapons.

4-108. Primary and secondary target lines are established within the sectors. Primary and secondary target lines are used to orient ADA weapons and sensors in the direction of the aerial threat. Operational environments can result in more than two target lines, and, in some cases, some deployed units can have multiple target lines that enable balance of fires. Pre-planned target lines assist in the swift execution of SHORAD fires, and with HIMAD fires allow fire units to rapidly orient to threats based on cueing data.

- A *primary target line* is an azimuth assigned to a weapon system or unit along which the system fire control personnel and or gunners focus their attention. Place primary target lines along the centerline of the assigned sector of fire to assist in the distribution of AMD fires.
- A *secondary target line* is a pre-planned alternative target line used to shift the orientation of fires to assure all likely threat avenues of approach are adequately defended. Designate multiple secondary target lines to either side of the primary target line when an ADA unit must defend adjoining areas.

SUPPORT TO THE TARGETING PROCESS

4-109. The AAMDC attack operations section supports the joint force land component commander and joint force air component commander in identifying and developing enemy air and missile targets on the ground for attack operations. The section coordinates with their targeting teams to address AMD objectives in the joint force commander's targeting strategy, and coordinates through the joint force land or air component commander's targeting personnel to implement a coherent joint theater AMD attack plan. The section enables the deputy AADC to support the joint force air component commander by helping to synchronize the targeting efforts against the air and missile threats on the ground and providing AMD focus to Army deep operations within the joint force land component commander's operating environment.

4-110. The air defense coordinators at the BCT and higher levels are involved in the deliberate targeting process through participation in the targeting working groups, targeting board, and assessment working groups. The air defense coordinator supports the collection of information to confirm or deny potential named areas of interest using ADA radars and to nominate targets for attack operations.

4-111. Unscheduled and unanticipated targets are prosecuted via dynamic targeting. *Dynamic targeting* is targeting that prosecutes targets identified too late, or not selected for action in time to be included in deliberate targeting (JP 3-60). Air defense coordinators can also support attack operations (counterfire) in the brigade area by transmitting sensor back plot information (information that identifies the point of origin of incoming fires). Sensor data is forwarded to fire support officers for execution of immediate fires. For more information on dynamic targeting, see ATP 3-60.1.

4-112. In addition to direct participation in targeting process activities, ADA sensors confirm named areas of interest, so that they can become target areas of interest for prosecution. ADA sensors can also provide potential time sensitive targets, such as identifying a forward arming and refueling point or UAS launch/recovery site that was not previously observed. ADA further contributes to targeting by defending field artillery target acquisition radars that are required to detect targets and deliver ordnance. Target acquisition radars are generally considered a high priority asset by maneuver commanders.

SUSTAINMENT

4-113. Sustainment activities are conducted at all ADA echelons in coordination with their respective higher headquarters, supported commands, and supporting sustainment elements. ADA units primarily rely on their

higher headquarters for AMD-specific sustainment, such as parts and munitions, and on their supported units for typical Army sustainment needs, such as food, maintenance of vehicles and generators, and petroleum products.

4-114. Representative sustainment actions for the AAMDC, ADA brigade, ADA task force, and ADA battery follow. Identified tasks are not inclusive or conducted by only one of the cited organizations.

ARMY AIR AND MISSILE DEFENSE COMMAND

4-115. The AAMDC headquarters plans and coordinates Army, joint, and multinational sustainment for land-based AMD forces and supervises execution of sustainment through its subordinate ADA brigades. Sustainment support must be coordinated in detail and in advance as much as possible. The AAMDC examines sustainment requirements to position land-based AMD forces in sufficient time and quantities to meet the joint force commander's needs in seizing and maintaining the initiative to defeat the enemy.

4-116. The AAMDC must provide a sustainable force that enables supported commanders to optimize their operations while minimizing adverse impacts from possible air and missile attacks. The AAMDC's primary and special staffs provide specialized operational, administrative, and logistical support for its task-organized ADA units. This includes all types of support unique to the theater, from force protection to supply chain management, communications and network operations, and diplomatic and host nation coordination. The AAMDC also coordinates with the theater sustainment command for sustainment support. The theater sustainment command manages requirements for sustainment and the physical flow of forces, equipment, and cargo to meet the daily operational requirements of the Army service component command. For more information, see ATP 4-93.

4-117. AAMDC planners in developing sustainment plans must consider and analyze the operational environment to account for ground and air threats that may impact friendly infrastructure and the availability of resources. This should ensure that adequate support is planned and available for sustainment, resupply, and reconstitution activities throughout all phases of an operation.

4-118. The AAMDC commander can establish priorities of support by phase of an operation or change priorities during operations to ensure that operational and force sustainment is provided in accordance with their relative importance to accomplishing the mission. Changes by phase to the defended asset list, or reprioritization of critical assets on the list, will normally affect support priorities and require continual assessment by the staff.

AIR DEFENSE ARTILLERY BRIGADE

4-119. In the absence of an AAMDC, the ADA brigade assumes responsibilities normally associated with the AAMDC in planning, preparing, executing, and sustaining AMD operations. When an AAMDC is present, the ADA brigade headquarters generally oversees two sustainment related responsibilities. First, the brigade assesses all the sustainment requirements across subordinate units and directs specific sustainment responsibilities to subordinate headquarters based on METT-TC (I). A subordinate battalion may be directed to assume sustainment responsibilities, such as logistics support and force protection, for non-organic subordinate batteries. Second, the ADA brigade coordinates sustainment support for joint/multinational AMD forces within the brigade's area of operations. The combination of these two responsibilities ensure that all sustainment functions are properly provided for subordinate joint/multinational AMD units. In cases where a particular sustainment function is inadequate for a subordinate unit, the brigade should seek the assistance of the AAMDC to secure the appropriate resources.

4-120. The ADA brigade relies on the expeditionary signal battalion and subordinate companies to augment its organic capabilities and extend communications to its subordinate ADA units throughout the area of operations. The expeditionary signal company provide such capabilities as wideband and protected satellite communications transport, beyond-line-of-sight troposcatter network transport, high-throughput line-of-sight transmission, and access to the Defense Information Systems Network's voice, data, and video services. For more information on signal support, see FM 6-02.

AIR DEFENSE ARTILLERY TASK FORCE

4-121. An ADA task force must pull the appropriate level of sustainment support from the peacetime battalion organization. This support includes system-specific maintenance parts and maintainers, as appropriate, for the mix of ADA sensors and weapons in the task force.

4-122. Planning for sustainment of dispersed elements of the ADA task force considers the availability of support from the supported unit. Most supported units can provide some level of common Army support, but do not have the capability of providing system-specific support. For example, a supported unit, with proper planning, coordination and collaboration, can provide fuel support to a DIVAD battery, but not necessarily weapon system parts.

4-123. Security of dispersed or remote ADA units is inextricably linked to sustainment. For example, Sentinel radars positioned forward of a defense, to provide extended early warning, must be protected as well as sustained. Security must include supply routes to and from the Sentinel site and the site itself. These and related requirements should be addressed in Protection working groups and reflected in the scheme of protection.

AIR DEFENSE ARTILLERY BATTERY

4-124. An ADA task-organized battery typically deploys with the ability to sustain itself for 72 hours; after that, it requires external support from higher headquarters or other support systems in general. The ADA task-organized battery employs the Army's two-level maintenance system, consisting of field maintenance and sustainment maintenance. Field maintenance is characterized by on-system maintenance-repair and return to user-while sustainment maintenance is off-system maintenance - repair and return to supply.

4-125. The ADA task-organized battery commander is responsible for all administrative and logistical functions within the ADA task-organized battery, supported by the executive officer, supply non-commissioned officers, system and conventional technicians, and, in most cases, system-specific or conventional maintenance warrant officers. The executive officer is responsible for supply, maintenance, services, and transportation of unit personnel and equipment and should organize and take advantage of all assets available.

4-126. The battery commander can ensure flexibility by tailoring methods of sustainment and should not allow the organization to be bound by traditional support methods. The commander must know the logistical requirements of the battery and the details of operation plans and devise innovative ways to support the plans and reduce risks. The ADA task-organized battery must be flexible enough to obtain support from any base arrangement and accomplish its mission.

REPORTING

4-127. Various reports are required as soon as deployment alerts are received. Requested reports can address all aspects of preparation, readiness, certifications, personnel, training, deployments, planning, headquarters and unit locations, communications, weapons statuses, and future planning. Some reporting is formal, and some is more coordination oriented to assure synchronization with supported forces.

4-128. AMD-specific reports reflect the posture of ADA units and their capability to defend designated assets in Army and joint operations. AMD reports include unit locations, equipment status, sustainment, engagement results, and aspects of other operational reports, such as future maneuver force plans. Unit location reports allow higher ADA units to understand where subordinate ADA units are positioned and, upon repositioning to support a change in mission for instance, the new locations. While unit locations may be directed, actual unit positions can be altered, given terrain constraints or a supported commander's guidance. Equipment status reports identify the operational status and availability of the ADA unit's major items of equipment, with a focus on those items required to conduct engagements. It also addresses battle damage to major components. and the need for additional missiles/ammunition. Sustainment reports delineate the status of fuel, missiles and ammunition, repair parts, and other logistical needs. Engagement reports summarize the number of engagements by type aerial object, engagement results, and expenditures of missiles/ammunition.

4-129. The ability to gather and process information from such reports from subordinate units allow ADA commanders and their staffs to see and understand the air battle. This is particularly critical as maneuver forces execute offensive operations.

SUMMARY

4-130. A summary of the key execution tasks is presented in table 4-9. The tasks are representative (not inclusive) of those that are conducted by ADA units and systems.

Table 4-9. Air and missile defense execution tasks

EXECUTE	Engage • Sense and track aerial objects. • Classify/discriminate/identify aerial objects. • Target air and missile threats using an appropriate weapon system to conduct the engagement. • Determine impact area. • Clear the target area. • Order the engagement. • Conduct the engagement in accordance with the AMD control measures. Sustain • Anticipate needs. • Coordinate with the supported force and sustainment commands/enabling organizations. • Address manning, arming, fueling, fixing, and moving. • Implement reconstitution activities where and when appropriate. Support to the Targeting Process • Synchronize the targeting efforts against the air and missile threats on the ground. • Collect information/nominate targets for attack operations. • Transmit radar back-plot information to FSOs to support counterfires. • Defend high-priority FA radars. Reporting • Develop and submit reports addressing unit locations, equipment status, sustainment, engagement results, and aspects of other operational reports, such as future maneuver force plans. • Coordinate and exchange reports with supported units. • Facilitate synchronization of efforts through timely and accurate reporting.
AMD air and missile defense FA field artillery FSO fire support officer	

SECTION V – ASSESSMENT

4-131. Assessment is a continuous activity throughout all phases of the operations process. ADA commanders and leaders require analyses and assessments of different options, many of which are inextricably linked, during operations to inform decisions. Information and assessments of the most likely or most dangerous aerial threats influence how commanders task organize their units and create defenses to deny aerial attacks and surveillance. They also impact selection of the best employment tenets to achieve the most advantageous positions in a defense. Assessments of levels of protection guide ADA commanders' recommendations to supported commanders on which assets can be defended with available ADA units. Assessments of risk are weighed against leaving some of the supported commander's critical assets without active AMD. The supported commander must understand this and acknowledge that defense of some of his priority assets must be conducted through passive measures and organic non-dedicated air defense capabilities. Risks to the supported force, as well as the ADA force, must be a constant consideration.

4-132. ADA commanders typically assess those specific operations or tasks that they were directed to accomplish. Readiness—personnel, equipment, supplies, and morale—and Solider/unit proficiencies are paramount considerations. Assessment activities, as noted in ADP 5-0, include—

- Monitoring the current situation to collect relevant information. Continuously observe conditions relevant to the current operation. Monitoring allows staffs to collect relevant information, focusing on that information about the current situation described in the commander's intent and concept of operations.
- Evaluating progress toward attaining end state conditions, achieving objectives, and performing tasks. Evaluating is using indicators to judge progress toward desired conditions and determining why the current degree of progress exists (ADP 5-0). Evaluation is at the heart of the assessment process where most of the analysis occurs. Recommending or directing action for improvement.
- Monitoring and evaluating are critical activities; however, assessments are incomplete without recommending or directing actions.

4-133. ADP 5-0 indicates that there is no single way to conduct an assessment, as every situation is unique. It identifies the following steps as guides in the development of an effective assessment plan and assessment activities during preparation and execution. The phase(s) of the operations process associated with each step is noted. For additional details, see ATP 5-03.

- Step 1 – Develop the assessment approach (planning).
- Step 2 – Develop the assessment plan (planning).
- Step 3 – Collect information and intelligence (preparation and execution).
- Step 4 – Analyze information and intelligence (preparation and execution).
- Step 5 – Communicate feedback and recommendations (preparation and execution).
- Step 6 – Adapt plans or operations (planning and execution).

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Chapter 5

Air Defense Artillery in Competition and Crisis

In any moment of decision, the best thing you can do is the right thing, the next best thing is the wrong thing, and the worst thing you can do is nothing."

President Theodore Roosevelt

This chapter begins with an explanation of the Army strategic contexts in relation to the joint competition continuum. It continues with descriptions of AMD activities in the competition and crisis phases. Section II discusses joint and Army activities and their ADA implications during competition below armed conflict. Section III addresses escalation from competition to crisis, ADA in crisis situations, and transition from crisis back to competition or escalation to armed conflict.

SECTION I – ARMY STRATEGIC CONTEXTS

5-1. The United States employs the military instrument of national power in support of strategic objectives. As national policy varies across the competition continuum, so may the application of violence. Elements of the competition continuum consist of cooperation, competition, and armed conflict/war (JP 3-0). Elements of the competition continuum are operationalized by the Army across four levels of warfare (FM 3-0). These four levels define and clarify the relationship among national objectives, the operational approach, and tactical tasks.

- National strategic level: addresses national, global, and theater strategy.
- Theater strategic level: addresses theater strategy, campaigns, and major operations.
- Operational level: addresses campaigns, major operations, and battles.
- Tactical level: addresses battles, engagements, and small unit and crew actions.

5-2. While the elements of the competition continuum serve as a useful framework for joint and multinational operations on a global scale, the Army typically conducts operations within a context dominated by one strategic relationship at a time. Therefore, Army doctrine describes the strategic situation through three contexts in which Army forces conduct operations (figure 5-1):

- Competition below armed conflict.
- Crisis.
- Armed conflict.
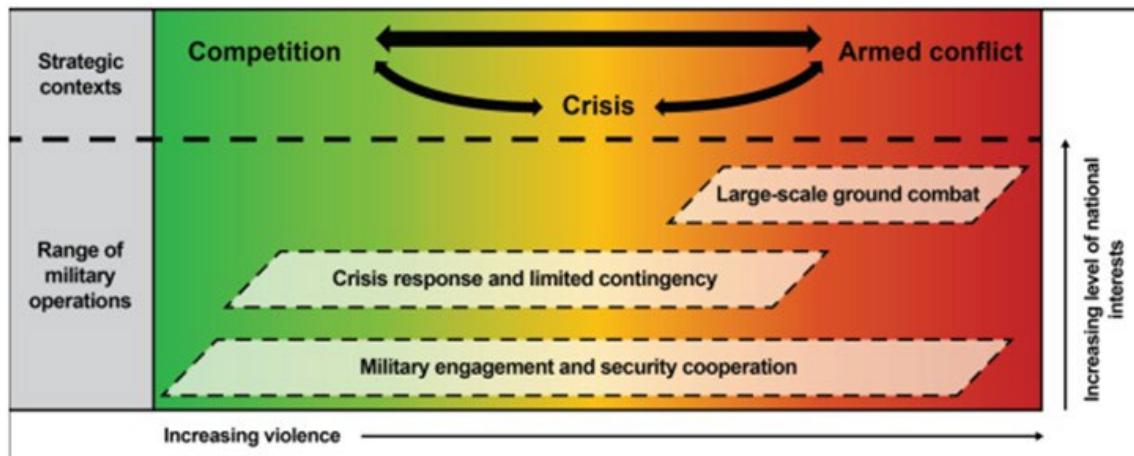
Figure 5-1. Army strategic contexts and operational categories

5-3. The Army strategic context generally corresponds to the elements of the joint competition continuum and the requirements of joint campaigns. Competition below armed conflict is deliberately intended to include military engagement and security cooperation because of its projected effect in a theater. The crisis strategic context accounts for the transition period between competition below armed conflict and armed conflict, characterized by both crisis response and limited contingency operations

COMPETITION BELOW ARMED CONFLICT

Our pleas for peace are measured not by the sincerity with which they are spoken but by the strength we can array to enforce them.

General Omar N. Bradley

5-4. Competition below armed conflict exists when two or more state or non-state adversaries have incompatible interests, but neither seeks armed conflict. Nation-states compete with each other using all instruments of national power to gain and maintain advantages that help them achieve their goals (FM 3-0).

5-5. Senior leaders balance policy objectives with the means to achieve them, and many situations are not solvable by military means. However, competition below armed conflict is a fundamental aspect of international relations. Therefore, Army forces operate in competition below armed conflict as part of a comprehensive approach, focused on the implementation on non-coercive strategies. Army forces can be applied in competition to support regional security cooperation, assure allies and partners, deter adversaries, and to coerce or force enemies and adversaries to comply with U.S. Government demands.

CRISIS

5-6. A *crisis* is an incident or situation involving a threat to the United States, its citizens, military forces, or vital interests that develops rapidly and creates a condition of such diplomatic, economic, or military importance that commitment of military forces and resources is contemplated to achieve national objectives (JP 3-0). During crisis, armed conflict has not yet occurred, but it is either imminent or a distinct possibility that requires rapid response by forces prepared to fight if deterrence fails. Crisis can be both long in duration or nearly simultaneous in transition to armed conflict (FM 3-0).

5-7. Army forces contribute to crisis through activities and actions taken to compel an adversary to deescalate aggression and return to competition under conditions acceptable for the United States and its allies or partners (FM 3-0). Army forces help the joint force maintain freedom of action and associated positions of relative advantage through the activities they conduct and their presence on the ground.

ARMED CONFLICT

5-8. Armed conflict occurs when a state or non-state actor uses lethal force as the primary means to satisfy its interests (FM 3-0). Entering and terminating armed conflict is a political decision. At the onset of armed conflict, forward-positioned Army forces may defend key terrain or infrastructure while seeking opportunities to gain the initiative or reposition to more favorable locations with partner forces. Army forces help the joint force commander gain and maintain the initiative, defeat enemy forces on the ground, and consolidate gains to establish conditions for a settlement favorable to U.S. interest (FM 3-0).

SECTION II – AIR DEFENSE ARTILLERY IN COMPETITION BELOW ARMED CONFLICT

5-9. The primary role of ADA during competition is to provide senior leaders with flexibility and options through presence, access, and influence. Through this role, ADA enables joint force agility throughout the competition continuum and through Army strategic context transitions. AMD activities in competition include—

- Setting the theater.
- Building allied and partner capabilities and capacity.
- Improving joint and multinational interoperability.
- Defending forward-stationed forces.

- Preparing to transition and execute operation plans.
- Training and developing leaders for operations in specific theaters.

SETTING THE THEATER

5-10. *Setting the theater* is the broad range of activities continuously conducted to establish conditions for the successful execution of operation in a theater (ADP 3-0). Theater campaign plans implemented at each echelon enable these types of activities, which require contributions from each warfighting function. For more information about the land component's responsibilities for setting the theater in conflict, refer to JP 3-31 and JP 3-35.

5-11. ADA plays a distinctly important role in setting the theater. Army air and missile defense commands (AAMDCs) plan and prepare for armed conflict with both the joint force land component/ARFOR commander and the joint force air component commander. These plans include agreements for basing and access in various theaters around the world that typically require AMD capability. ADA units improve positions by focusing on passive defense measures to enable survivability during rapid transitions to crisis or armed conflict. Air defenders improve communications networks and fighting and sensor positions which maximize survivability and detection. The AAMDC attack operations cells work with the joint force land component/ARFOR and the joint force air component headquarters to plan deterrent or offensive fires that prevent future attacks or attrition of ADA units.

5-12. Forward-stationed ADA units are preeminent considerations in setting the theater. These units contain HIMAD capabilities found in the Patriot, Terminal High Altitude Area Defense (THAAD), and AN/TPY-2 forward-based mode radar systems. Patriot units, for instance, have been forward stationed in the Mideast since Desert Storm and in the Republic of Korea since the mid-1990s. ADA units project national power and set the conditions within the theater for the arrival of additional combat power.

BUILDING ALLIED AND PARTNER CAPABILITIES AND CAPACITY

5-13. Combatant or theater commanders use security cooperation, military engagements, and other activities to build partner capabilities and capacity. Security cooperation activities protect and enhance mutual national security interests, deter conflict, and set conditions for future contingency operations (transition from competition below armed conflict to crisis or armed conflict), including peacetime and contingency access to allied and partner nations. The Foreign Assistance Act (Title 22 United States Code, 2151) and the Army Export Control Act (Title 22 United States Code, 2751) govern all security cooperation activities, meaning Department of Defense security cooperation activities must nest within Department of State guidance. (See JP 3-20 for more information on joint security cooperation and FM 3-22 for additional details on Army support to security cooperation.) Security forces assistance and foreign internal defense are two types of activities focused on building allied or partner nation defense or institutional capabilities or capacities.

- *Security force assistance* is the Department of Defense activities that support the development of the capacity and capability of foreign security forces and their supporting institutions (JP 3-20). The purpose of security force assistance is to support efforts to organize, train, equip, rebuild or build, and advise foreign security forces and relevant supporting institutions. Security force assistance activities are conducted primarily to assist partner nations to build their capacity to defend against external and transnational threat actors. While security assistance and security force assistance both include training, security assistance includes the transfer or sale of equipment; security force assistance does not.
- *Foreign internal defense* is participation by civilian agencies and military forces of a government or international organizations in any of the programs and activities undertaken by a host nation government to free and protect its society from subversion, lawlessness, insurgency, terrorism, and other threats to its security (JP 3-22). Foreign internal defense is a core function of special operations forces. The core difference between security force assistance and foreign internal defense is that security force assistance focuses on external threats and foreign internal defense on internal threats and stability.

5-14. Combatant commanders develop country- or regionally-specific security cooperation plans which are codified in combatant command campaign plans to synchronize and facilitate resources, authorities and

timelines (JP 5-0). Therefore, Army support to military engagements and security cooperation directly support joint force campaigning goals, and security cooperation is one of the Army's primary stability tasks.

5-15. ADA units primarily conduct military engagements unless notified that they fall under the Title 22 United States Code provisions. *Military engagement* is contact and interaction between individuals or elements of the Armed Forces of the United States and those of another nation's armed forces, or foreign and domestic civilian authorities or agencies, to build trust and confidence, share information, coordinate mutual activities, and maintain influence (JP 3-0). Military engagement does not include training allied or partner nation forces. The Army conducts military engagements through deliberate interactions with allies or partners at the junior Solder to senior leader level.

5-16. ADA supports military engagement through participation in multi-national exercises, training events, experiments, and service member exchange programs. Additionally, routine interaction with allies and partners builds and maintains human, technical, and procedural interoperability.

IMPROVING JOINT AND MULTINATIONAL INTEROPERABILITY

5-17. *Interoperability* is the ability to act together coherently, effectively, and efficiently to achieve tactical, operational, and strategic objectives (JP 3-0). Demonstrated readiness for combat operations, as part of a joint or multinational unified action partnership, is deterrent and upsets an adversary's risk calculus for limited contingency operations or armed conflict. Improving joint and multinational interoperability aids in setting the theater and complements each AMD competition activity.

5-18. Joint interoperability is not as ideal as integration. *Integration* is the arrangement of military forces and their actions to create a force that operates by engaging as a whole (JP 1, Volume 1). ADA units contribute to joint interoperability through support to joint exercises, including multinational exercises, planning conferences, situational or short notice readiness drills or rehearsals, and operation plan development. ADA units work continuously to achieve integration with the joint force, especially through technical means, which reduces risk of fratricide or confusion during crisis or armed conflict. Such activities include integration of ADA C2 systems into multi-tactical data link architectures to share situational awareness with joint counterparts and decision makers. ADA units also facilitate procedural interoperability with the joint force, which includes the development of airspace coordinating measures and firing doctrine, to clarify roles and responsibilities of each force within space and time and assist in mitigating fratricide and preventing over-engagements. ADA units plan and prepare (train) with joint counterparts habitually to achieve integrated AMD.

5-19. Multinational interoperability is a direct result of activities to build allied and partner capability and capacity. At the theater level, ADA units may seek to improve established technical data links to enhance combined AMD operations with partners. Routine interaction with allies and partners builds and maintains human, technical and procedural interoperability (JP 3-0). Foreign military sales programs administered by the Department of State further complement interoperability by establishing a foundational standard of unified action partner capability. Army and unified action partners conduct joint deployment exercises whenever possible, develop (under the appropriate authorities) intelligence and information sharing architectures, and collaborate to develop coordination tactics, techniques, and procedures whenever possible (JP 3-0).

5-20. ADA units contribute to this interoperability through demonstrations of their use of their own, and perhaps similar, AMD systems to multinational partners. At the theater level, ADA units may seek to improve or establish a partner nation's technical data links to enhance combined AMD operations. This can be done at local ADA platoon or battery echelons to larger ADA units moving or supporting maneuver in robust multinational events or exercises. ADA leaders and Soldiers work with allies and partners to develop common coalition tactics, techniques, and procedures which facilitate unity of action in transition from competition to crisis or armed conflict. ADA units facilitate coalition- or country-specific procedural interoperability through support to joint force development of a combined military area air defense plan (AADP) and other key AMD planning products. Education and training exchanges support AMD interoperability by equipping allied and partner forces' planning and operational frameworks, which enable them to train and employ their AMD forces in a way complementary to the joint force.

DEFENDING FORWARD STATIONED FORCES

5-21. Deterrence is not guaranteed. Forward stationed forces require defense against unexpected or initial attacks from both state and non-state adversaries. Forward stationed ADA units provide crucial active defense of these forces. Additionally, their positioning and operations serve as a signal of U.S. resolve and assure allies and partners.

5-22. ADA performs critical roles in defending forward stationed forces. These roles include—
- Providing AMD coverage of designated critical assets.
- Providing situational awareness of the airspace.
- Predicting, determining, and reporting threat air and missile launch points and impact points.
- Integrating joint and multinational capabilities into defenses.
- Providing and disseminating early warning to all affected forces.
- Proactively engaging threat air and missile platforms before they attack or surveil.

5-23. The AAMDC commander, as the deputy area air defense commander (AADC), and the AAMDC staff, assist combatant and theater commanders in the development of the critical asset list and, on behalf of the AADC, lead joint force components through an AMD coordination board. The critical asset list is prioritized based on criticality, vulnerability, and threat (ATP 3-01.94). The AMD coordination board assesses the current operational environment and available friendly AMD capabilities to make recommendations to the combatant or theater commanders on which critical assets to defend with which capabilities and the arrayal of these capabilities. The result of the combatant or theater commanders' decisions is the development and refinement of a defended asset list. Requirements are developed to request the deployment or repositioning of AMD capabilities to the defended asset locations.

5-24. If forward stationed forces cannot be defended from initial attacks or are not survivable enough to be able to move to safety following an initial attack, forces should be repositioned to a location at which they can be defended. Alternatively, based on changes in any of the criteria listed above, commanders can move ADA capabilities to undefended locations to increase the survivability of forces in those positions.

5-25. ADA units frequently assess their operational environments and defended locations to determine if attributes of the environment change. For instance, the addition of a new technology or capability at defended locations increases electromagnetic spectrum congestion. Congestion can degrade sensors and communications equipment. ADA commanders at each echelon should continue assessments to understand when changes occur, and work with joint and multinational AMD leaders to ensure optimal defenses of forward stationed forces.

5-26. Deployed ADA units are normally tailored as task forces with the right sizes and mix of capabilities to deter or, when required, defeat the projected air and missile threats. Presence, profile and posture define and describe the means by which ADA units can shape the operational environment. Profile and posture address the manner that units, systems, and Soldiers are present. Profile is the degree of presence, both in terms of quantity and quality. ADA units can tailor their profiles through the number of forces or effects. Military deception can play a significant role by allowing commanders to make their forces appear larger or more substantial than they are or to keep the profiles to a minimum. Posture dictates how units or Soldiers appear to others and how they act towards them, and is determined by the operational environment. See FM 3-13 for additional information.

5-27. ADA units increase their own survivability through developing and improving passive defense measures such as hardening and force protection. This includes integration with host or partner nation forces and integration of force protection means, such as cameras, detection devices, and barriers.

5-28. Forward stationed ADA units balance the deterrent effect of being seen or observable with the passive defense effect of being unpredictable and hardened. ADA units achieve this balance through emphasis on readiness of equipment to perform the AMD mission and ability to move to alternate fighting positions or increasing survivability when transitions to crisis or armed conflict occur.

PREPARING TO TRANSITION AND EXECUTE OPERATION PLANS

5-29. ADA units are critical to the transition from competition below armed conflict to crisis and armed conflict because they are typically among the first forces to deploy, and they secure key theater infrastructure and defend forward forces throughout the depth of the battlefield. ADA planners at each echelon assist in the development of plans with supported commands that synchronize deployment timelines, resource requirements including sustainment and communications support, and set conditions for the rapid execution of the operation plan. These plans are regularly assessed to determine where ADA units should be deployed; which ADA units, by type and quantity, are required for the operation; and the aerial threats in the evolving operational environment around the world.

5-30. ADA units train to conduct expeditionary deployment operations, which include the variety of commander prioritized tasks which enable a unit to rapidly respond to crisis or armed conflict (FM 7-0). Commanders at each echelon specify contingency response and deployment requirements which often include externally-evaluated emergency deployment exercises that assess a unit's ability to move its equipment safely and quickly from home-station to a deployment location. Theater staff develop plans for joint reception, staging, onward movement, and integration, which facilitate the rapid reception and movement of an ADA unit from a theater entry point to a fighting position. However, the senior ADA commander in a theater is responsible to receive and fully integrate deploying ADA units into theater AMD operations. ADA commanders and staffs—not theater staffs—ensure deploying ADA units are prepared to execute AMD operations.

5-31. ADA units support the execution of an operation plan by building and sustaining readiness in gunnery and their core AMD mission-essential tasks. Building readiness at home station enables ADA units to deploy to a forward location and flow in to a theater with limited or no notice and defend a supported commander's critical assets and other joint and Army forces. Forward stationed ADA units sustain training readiness to defend joint and Army forces from initial adversary attacks. Forward stationed ADA units sustain training readiness through continued gunnery and mission-essential task training, and focus on joint and multinational interoperability, which include exercises and major training events. Additionally, staffs at each theater echelon develop plans for rapid integration of new ADA capabilities into communications and C2 architectures to enable rapid mission assumption with requisite authorities and risk mitigation.

5-32. Forward stationed ADA units plan for movements from forward locations to alternate locations to increase their survivability while still maintaining defense of the supported commander's designated assets. Units can plan as many locations as they can coordinate for and deconflict. Planning should include ways to rapidly create and provide force protection of the assets from the new locations, coordination of permissions and firewall considerations that enable rapid communications integration, spectrum and radio frequency requests to prevent electromagnetic interference saturation, and sustainment support. In many cases, alternate fighting positions necessitate joint and multinational coordination for either the facility or occupied land.

TRAINING AND DEVELOPING LEADERS FOR OPERATIONS IN SPECIFIC THEATERS

5-33. Training and developing leaders for operations in specific theaters complement other training and leader development programs. However, this training can specifically focus on a theater or region that a unit commander prioritizes based on mission requirements (FM 7-0). Theater-specific training can focus on educational developmental opportunities, such as formal and informal classes on language and culture, but also presents many opportunities for challenging experiences and collective training. See FM 6-22 to learn more about leader program development.

5-34. Theater-specific training is important for ADA units because of the habitual heightened readiness requirements, imposed on the force for the execution of an operation plan, and the high proportion of forward stationed ADA units. Commander investment in theater-specific training and development supports each of the other AMD activities in competition, specially building allied and partner capacity and improving joint and multinational interoperability.

SECTION III – CRISIS

5-35.   A *crisis* is an emerging incident or situation involving a threat to the United States, its citizens, military forces, or vital interests that develops rapidly and creates a condition of such diplomatic, economic, or military importance that commitment of military forces and resources is contemplated to achieve national objectives (JP 3-0). Regardless of the capabilities employed, there are generally two broad outcomes from a crisis: either deterrence is maintained, and de-escalation occurs, or armed conflict begins. While this requires that Army forces to be prepared for either, forces deploying during crisis always assume they are deploying to fight. Monitoring indications and warnings of intended aggression can enable appropriate preventive actions.

CRISIS RESPONSE AND LIMITED CONTINGENCY OPERATIONS

As a fortifier of morale, an immediate and visible form of support is infinitely more efficacious than a distant and unseen one.

Basil H. Liddell Hart

5-36. Contingency plans should include a range of military options in support of a U.S. Government response, to include both flexible deterrent and flexible response options. A *flexible deterrent option* is a planning construct intended to facilitate early decision making by developing a wide range of interrelated responses that begin with deterrent-oriented actions carefully tailored to create a desired effect (JP 5-0). A flexible response option is a military capability specifically task organized for effective reaction to an enemy threat or attack and adaptable to the existing circumstances of a crisis (FM 3-0). Flexible deterrent and flexible response options are executed on order and provide scalable options to respond to a crisis. Both provide the ability to escalate or de-escalate based on continuous assessment of an adversary's actions and reaction. While flexible deterrent options are primarily intended to prevent the crisis from worsening and allow for de-escalation, flexible response options are generally punitive in nature (JP 5-0).

5-37. The initial employment of Army forces during a crisis will most likely serve as a flexible deterrent or flexible response option. This employment may represent the opening stages of a joint operation or a show of force demonstration. The objective of this early employment is to deter an adversary from further aggression, expand the theater to receive follow-on Army and joint forces, and form a credible defense with host-nation forces to prevent adversary gains.

5-38. Examples of ADA support to flexible deterrent options include:
- Increased readiness posture of in-place ADA units.
- Upgraded alert state or status.
- Increased intelligence, surveillance, and reconnaissance in joint AMD.
- Initiated or increased show-of-force operations, such as demonstrations or live-fires of ADA capabilities.
- Increased training or exercise activities, including with joint or multinational forces.
- Increased information operations, which include public affairs or support to diplomatic activities.
- Deployment of ADA units into or near the potential area of operations, including the rapid deployment of ADA capabilities or units to achieve the effect of surprise and demonstrate worldwide contingency capability.
- Increased active and passive defense measures, which include activities such as moving ADA capabilities or changing normal behaviors to reduce predictability in an observable way.
- Occupation of defensive positions around theater gateways or aerial/sea ports of debarkation to set conditions for future theater force flow.

5-39. Examples of ADA support to flexible response options include:
- Increased readiness posture and alert state prior to, during, and after the execution of a flexible response to defend against possible adversary retaliation.
- Movement and massing of types of ADA capabilities and munitions in preparation for adversarial retaliation.

- ADA planner support to flexible response option planning.
- Deployment of ADA units to the operational area to increase AMD capacity as part of or prior to execution of a flexible response to set conditions for potential escalation.
- Increased active and passive defense measures such as movement of ADA capabilities, hardening, and dispersion.

5-40. As noted during competition, some ADA units are typically forward stationed. As defensive-focused capabilities, forward-stationed ADA units can serve as flexible deterrent options, showing U.S. resolve and commitment to our partner nations, while not escalating a situation. In addition, they can discourage adversaries by dramatically reducing their expectation of success.

5-41. Forward stationing requires ADA leaders to work with joint and multinational partners and focus on the most critical interoperability tasks necessary for effective operations. It also requires constant awareness and considerations of our joint and coalition partners' disparate capabilities, limitations, language, terminology, and culture. Employing the liaison teams and networks built during competition help to mitigate these challenges. Liaison teams further enable simultaneous in-theater training exercises with the deployment of Army forces. These activities lead to early shared understanding, facilitating the expeditious and efficient integration with ADA units with joint and partner AMD forces and signaling determination to adversaries.

5-42. The demonstrated ability to project Army forces into an operational area is an essential element of conventional deterrence. Entry operations are likely to be contested, as the time of greatest vulnerability is in the early phases of deployment. Enemy forces are expected to concentrate on access points with air and missile munitions to deny U.S. build-up of forces. Forward-stationed, forward-deployed, or early entering ADA units provide AMD of these access points to support U.S. massing of critical combat power to seize the initiative. As the campaign progresses, ADA units, in concert with joint and multinational AMD elements, continue to defend access points, enabling the flow of combat, logistics, and sustainment elements. The collective and coordinated coverage by these AMD forces also provide area defenses over land masses and multiple assets. An example of a crisis response is presented in the following vignette.

2019 Air Defense Artillery Surge

Iranian escalations in 2019 led to the activation of FORSCOM's Patriot Global Response Force capability. Subsequent micro-escalations led to the Iranians shooting down a U.S. Navy drone over the Strait of Hormuz on 20 June 2019; this action resulted in additional non-Global Force Management Allocation Plan increases in USCENTCOM Patriot capacity. The 32d AAMDC dynamically shifted new AMD capabilities across the battlefield to counter new threats and changes in the operational environment. In one case, the 32d AAMDC diverted one Patriot battery, planned to execute a standard, rotational Patriot deployment to Kuwait, to an austere, undeveloped location with little notice. That battery established an expeditionary Patriot site and occupied it for several months, before moving to a third location.

5-43. While deterrence as addressed above focuses on an overseas theater, joint AMD of the homeland begins in competition and continues through crisis. Deterrence in the homeland denies an enemy's ability to successfully attack a geopolitical area or installation. Army ground-based midcourse defense systems are deployed in the United States to counter potential long-range ballistic missile threats, such as intercontinental ballistic missiles. See FM 3-27 for more information. Army National Guard ADA systems are emplaced in and around Washington D.C. to defend the National Capital Region against air threats. The ground-based air defense systems consist of Avengers, Stinger teams, National Advanced Surface-to-Air Missile System (known as NASAM), and Sentinel radars. Navy and Air Force elements also provide formidable capabilities to defend against air and ballistic missile threats.

TRANSITION TO COMPETITION OR ARMED CONFLICT

5-44. There are two outcomes of a crisis: de-escalation to competition or escalation to armed conflict. Army forces responding to a crisis are prepared for and expect to fight. ADA units are expected to provide the requisite land-based defense of maneuver forces and other critical assets against air and missile threats.

5-45. De-escalation resulting in a return to competition below armed conflict necessitates a period of consolidating gains. Consolidating gains prevents an adversary from either extending a conflict or creating a similar crisis in the future. This period requires a reassessment of the theater to understand changes in the operational environment, repair damages to infrastructure or equipment, and increase ally and partner cooperation and engagement. ADA units are often required to maintain an enhanced force posture in a joint operations area following de-escalation to not only assure allies and partners, but to deter adversaries from re-escalation. Deterrence during this period enables the joint force to seize on improved relative advantages to reinforce changes beneficial to U.S., ally, and partner interests.

5-46. Deploying and forward stationed forces responding to crisis assume further adversary escalation to armed conflict. Forward stationed ADA units defend critical assets in their assigned areas of responsibility to defeat, deny or destroy adversary or proxy aerial threats. ADA units develop situational awareness while integrating into supported units, integrating into the communications architecture in the joint operations area, implementing passive defense measures such as moving between fighting positions, and preparing to execute operation plans.

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Chapter 6

Air Defense Artillery in Large-Scale Combat Operations

We'll write our history in the skies.

BG Edward "Big Ed" Timberlake

This chapter addresses operations during armed conflict, specifically large-scale combat operations. It provides an overview of large-scale combat operations, noting an enemy's generic approach to such operations and the AMD responses by the ADA force. This is followed by sections that describe deployment and entry, offensive and defensive operations and the actions of ADA forces in each. The focus of most of the discussions is the actions of the maneuver force and those of supporting ADA units.

SECTION I – OVERVIEW

6-1. Potential conflicts with state or non-state actors can ultimately lead to large-scale combat operations. *Large-scale combat operations* are extensive joint combat operations in terms of scope and size of forces committed, conducted as campaigns aimed at achieving operational and strategic objectives (ADP 3-0). The ability to prevail in ground combat is a decisive factor in breaking an enemy's will to continue a conflict. Large-scale combat operations are extensive joint combat operations in terms of scope and size of forces committed, conducted as campaigns aimed at achieving operational and strategic objectives through the application of force (FM 3-0).

6-2. The Army always fights as part of a joint force and usually as part of a multinational force during large-scale combat operations. The Army supports the joint force by employing capabilities from the land, maritime, air, space, and cyberspace domains in support of ground operations on land and employing ground-based capabilities to enable operations in the other domains.

6-3. The characteristics of large-scale combat operations vary based on many factors, including the enemy. When fighting against a peer enemy, able to contest the joint force in all domains, the operational environment is challenging. Enemy capabilities can create parity or significant advantages in one or more domains, particularly early during a conflict and when operating close to the enemy's own borders. Conditions preceding large-scale ground combat operations vary depending on the threat. Some adversaries possess significant capabilities to execute antiaccess and area denial strategies.

ANTIACCESS AND AREA DENIAL

6-4. *Antiaccess* is an action, activity, or capability, usually long-range, designed to prevent an advancing enemy force from entering an operational area (JP 3-0). *Area denial* is an action, activity, or capability, usually short-range, designed to limit an enemy force's freedom of action within an operational area (JP 3-0). Enemies pursue these approaches with lethal means that significantly increase the risk to forward-stationed forces and the ability to deploy and stage additional forces into tactical assembly areas. Defeating antiaccess and area denial actions requires—

- A multidomain approach that includes Army forces retaining or seizing critical terrain to establish the depth necessary for defeating enemy forces.
- The employment of multiple attacks through multiple domains.
- The use of space and cyberspace effects to disrupt C2 networks, impacting human and automated communications between sensors, firing units, and command posts.
- The enabling of joint forcible entry operations and the movement of friendly forces from aerial ports of debarkation and seaports of debarkation to their tactical assembly areas.

6-5. Joint force commanders seek to achieve air, maritime, space, and cyberspace superiority early to allow the joint force to conduct land operations without prohibitive enemy interference. ADA has a critical role in countering antiaccess and area denial activities and assuring access into a given region. The joint warfighting

force's ability to conduct force projection is reliant on ADA's ability to rapidly provide expeditionary AMD capabilities. When deployed, ADA units will be integrated with joint and multinational AMD forces to improve and extend surveillance and defend land, air, and sea bases that support operations in the antiaccess and area-denial environment.

AIR DEFENSE ARTILLERY CONSIDERATIONS

6-6. ADA is a significant enabler in the battle to achieve air superiority, or at a minimum, maintain air parity throughout large-scale ground combat operations. Large-scale ground combat operations require the employment of a considerable amount of ADA forces to defend the most critical theater assets, as designated by the joint force commander. An army air and missile defense command (AAMDC) is positioned in the theater of operations to provide overall command of deployed ADA forces. An ADA brigade can be placed in supporting roles to an Army corps in accordance with METT-TC (I) conditions and the joint force commander's directives. A divisional air defense (DIVAD) battalion (or supporting ADA unit when DIVAD is not assigned) employs SHORAD units in support of the division commander's scheme of maneuver. The DIVAD's M-SHORAD batteries are normally deployed with BCTs.

6-7. ADA commanders task organizes units to execute an AMD operation plan, optimizing available ADA forces for defenses of the supported commander's priority assets. Battalion-level task forces are generated to defend theater, corps, and division assets, and task-organized batteries generally support brigade and below formations. Each task organization is constructed based upon mission-available ADA systems and commanders' intents and allows the matching of unit capabilities to tasks.

6-8. The phasing of operations determines where ADA forces are positioned in the theater of operations. In the early phases of operations, Patriot and Terminal High Altitude Area Defense (THAAD) units are generally arrayed in the strategic support area to combat enemy ballistic missiles, cruise missiles, manned aircraft, and UASs, as the joint force commander sets the theater and builds combat power. SHORAD units may remain with their assigned forces and defend their assets or can be task organized to other units, to provide an inner layer of defense against the air threats. Once offensive ground operations begin, DIVAD units deploy with maneuver formations in divisions and BCTs, and Patriot units may be directed to provide AMD to a corps, as it maneuvers forward.

6-9. Defeating enemy forces in close combat is normally required to achieve campaign objectives and national strategic goals after the commencement of hostilities. Divisions and corps are the formations central to the conduct of large-scale combat operations, as they are organized, trained, and equipped for the deep, rear, and support operations that enable success during close combat. The ability to prevail in ground combat is a decisive factor in breaking an enemy's will to continue a conflict (FM 3-0). An example of ADA's contributions to the success of Desert Shield/Desert Storm operations is presented in the following vignette.

Air Defense Artillery in Desert Shield/Desert Storm

Fifty years after the end of World War II, American forces once again were called upon to conduct force-projection operations against a modern mechanized army that was supported by large numbers of technologically advanced aircraft and ballistic missiles. As during World War II, ADA forces were fully integrated into operations at all echelons.

Seven days after Iraq invaded Kuwait in August 1990, Stinger teams and Vulcan squads from 2-52 ADA and 3-4 ADA were on the ground in Saudi Arabia, protecting the advance elements of XVIII Airborne Corps and the 82d Airborne Division. They were quickly followed by a Patriot battery from 2-7 ADA which provided air and missile defense for the aerial port of debarkation at Dhahran. During the buildup preceding the ground war, elements of 21 Army ADA battalions were deployed to protect U.S. and coalition forces and assets in Saudi Arabia, Turkey, and Israel.

The 11th ADA Brigade's Patriot batteries made history the night of January 18, 1991, when Alpha Battery, 2-7 ADA, defending forces in Dhahran, Saudi Arabia, recorded the first intercept of a ballistic missile in combat. As indicated by the debris from the missile that fell to the ground, the missile would have struck a village housing soldiers from VII Corps. Scud intercepts became a nightly event for the Patriot soldiers defending coalition forces and the cities of Saudi Arabia and Israel. The fiery collisions of Patriot and Scud missiles were captured live by network television and telecast worldwide to prime viewing audiences. The morale of the soldiers of the coalition, and the citizens of the United States, soared with each successful intercept.

ADA units protected the divisions and corps in their tactical assembly areas and were fully integrated into the maneuver units as they conducted breaching operations and attacked Iraqi divisions in Kuwait and Iraq. Patriot and Hawk batteries of TF 8-43 ADA and TF 2-1 ADA protected VII and XVIII Corps breach sites and joined division ADA units in defending maneuver forces and fire support, logistics, and command and control elements throughout the attack. Stinger sections from 2-44 ADA participated in history's largest air assault on February 24th, when the 101st Airborne Division (Air Assault) attacked 150 miles into Iraq to seize Forward Operating Base Cobra. Vulcan crews from the mechanized and armored divisions destroyed numerous enemy infantry-fighting vehicles, killed and captured hundreds of Iraqi infantry and reduced fortifications to piles of rubble. As a fitting end to the war, TF 8-43 ADA was given the honor of protecting Safwan Airfield, where coalition commanders received the surrender of the Iraqi armed forces on March 12, 1991.

SECTION II – DEPLOYMENT AND ENTRY OPERATIONS

6-10. ADA units are trained, structured, and postured for rapid deployment. Deployment planning tools allow commanders to adapt to rapidly changing circumstances. Lift assets are limited, but critical to the successful projection of the force. ADA commanders make every effort to integrate the capabilities of the host nation, joint and multinational forces, and forward presence forces with those of the deploying force. Commanders must balance the factors of METT-TC (I) against available lift assets to determine the composition of the initial response force. Each crisis has unique demands, causing commanders to balance requirements against time and lift availability and resolve shortfalls. In deployment, commanders must maintain flexibility and agility in force mix, their combat capability, sustainment, and lift, along with the need to forecast future events that call for decisions early in the deployment stage of the operation.

6-11. ADA commanders are responsible to provide AMD during deployment. They must tailor the force to accomplish the mission against the threat developed during IPOE. They may have to sacrifice mobility,

redundant communications, and sustainability to bring in sufficient AMD fires to defend the force and designated assets during the initial phases of the deployment. Tailoring includes force refinement, which is the continuous process of adjustment conducted by commanders. Countering enemy surveillance activities is also a significant part of the responsibilities of the ADA commanders, especially with respect to the increasingly expanded roles of sUASs. AMD of joint priorities may outweigh defense of service priorities.

6-12. In preparations for and the conduct of deployments, ADA units must consider—
- Potential enemy air and missile capabilities, to include quantities and qualities.
- The presence and availability of joint and multinational AMD systems.
- The presence of and coordination of efforts with forward-stationed ADA units.
- Identification of the supported commander's critical assets.
- ADA capabilities and organizations to be deployed.
- Priority of ADA forces and capabilities to be deployed.
- Coordination and integration with supported forces.
- Command and support relationships with supporting and supported Army and joint units.
- Enroute communications and internal/external C2 networks upon arrival at a lodgment.
- Initial and build-up sustainment needs.

6-13. Forces are most vulnerable, and the success of the operation is at greatest risk during initial entry. This vulnerability is intensified when the enemy possesses weapons of mass destruction. Defensive and offensive operations to counter these weapons will affect ADA, Army, joint, and multinational planning efforts. Defending the entry force is critical.

6-14. The requirements of entry operations vary. Each operation is different. Entry operations include rapid buildup and expansion that can require—
- Positioning the forces to achieve initial mission success and maximize future employment options.
- Establishing forward operating and logistics bases.
- Closing the remainder of the force.
- Expanding the lodgment.
- Linking up with other forces.
- Preparing for future operations.

6-15. Entry can be either opposed or unopposed. While it is conceivable that an entry may be unopposed, it is highly unlikely. Enemies of the United States have studied previous U.S. operations and understand that allowing U.S. forces to enter and build up allows them to mass technologically superior weapons and systems whose effects can rapidly change the operational environment. Thus, opposed, or forced entry, can be assumed to be the norm for all future entry operations. *Forcible entry* is the seizing and holding of a military lodgment in the face of armed opposition or forcing access into a denied area to allow movement and maneuver to accomplish the mission (JP 3-18). Forcible entry operations can be used to conduct operational movement and maneuver to attain positional advantage or as part of a deception.

6-16. The joint force is particularly vulnerable to attacks by enemy air platforms and missiles during the early stages of a forcible entry. AMD forces assist the joint force in gaining air superiority and protecting the assault force.

6-17. An ADA commander must ensure that the supported commander understands the need to deploy ADA forces with the supported force during entry operations. The ADA commander and staff develop an AMD plan to integrate AMD capabilities into the supported force commander's plan, facilitating a coordinated effort, providing defense of the supported commander's priority assets, and achieving the supported commander's goals and intent. The AMD plan must identify and allocate sufficient capabilities to deny, defeat, and destroy projected enemy air and missile systems. The ADA commander may create a task force with mixed long- and short-range capabilities to reduce risks to entry forces from enemy UASs, fixed- and rotary wing aircraft, and missiles.

6-18. The ADA commander must have the requisite authorities to execute AMD tasks in entry and follow-on operations. If operating as part of a joint entry force, the commander may require decentralized control of

supporting ADA forces, as authorized by a joint engagement authority, to enable timely engagements of enemy air and missile systems. If operating as part of an Army-only force, the ADA commander requires identification and engagement authority within the entry area. Such authority must be identified, approved, and promulgated in the supported commander's operation order.

6-19. Forcible entry operations are conducted in five phases: preparation and deployment, assault, stabilization of the lodgment, introduction of follow-on forces, and termination or transition of operations. Examples of ADA actions in each are presented in table 6-1.

Table 6-1. Forcible entry

Phase of Operation	ADA Actions
Preparation and Deployment	See paragraph 6-12 on page 138.
Assault	- Understand the ground tactical plan. - Establish communications with supported units. - Support airspace management using airspace C2 and coordinating measures. - Position ADA systems to support deployed forces and critical assets. - Deny surveillance and attack by enemy air platforms and missiles. - Decentralize control as required by the situation. - Plan ADA force arrayal in support of the expansion of the lodgment and future operations.
Stabilization	- Maintain AMD of the entry forces. - Adjust HIMAD positions as required to expand coverage over the joint area of operations. - Reposition SHORAD units with supported forces as the lodgment expands. - Work with other Army, joint, and host nations elements to coordinate and manage the airspace.
Introduction of Follow-on Forces	- Provide AMD of arriving Army and joint maneuver and sustainment forces. - Employ follow-on ADA units in support of the joint/ARFOR commander's OPLAN/OPORD. - Integrate and synchronize AMD with offensive and defensive operations. - Continue to support coordination and management of the airspace.
Termination or Transition	- Defend redeploying forces. - Reposition ADA units as necessary to support current and future operations. - Support stability operations.

ADA	air defense artillery	OPLAN	operation plan
AMD	air and missile defense	OPORD	operation order
C2	command and control	SHORAD	short-range air defense
HIMAD	high-to-medium altitude air defense		

6-20. Commanders design their forcible entry operations to seize and hold a lodgment against armed opposition. A lodgment is a designated area in a hostile or potentially hostile operational area that, when seized and held, makes the continuous landing of troops and materiel possible and provides maneuver space for subsequent operations (JP 3-18). Friendly forces must be combat loaded and prepared for immediate combat operations upon arrival on the ground in the lodgment area. A force defends the perimeter of a lodgment until it has sufficient forces to break out and conduct offensive operations (FM 3-0).

6-21. Continuous intelligence support is critical. ADA commanders must have in-flight intelligence during deployment and entry operations. Once on the ground, ADA commanders and staffs must ensure that intelligence is timely, relevant, accurate, and predictive. The ADA S-2/G-2 gathers information on the enemy air and missile capabilities from joint and multinational elements and U.S. national intelligence agencies. Coordination is also established with supported unit, local units, and civilian entities to enhance knowledge of the immediate operational environment.

6-22. Early deployment of ADA units is crucial to the success of entry operations. Initial entry forces should be accompanied by organic, SHORAD systems, such as M-SHORAD or Avenger. More robust, HIMAD systems, such as Patriot, should be deployed with follow-on forces. Even in an apparently benign entry operation, defense of the force remains a critical command consideration. Theater missile defense units defend the lodgment, geopolitical assets, and debarking forces. As the joint force expands the lodgment, ADA units continue to defend the force and geopolitical assets and deny threat reconnaissance, surveillance, and target acquisition throughout the area of operations. This is particularly critical to deceiving the enemy on the U.S.'s intended course of action.

6-23. The AAMDC deploys its headquarters and subordinate units into theater to defend Army, joint, and multinational maneuver forces, critical assets, and designated support areas against enemy surveillance and air and missile attacks. The AAMDC is the area air defense commander's (AADC's) and ARFOR commander's primary resource and means to plan and prepare AMD assets during large-scale combat operations. The AAMDC directs ADA brigades, and other assigned or attached units, in the conduct of all operational- and tactical-level AMD missions within the joint area of operations. The AAMDC staff coordinates with the AADC and Service components to again define or confirm the critical assets requiring defense and array the ADA units. The staff coordinates AMD operations with the fires and protection cells in an Army corps to ensure that AMD actions are synchronized with those of the supported commander.

6-24. ADA brigades are deployed early to defend aerial and seaports of debarkation, early arriving forces, and critical sustainment elements. The ADA brigade, as a force provider for the AAMDC, ensures that required forces are available to meet mission objectives. The brigade coordinates the operations of subordinate ADA battalions, typically organized as task forces and assigned or attached units within the joint area of operations. The brigade plans, prepares, and executes operations based on the commander's intent as derived through guidance from the AAMDC. As a lodgment expands, the brigade may reposition its ADA units to better defend maneuver forces and other critical assets, such as communications nodes and transportation hubs.

SECTION III – DEFENSIVE OPERATIONS

The one effective method of defending one's own territory from an offensive by air is to destroy the enemy's air power with the greatest possible speed.

General Giulio Douhet

6-25. A *defensive operation* is an operation to defeat an enemy attack, gain time, economize forces, and develop conditions favorable for offensive or stability operations (ADP 3-0). Reasons for conducting a defense include to—

- Create conditions for the offense that allow Army forces to regain the initiative.
- Retain decisive terrain or deny a vital area to an enemy force.
- Attrit or fix an enemy force as a prelude to the offense.
- Counter enemy action.
- Accept risk in one area to create offensive opportunities elsewhere.

6-26. While the offense is more decisive, the defense is typically stronger. However, a defense normally cannot determine the outcome of battles (FM 3-90).

6-27. Defenses for virtually all Army elements are focused on the potential or projected ground threat. Units and their weapons are positioned to deny or mitigate this threat. However, with the increasing proliferation of sUASs and potential for complex integrated attacks of any friendly concentration of forces, commanders must be cognizant of, plan, and allocate resources to defend against all air threats. Thus, defenses of installations, such as operating bases, or areas where brigade elements may concentrate, should consider the most likely air avenues of approach, surveillance orbits, and suspected areas from which UASs and rotary- and fixed-wing aircraft can be launched. See table C-3 beginning on page 177 for additional information on air threats to land targets.

CHARACTERISTICS OF THE DEFENSE

6-28. Successful defenses share some important characteristics. These characteristics and associated AMD actions are presented in table 6-2.

Table 6-2. Characteristics of the defense

Characteristic	Description	ADA Actions
Disruption	Deceiving or destroying enemy reconnaissance forces, breaking up combat formations, separating echelons, and impeding an enemy force's ability to synchronize its combined arms.	ADA forces and non-dedicated air defense capabilities provide defense against UASs, manned attack aircraft, rockets, and missiles.
Flexibility	Developing plans that anticipate a range of enemy actions and allocate resources accordingly.	ADA commanders, staffs, and leaders conduct thorough IPOE analysis of potential enemy aerial capabilities and develop plans, with branches and sequels, that allocate the right-size forces that provide suitable defenses against them.
Maneuver	Achieving and exploiting a position of physical advantage over an enemy force.	DIVAD forces maneuver with their supported forces, synching their movements and activities to best defend the supported maneuvering units. Patriot units conduct movements, as ordered, to extend AMD coverage over maneuvering forces.
Mass and concentration	Creating overwhelming combat power at specific locations to support the main effort.	ADA forces mass capabilities to mitigate the effects of enemy air threats. Massing effects can be created through the use of multiple ADA units or systems or by multiple launches/shots fired. Massing effects does not imply massing units or systems at one location.
Depth	Engaging multiple enemy echelons, enemy long-range fires, sustainment, and C2.	ADA units seek to create defense in depth wherever feasible. The intent is to bring enemy aerial platforms and missiles under increasingly more AMD fires as they ingress to the defense.
Preparation	Preparing the defense before attacking enemy forces arrive.	AMD plans identify the allocation of ADA forces to designated critical assets. Commanders and leaders plan defenses of these using the ADA employment tenets and IPOE analyses. Once in position, ADA commanders and leaders adjust system component positions to best achieve the planned defense. All preparations are typically initiated prior to enemy air actions.
Security	Conducting security, protection, information activities, operations security, and cyberspace and electromagnetic warfare tasks.	ADA units conduct security operations with their supported units or assets. They effect coordination to prepare and execute security of positions and force protection. They synchronize AMD operations with offensive and defensive tasks conducted by cyberspace forces.

ADA	air defense artillery	DIVAD	divisional air defense
AMD	air and missile defense	IPOE	intelligence preparation of the operational environment
C2	command and control	UAS	unmanned aircraft system

6-29. Defensive operations are conducted throughout the area of operations, from the deep area to the strategic support area. Depending on METT-TC (I), maneuver units typically execute operations in portions of the close area—a main battle area, security area, or along the forward edge of the battle area or forward line of own troops—or in the rear area, The *main battle area* is the area where the commander intends to

deploy the bulk of their unit to defeat an attacking enemy (FM 3-90). The *security area* is that area occupied by a unit's security elements and includes the areas of influence of those security elements (ADP 3-90). The *forward edge of the battle area* is the foremost limits of a series of areas in which ground combat units are deployed to coordinate fire support, the positioning of forces, or the maneuver of units, excluding areas in which covering or screening forces are operating (JP 3-09.3). The *forward line of own troops* is a line that indicates the most forward positions of friendly forces in any kind of military operation at a specific time (FM 3-90). The rear area constitutes that area behind the security and main battle areas. DIVAD units may defend their supported forces in each of these. HIMAD units defend key fixed assets in the rear area of committed corps or division forces, joint security area, and the strategic support area. Patriot may also be required to defend assets in a corps or division's sector where an operational activity is occurring. See figure 1-2 on page 20 for the arrayal of ADA units.

6-30. ADA units begin defensive preparations immediately upon moving into position. Priority for air defense in the defense may be to the battle positions in the main battle area, command and control elements, or logistics assets. ADA commanders and leaders must perform mission analyses, ensuring they understand the supported commander's intent and concept of the operation. Based on these considerations, they develop coverage plans to support the defensive concept of operations. Actual positioning of ADA systems should be based on the air IPOE, the commander's priorities for AMD, and the location of the supported unit's assets. ADA commanders and leaders must ensure that their plans for support of the defense are properly coordinated, within their unit and with adjacent and supported forces. Constant coordination and exchange of information is key. Leaders consider these planning aspects in the coordination process:

- The higher commander's intent and concept of operations.
- Updated locations and composition of the supported force.
- The tactics applied by the supported force.
- Control measures that enhance coordination between units.
- Planning for mutual support—air defense of the supported force by ADA units, and ground defense of ADA units by the supported force.
- Airspace coordination measures.
- Information collection and sensing of the airspace.
- ADA unit locations and coverage areas.
- Engagement operations and clearance of fires.
- Communications.

6-31. ADA forces can be allocated to reserve or counterattack forces, C2 and logistics facilities, and fire support units. If the supported unit is defending against an enemy main attack, the ADA commander may move ADA forces forward, to achieve the mass and early engagement needed to defeat potential enemy UAS and manned air platforms and take risks in the rear area. If defending against a supporting attack, more Avenger and Stinger teams can be allocated to static assets in the unit's rear. The AMD plan must be flexible enough, however, to quickly mass against enemy air surveillance and attacks should the enemy's main effort shift and occur in the supported unit's sector.

TYPES OF DEFENSIVE OPERATIONS

6-32. The Army conducts three types of defensive operations: area defense, mobile defense, and retrograde. For more information on these, see FM 3-90. Although the names of these types convey the overall aim of a selected operation, each type usually contains elements of the other and combines static and mobile elements (FM 3-90).

6-33. These types of defenses are predominately supported by DIVAD forces. They provide direct support of division forces. While Patriot and THAAD can also support these defensive operations, they provide defense from established positions in the rear or joint security areas, from where they focus on the defense of higher echelon (theater and corps) assets. Coverage is extended over maneuver force operations as a complementary capability (complementary to the defense of the designated assets) or per the direction of a joint/ARFOR commander.

> ***Note.*** ADA units typically provide point and area defense of designated critical assets. A *point defense* is the employment of defense measures to protect limited areas (JP 3-01). A Maneuver Short-Range Air Defense (M-SHORAD) platoon may establish a point defense of a forward arming and refueling point or maneuver battalion assembly area. A Patriot battery may establish a point defense of an airfield. Included within this defense may be the airfield and control tower, operations center, and fuel area, given the range and altitude capabilities of the Patriot system. An area defense, in AMD terminology, is one that employs defensive measures to protect assets over an extended area. THAAD, with its extended range and altitude capabilities, is the only ADA system that can provide area defense. Subsequent discussions of area defense, however, are keyed to the Army definition in ADP 3-90.

AREA DEFENSE

6-34. An *area defense* is a type of defensive operation that concentrates on denying enemy forces access to designated terrain for a specific time rather than destroying the enemy outright (ADP 3-90). The purpose of an area defense is to retain the terrain where the bulk of the defending force positions itself in mutually supporting prepared positions.

6-35. DIVAD forces in an area defense are generally focused on defending designated fixed or semi-fixed assets, rather than denying access to terrain. ADA commanders and leaders implement defenses based on the IPOE, METT-TC (I), AMD employment tenets, and the maneuver commander's scheme of maneuver. Positions must be planned and prepared in coordination with the supported commander to ensure integration of efforts and optimal defenses against enemy air surveillance and attacks. During preparations of the maneuver forces' defensive positions, the unit preparing positions and obstacles is initially the air defense priority. The air defense priority can then shift, based on the supported commander's priorities. When maneuver is required, for instance, priority may be given to the maneuvering elements.

6-36. DIVAD units establish and coordinate position areas for air defense and aerial engagement areas to ensure that the supported force and adjacent forces are cognizant of DIVAD unit locations while preparing for and engaging enemy air platforms. Position areas for air defense are located near the defended asset based on METT-TC (I). M-SHORAD, Avenger, and Stinger units can move from primary to secondary and supplementary locations within the position area, as needed, for survivability and enhanced engagement opportunities. Deliberate planning and coordination are required for the emplacement and operation of position areas for air defense near the forward line of own troops to minimize the risk for fratricide between maneuver forces operating along there and the ADA units forward positioned to defend those forces. This can be extremely important with operating with Coalition forces. Position areas for air defense—

- Are planned for in coordination with the supported commander's schemes of action and maneuver.
- Are designated for a specific period of time.
- Clearly delineate areas where DIVAD units can operate while optimizing survivability.
- Ensure that assigned areas for DIVAD units are included in the common operating picture.
- Assist in ensuring DIVAD unit engagement areas support the maneuver force's offensive and defensive operations.

6-37. Figure 6-1 on page 144 depicts a nominal position area for air defense for a M-SHORAD platoon defending an armor battalion-sized task force. The PAAD is irregularly shaped as M-SHORAD systems in the platoon can be positioned at various ranges and different locations from the task force, though all must focus on projected enemy air avenues of approach. The PAAD contains primary, alternate, and supplementary positions. Irrespective of locations, the M-SHORAD systems must be capable of maintaining the primary target line. The date-time group identifies the effective time that the platoon occupies the PAAD and the time the supported force is expected to stay in that location
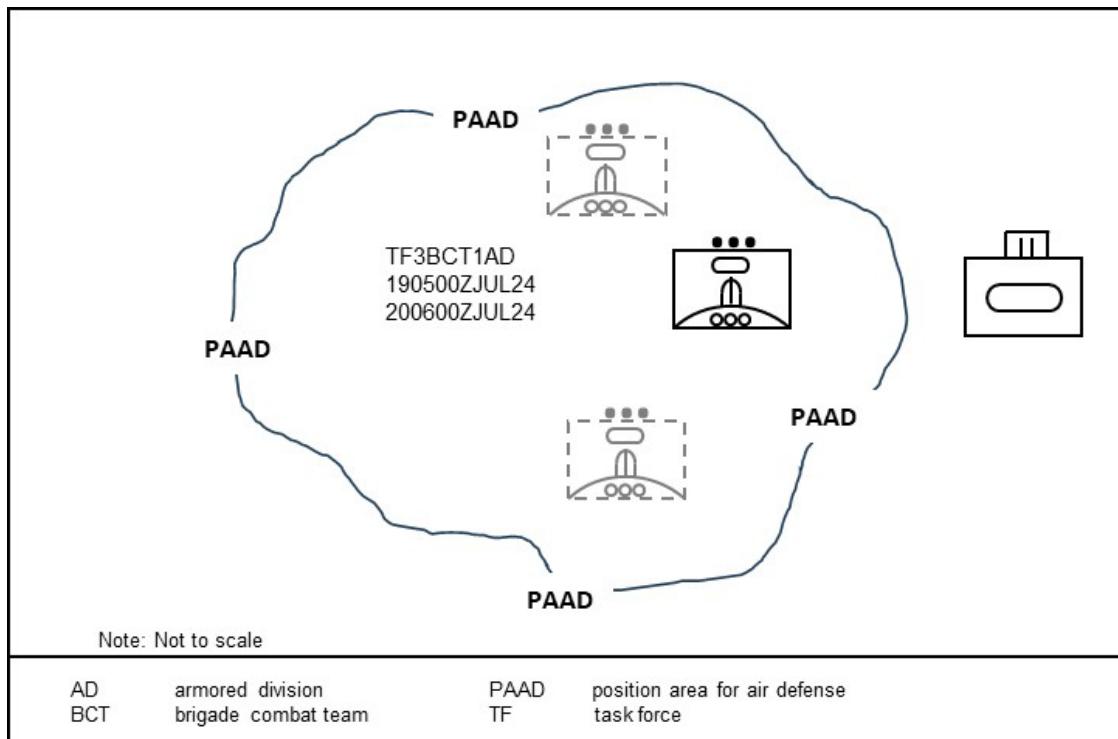
Figure 6-1. Nominal position area for air defense

6-38. Aerial engagement areas are created over the defended maneuver formation or other asset in coordination and synchronization with the supported commander and other ADA/joint units providing AMD in or near the supported commander's area of operations. The use of aerial engagement areas can alleviate potential overkill and excessive expenditure of munitions in engaging air targets. Aerial engagement areas are adjusted as assets move or priority of assets change. ADA commanders implement the following steps of engagement area development adapted from FM 3-90:

- Identify likely enemy air avenues of approach.
- Identify the most likely enemy course of action for aerial attacks and surveillance.
- Determine where to engage and destroy the enemy before its air platforms and missiles can reach their target areas (keep-out range).
- Position subordinate forces and weapons systems to optimize defenses against enemy aerial surveillance and attack.
- Rehearse the execution of operations within the engagement area.

6-39. DIVAD assets in each defense focus on the templated air avenues of approach. M-SHORAD systems can be positioned to conduct early engagements of UASs. They can be collocated with counter-reconnaissance forces or independently along air avenues of approach that allow the enemy surveillance of defensive positions and preparations. While DIVAD systems are emplaced where they can best defend against air threats, maximizing their engagement capabilities, ADA commanders should mitigate exposure to direct fires as much as possible.

6-40. DIVAD units provide warning of threat actions, most notably UAS surveillance and attacks, to their supported forces. Detections by Sentinel radars or other sensors are broadcast to affected units or installations. Detections of sUASs, particularly groups 1 and 2, can trigger self-defense actions by non-dedicated air defense elements in Army units. Passive defense measures should be executed to mitigate indirect fire attacks.

6-41. Patriot and THAAD units typically operate at the strategic or operational level to provide defense of critical assets designated by joint force commander against the most likely threats to the joint force—longer-range ballistic and cruise missiles. These assets include geopolitical assets, aerial and seaports of debarkation,

critical command posts, logistical facilities, assembly areas, forward operating bases, and maneuvering forces.

6-42. The HIMAD-based task force fights from stationary locations; therefore, tactics are a matter of the proper positioning, orientation and system configuration of subordinate components with respect to the defended assets and threat. Tactics for threat engagements will vary based on the specific threat platforms, such as ballistic missiles, cruise missiles, or fixed-wing aircraft.

6-43. Patriot units in task forces are generally employed as task-organized batteries. The task-organized battery affords continuous defense of assets against threats within its METT-TC (I)-tailored capabilities. A Patriot task force can also be missioned to defend a maneuver force. It conducts this defense using bounding overwatch techniques, as Patriot lacks the mobility to maintain pace with maneuvering forces. *Bounding overwatch* is a movement technique used when contact with enemy forces is expected. The unit moves by bounds. One element is always halted in position to overwatch another element while it moves. The overwatching element is positioned to support the moving unit by fire or fire and movement (FM 3-90).

6-44. Figure 6-2 presents a nominal area defense. THAAD conducts the area defense, with surveillance and engagement coverage overlaying the point defenses provided by Patriot and M-SHORAD. Patriot could be positioned to extend its coverage over the tactical assembly area if directed by the controlling commander—in this case, the corps commander.
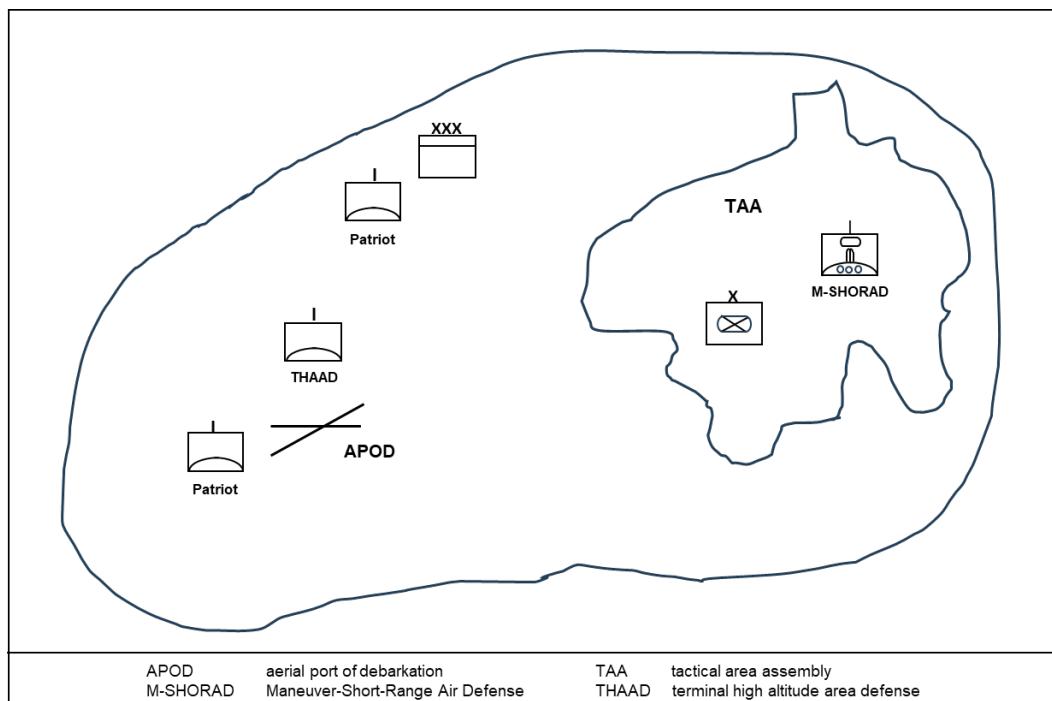

Figure 6-2. Air defense artillery units in a nominal area defense

MOBILE DEFENSE

6-45. *Mobile defense* is a type of defensive operation that concentrates on the destruction or defeat of the enemy through a decisive attack by a striking force (ADP 3-90). The mobile defense focuses on defeating or destroying enemy forces by allowing them to advance to a point where they are exposed to a decisive counterattack by a striking force. A mobile defense includes a fixing force and a striking force. A *fixing force* is a force designated to supplement the striking force by preventing the enemy from moving from a specific area for a specific time (ADP 3-90). The *striking force* is a dedicated counterattack force in a mobile defense constituted with the bulk of available combat power (ADP 3-90). A fixing force supplements the striking force by holding attacking enemy forces in position, by canalizing attacking enemy forces into ambush areas, and by retaining areas from which to launch the striking force.

6-46. M-SHORAD units may accompany the striking force. M-SHORAD systems are positioned with the maneuver force formations to defend against manned aircraft attacks and UAS surveillance. Defense against manned aircraft is focused on the likely air avenues of approach. Defense against UASs requires 360-degree coverage. M-SHORAD systems may also be placed in defense of a site, such as a wet gap crossing or terrain obstacle. Avenger platoons and C-sUAS/Stinger teams may support the fixing force by engaging aerial surveillance and attack platforms from select, suitable locations. Positioning is determined in accordance with the projected enemy air and ground capabilities and activities and the supported commander's objectives.

6-47. Figure 6-3 presents a nominal mobile defense after the commitment of the strike force. A M-SHORAD platoon accompanies each of the maneuver battalions in the strike force. Another M-SHORAD platoon defends a fixing force battalion. The M-SHORAD platoons are placed in direct support of the maneuver units. C-sUAS teams are positioned to deny or defeat sUAS surveillance and attack options. C-sUAS teams are in general support of the fixing force units.
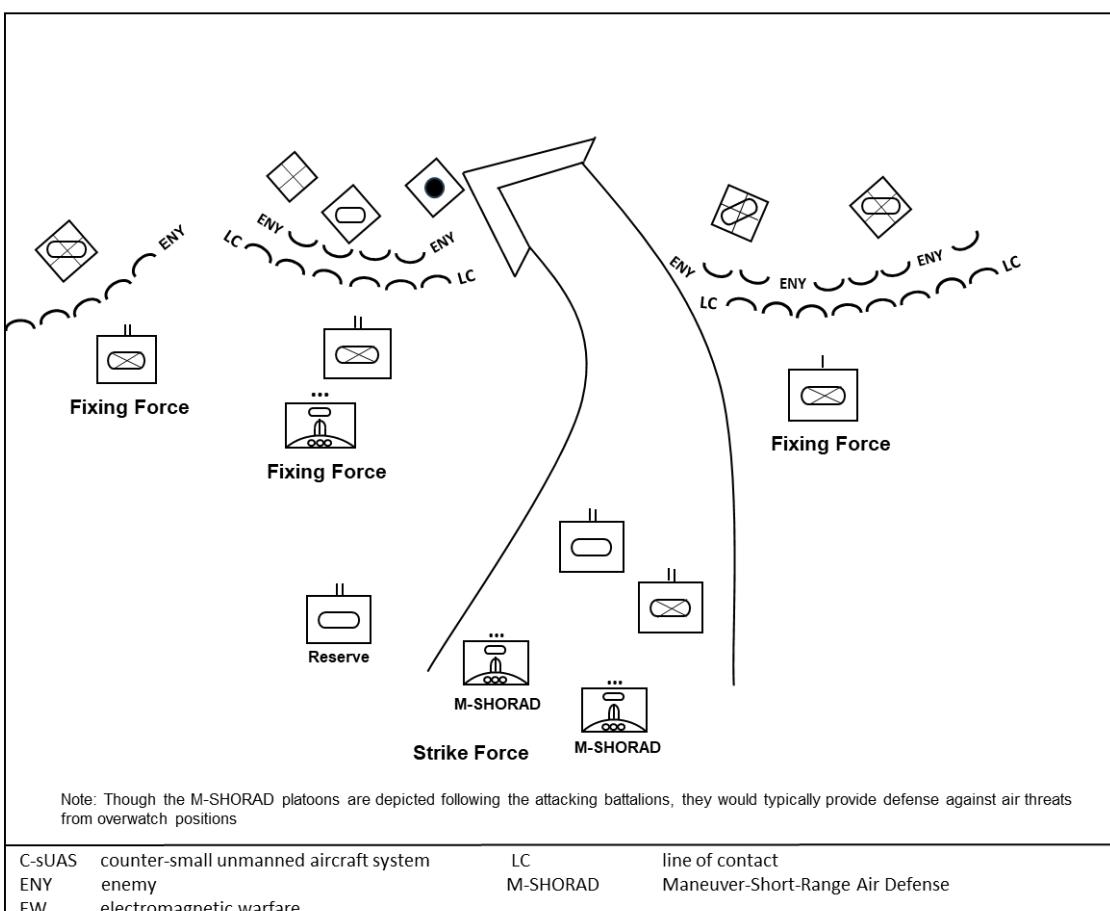

Figure 6-3. Divisional air defense units in a nominal mobile defense

6-48. The key aspects of supporting mobile defense are mobility and survivability. The moving elements in a mobile defense are the most vulnerable to attack and surveillance. Counterintelligence, surveillance, and reconnaissance are critical because the plan relies on surprise.

RETROGRADE

6-49. A *retrograde* is a type of defensive operation that involves organized movement away from the enemy (ADP 3-90). A retrograde is a transitional operation. It is always part of a larger scheme of maneuver designed to regain the initiative and defeat the enemy.

6-50. DIVAD units can be missioned to defend the covering force, assuming that the covering force's mission is not to destroy the lead elements of the enemy force. A covering force provides the main body of the maneuver force with early warning, protects its movement, and develops the situation before the main body is committed. M-SHORAD units can maneuver with the covering force and provide the required defense against air threats. Avenger and Stinger can provide overwatching fires of a covering force, that is used as a screening force, providing information on enemy air activity and engaging enemy air targets as required. Since the covering force units are typically not the air defense priority, the covering force units normally rely on passive air defense.

PASSIVE AIR AND MISSILE DEFENSE

6-51. Passive actions are a unit's first line of defense and improve survivability by reducing the likelihood of being detected and targeted from the air and by mitigating the potential effects of air surveillance and attack. Passive air and missile defense measures include detecting air and missile launches, predicting impact points, providing threat identification, and disseminating early warning. Passive measures also include those initiated to reduce vulnerability and minimize the effect of damage caused by missile attack.

6-52. Five fundamental methods can be used to camouflage and conceal individual weapons, units, installations, and activities: hiding, blending, disguising, disrupting, and decoying.

- Hiding is the complete concealment of an object by some form of physical screen. For example, the overhead canopy of trees hides the objects beneath from aerial observation; tunnels hide objects located within them; a building's roof and walls, camouflage net, or tarpaulin hides objects beneath them; and a defilade position hides objects from ground observation. In some cases, the screen may be invisible. In other instances, the screen may be visible, but it hides the activity behind it.
- Blending is arranging or applying camouflage materials on, over, and around an object so that it appears to be part of the background. Examples include applying face paint to the exposed areas of skin, and adding burlap, paint, and live vegetation to helmets and clothing to closely resemble or blend into the background. Units can apply the same technique for equipment or structures.
- Disrupting is the technique that alters or eliminates regular patterns and target characteristics. Disrupting techniques include pattern painting, deploying camouflage nets over selected portions of a vehicle, and using shape disrupters (such live vegetation) to eliminate regular target patterns.
- Disguising is the intentional misleading of the enemy about the friendly force's identity, strength, and intention, and may draw enemy fire from real assets. Therefore, the simulation of objects, pieces of equipment, or activities may have military significance. Decoys, such as inflatable tanks or ADA radars, can look like the real thing to an aerial observer.
- Decoying is the technique that deploys a false or simulated target within a target scene or in a position where the enemy might conclude that it has found the correct target. Decoys generally draw fire away from real targets. Depending on their fidelity and deployment, decoys greatly enhance survivability.

OTHER CONSIDERATIONS

6-53. In addition to camouflage and movement control, units can plan for and institute electromagnetic hardening, electronic masking, and emission control by such measures as shielding sensitive equipment components, controlling signatures to protect against threat signals intelligence operations, and selecting and controlling the use of sensors and C2 emitters, respectively (FM 3-12). Units on installations should continually harden their locations and incorporate all means to lessen the potential for threat observation and mitigate the effects of air attacks. For more information on passive AMD measures, see ATP 3-01.8.

6-54. Non-dedicated air defense capabilities should also be integrated into defenses, as complements to supporting ADA units and systems or as standalone resident capabilities if ADA units are not available. A ground force's organic weapons are its primary defense against short-range air threats. See page 51 for discussions of non-dedicated air defense.

6-55. Once defending units arrive at acceptable force ratios—or the degree of risk is clear—they allocate available forces and begin planning engagement areas. They determine where to engage enemy forces on each enemy avenue of approach. Defending units position forces on those avenues of approach and establish engagement areas using obstacles and fires to canalize enemy forces into them. Supporting ADA units complement these actions with denying or destroying enemy air platforms supporting enemy ground attacks.

TRANSITION TO OFFENSIVE OPERATIONS OR STABILITY OPERATIONS

6-56. If a defense is successful, units anticipate and transition to either offensive operations or stability operations. If an area or a mobile defense is unsuccessful, forces transition into a retrograde.

6-57. The ultimate goal of defensive operations is to defeat the enemy's attacks and transition, or threaten to transition, to the offense. Unit must determine and plan, prepare, and execute required friendly actions for a successful transition, while considering enemy conditions. As friendly forces meet their defensive objectives, forces consolidate and reorganize for offensive operations or prepare to facilitate forward passages of lines for fresh formations. Commanders transition to the offense when they assess they have enough combat power to maintain pressure on the enemy (FM 3-0).

6-58. Units may transition to stability operations if the defense retained decisive terrain, denied vital areas to enemy forces, and successfully defended against attacking enemy forces, thus eliminating the need for an offensive operation. Stability operations generally focus on meeting immediate essential service and civil security needs for civilians in the assigned area while coordinating with any existing local nation government and nongovernmental organizations before addressing other stability tasks. Support requirements can change dramatically. Air defense coordinators may need to request a change to the ROE in the AADP and ensure that approved changes are quickly disseminated to all levels.

SECTION IV – OFFENSIVE OPERATIONS

6-59. An *offensive operation* is an operation to defeat or destroy enemy forces and gain control of terrain, resources, and population centers (ADP 3-0). The main purpose of the offense is to defeat or destroy enemy forces and to gain control of terrain, resources, or population centers (FM 3-90). Other purposes are to—

- Secure decisive terrain.
- Deprive the enemy of resources.
- Gain information.
- Fix an enemy force in position.
- Disrupt an enemy force's attack.
- Set the conditions for successful future operations.

6-60. Commanders seize, retain, and exploit the initiative when conducting the offense. Taking the initiative from an enemy force requires conducting offensive operations, even in the defense. Defeating enemy air and missile threats is necessary to create opportunities for offensive maneuver.

6-61. ADA units generally do not conduct offensive operations in the traditional sense; they support offensive operations. However, in certain circumstances, they can set air defense ambushes, with positions forward along the likely avenues of approach to engage enemy air—this may be considered an offensive action. ADA units can also execute offensive operations, as depicted in the following vignette on page 149.

Securing Najaf's Key Bridges during the 2003 U.S. Invasion of Iraq

During the 2003 US invasion of Iraq, an essential highway leading toward Baghdad passed through the city of Najaf. Given its proximity to this critical highway, which would be used by U.S. troops to reach the Iraqi capital. It became evident that Najaf needed to be cleared to prevent attacks on U.S. convoy routes.

The strategic plan involved the 3rd Infantry Division encircling the town, while the 101st Airborne Division focused on clearing Najaf. Within this context, two vital bridges were identified as key assets to secure. The northern bridge, codenamed Objective Jenkins, fell under the responsibility of the 1st Brigade Combat Team. With limited available units, the BCT's air defense battery was chosen to spearhead the attack. Led by (then) CPT Charles Branson, the battery consisted of Alpha Battery, 1st Battalion, 3rd Air Defense Artillery Regiment (equipped with two Bradley Linebacker platoons), a reserve tank platoon, a combat observation lasing team, and a long-range acquisition system team.

Around midnight on March 25th, 2003, this determined force headed for Objective Jenkins, ready to secure the vital bridge. Upon reaching the bridge, Alpha Battery immediately found themselves under a barrage of RPGs, small arms fire, and mortar rounds from well-entrenched enemy positions. CPT Branson swiftly made a critical decision: he pulled his troops back while urgently calling for artillery support. For the next eight grueling hours, CPT Branson persisted in directing artillery fire onto the enemy positions. He also brought his reserve tank platoon forward to reinforce the assault. The Iraqis, desperate to halt the American advance, attempted to destroy the bridge. Despite sustaining damage, Branson issued a bold order: his troops were to cross the bridge and secure the far side of the bridgehead.

This aggressive maneuver turned the tide of battle in favor of the US forces. With the assistance of the remaining elements of Task Force 3-69 Armor, additional ground was secured. On March 29, 2003, after successfully securing Objective Jenkins, CPT Branson and his battery were finally relieved.

6-62. Support of offensive operations is primarily executed by M-SHORAD and Avenger batteries/platoons, C-sUAS teams, and Stinger man-portable air defense (MANPAD) teams. DIVAD battery commanders and platoon leaders organize and position their units to support the maneuver commander's mission and scheme of maneuver. They should organize their units for maximum flexibility and plan for decentralized execution. Patriot and THAAD units, if so directed, can also provide defense of maneuvering forces from their primary defensive positions or relocate to extend such coverage. Any repositioning of Patriot or THAAD must be coordinated with the AADC and senior ADA commander to ensure that the relocation does not result in a subsequent gap in a defense. If a Patriot unit is placed in direct support of a corps, the corps commander sets the priorities for the Patriot unit. Patriot units placed in direct support of a maneuver force notify the controlling joint C2 element, through the ADAFCO, and their parent ADA brigade when their batteries are executing movements in accordance with the supported commander's scheme of maneuver. In this case, the supported commander dictates movements as the supported unit is the defended asset.

6-63. AMD tasks to enable offensive operation include—
- Planning air defense coverage, to include denying surveillance by threat UASs, to provide freedom of maneuver for supported forces and their critical assets.
- Developing air aspects of the IPOE.
- Developing and coordinating IPOE information to support attack operations of enemy air bases and other aerial launching sites.

- Developing air defense priorities.
- Defending forward-based infrastructure, such as lines of communications and command nodes, from aerial attack.
- Planning early warning and surveillance.
- Maneuvering to maintain air defense coverage.
- Developing engagement guidance for ground targets.

CHARACTERISTICS OF THE OFFENSE

Never forget that no military leader has ever become great without audacity. Carl von Clausewitz

6-64. Successful offenses share four characteristics: audacity, concentration (mass), surprise, and tempo. These characteristics and associated AMD considerations are presented in table 6-3. For more information on the characteristics, see ADP 3-90.

Table 6-3. Characteristics of the offense

Characteristic	Description	ADA Actions
Audacity	The ability to assume risk to create opportunity with bold action.	DIVAD units support maneuver commanders and forces in aggressively seizing opportunities to maintain the initiative and force enemy forces to react.
Concentration (mass)	Orchestrating forces or effects to create and exploit opportunity.	As in defensive operations, ADA forces mass capabilities to mitigate the effects of enemy air threats. Massing effects may be created through the use of multiple ADA units or systems, at different locations, to execute multiple launches/shots fired from a single system or multiple systems.
Surprise	Taking action that catches enemy forces off guard.	SHORAD systems may assume positions away from defended forces or other assets, and along likely air avenues of approach, to conduct early engagements of enemy air transiting the area.
Tempo	Maintaining a pace of operations that is faster than that of the enemy, but not so fast that it cannot be sustained for as long as necessary to achieve all assigned objectives.	M-SHORAD units maintain pace with their supported maneuvering forces to mitigate or deny enemy air surveillance and attacks.

ADA	air defense artillery	M-SHORAD	maneuver short-range air defense
DIVAD	divisional air defense	SHORAD	short-range air defense

TYPES OF OFFENSIVE OPERATIONS

6-65. There are four types of offensive operations: movement to contact, attack, exploitation, and pursuit. For more information on each, see ADP 3-90.

- *Movement to contact* is a type of offensive operation designed to develop the situation and to establish or regain contact (ADP 3-90).
- *Attack* is a type of offensive operation that destroys or defeats enemy forces, seizes and secures terrain, or both (ADP 3-90).
- *Exploitation* is a type of offensive operation that usually follows a successful attack and is designed to disorganize the enemy in depth (ADP 3-90).
- *Pursuit* is a type of offensive operation designed to catch or cut off a hostile force attempting to escape, with the aim of destroying it (ADP 3-90).

MOVEMENT TO CONTACT

6-66. The goal of a movement to contact is to make initial contact with a small element while retaining enough combat power to develop the situation and mitigate the associated risk. Commanders conduct a movement to contact when an enemy situation is vague or not specific enough to conduct an attack. Once contact is made with an enemy force, the friendly force quickly transitions either to an attack, a hasty defense, or bypasses enroute to their objective.

6-67. In a movement to contact, forces deploy from assembly areas in attack formations that facilitate movement and mass sufficient combat power to ensure decisive victory. Commanders adjust their tempo appropriately as they anticipate closing with enemy forces. They decide where their forces can deploy into formations that facilitate the initial contact and still provide freedom of action for the bulk of their forces.

6-68. A movement to contact can result in a meeting engagement. A *meeting engagement* is a combat action that occurs when a moving force, incompletely deployed for battle, engages an enemy at an unexpected time and place (ADP 3-90). Once contact is made and a meeting engagement ensues, M-SHORAD units move to planned positions, observe and focus on enemy air avenues of approach, and activate planned target areas of interest.

6-69. M-SHORAD platoons are integrated with the maneuvering forces. M-SHORAD platoons must be able to posture themselves quickly to counter any enemy surveillance or attack efforts. They are positioned based on the maneuver force's type of travel (for example, deliberate movement when contact with enemy forces is likely) and formation and other METT-TC (I) factors. The M-SHORAD battery commander or platoon leader makes positioning decisions based on preventing enemy aircraft from successfully observing or attacking the vulnerable moving elements. M-SHORAD systems are generally placed behind the lead elements of the supported force during movement to provide overwatch of enemy air avenues of approach. Air defense coverage is extended forward of the lead elements. C-sUAS teams can also be positioned with the M-SHORAD systems or as standalone capabilities to strengthen defenses against small surveilling and attacking unmanned aircraft.

6-70. Avengers can be deployed with the covering force, along the flanks, or in overwatch positions of the maneuver force. Avenger fire units are light-skinned vehicles and should not be integrated into the maneuver force when contact is expected. The Avenger can be positioned on the maneuver force flank and rear where it is best suited to defend enemy air avenues of approach. Avengers may also be employed to protect the supported unit's critical assets, such as C2 elements and artillery radars. Avengers and Stinger MANPAD teams can provide coverage for choke points along the march route or to defend the maneuver force as it moves prior to contact. Stinger teams are primarily used to protect maneuver support assets, such as fire support systems and C2 nodes. Once contact has been initiated, Stinger teams need to assume overwatch positions.

ATTACK

6-71. Attacks incorporate coordinated movement supported by fires. An attack differs from a movement to contact because in an attack commanders know at least part of an enemy's dispositions. A commander may describe an attack as hasty or deliberate, depending on the time available for assessing the situation, planning, and preparing. A commander may decide to conduct an attack using only fires, based on an analysis of METT-TC (I). Figure 6-4 on page 152 presents a nominal attack with supporting DIVAD units. Two M-SHORAD batteries accompany the main attack and one battery the supporting attack. The M-SHORAD batteries are portrayed as following the attacking maneuver units for illustrative purposes. They are generally integrated with the maneuver forces, positioned to defend against air threats from overwatch positions. M-SHORAD systems are positioned in accordance with the projected air threat and mission demands. C-sUAS teams, though not shown, are likely employed with the M-SHORAD systems.
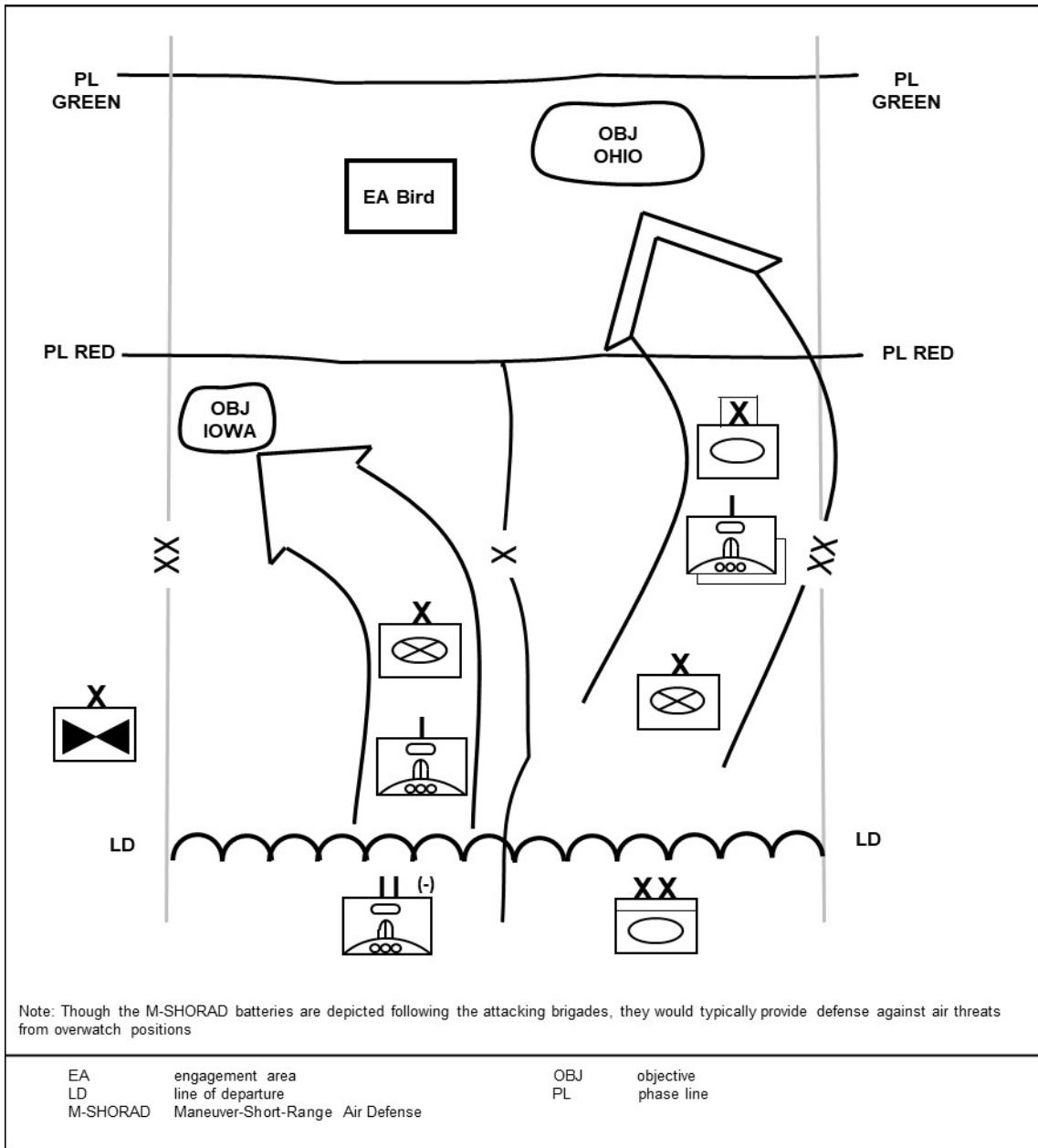
Figure 6-4. Divisional air defense units in a nominal attack

6-72. In a hasty attack, the commander must move quickly to gain the advantage. Speed and violence of action can overcome lack of preparation. A deliberate attack is much more thoroughly planned and prepared. Hasty attacks are not based on detailed planning, but the commander must anticipate and plan for them as much as possible. They are conducted to catch the enemy off-guard. The maneuver commander can use assets available and synchronize all available support and combat multipliers provided they can be committed without significant delay. Hasty attack plans are disseminated through fragmentary orders. The use of standard operating procedures and battle drills are critical for effective execution of hasty attacks. The success of DIVAD units in a hasty attack is dependent on thorough prior planning. Prior to the mission, M-SHORAD, Avenger, and Stinger MANPAD systems may be positioned along suspected enemy air avenues of approach. ADA platoon leaders plan operations based on the supported commander's scheme of action and designated priorities.

6-73. The deliberate attack requires more time for a detailed analysis of the operational environment and preplanned positions throughout the expectant zones of advance. For a deliberate attack, air defense coverage must be extensive and well-coordinated. This requires a thorough IPOE analysis that includes—

- Enemy aerial types, quantities, and capabilities.
- Potential launch sites.
- Ground and air avenues of approach.
- Aerial surveillance positions and routes.
- Aerial attack profiles.

6-74. ADA platoon leaders use system-specific graphic control measures and those directed by the supported unit to control M-SHORAD, Avenger, and any Stinger team movements. All movements are conducted in synchronization with the supported unit's scheme of maneuver. During an attack, M-SHORAD systems are generally positioned to support the main effort. Avengers are positioned to protect maneuver support, C2, and fire support assets. However, M-SHORAD or Avenger units may be redirected to shift fires or positions and change priorities in accordance with the supported commander's directives,

6-75. An attack can require a forward passage of lines through a stationary force. In a passage of lines, the stationary force's SHORAD units (C-sUAS teams from a DIVAD battalion or Avenger systems/Stinger MANPAD teams) protect the passage lanes. The attacking force's M-SHORAD units accompany the passing forces. Airspace coordinating measures and weapons control measures must be planned and disseminated by either the division AMD section or brigade air defense support element (ADSE). Similar procedures apply for a rearward passage of lines.

EXPLOITATION

6-76. Exploitations seek to disintegrate enemy forces to the point where they have no alternative but to surrender or retreat. Exploitation follows any successful attack and is conducted to take advantage of the success. The exploiting force must have mobility and balanced firepower.

6-77. DIVAD units supporting an exploiting force must be as mobile as the maneuver forces. They must be able to move with the exploiting force to provide defense against aerial surveillance and attacks. A M-SHORAD platoon, for instance, may move with the main body (exploitation force), or it may be task organized to provide support for both the exploitation force and the logistics elements. Avenger units can be used to keep maneuver force lines of communications open and defend the exploiting force's less mobile assets. Stinger MANPAD teams can provide coverage of key terrain and choke points and protect C2 posts. C2 is critical to support constantly moving units.

PURSUIT

6-78. There are two variations of the pursuit: frontal and combination. A pursuit normally follows a successful exploitation. However, if enemy resistance breaks down and enemy forces begin fleeing the battlefield, any type of offensive operation can transition into a pursuit. Pursuits entail rapid movement and decentralized control. The pursuit is oriented on the enemy rather than on terrain objectives.

6-79. As in an exploitation, DIVAD units deployed with the encircling forces must be as mobile as the defended asset. Flexibility, decentralized execution, and the direct fire threat to ADA fire units are key considerations in the employment of DIVAD units. M-SHORAD units maneuver with the pursuing forces, normally traveling at their flanks. M-SHORAD battery commanders and platoon leaders employ their M-SHORAD systems to prevent the enemy from using attack helicopters to disrupt, delay, or deny the pursuing force. Avengers are generally positioned at the rear of a maneuvering force to defend the maneuver support, C2, fire support, and maneuver reserve forces. Stinger MANPAD teams can be best used to provide area defense along main supply routes or logistics support areas. The ability of the DIVAD units to maintain ADA coverage over the maneuver force ensures that the maneuver force commander can retain the initiative during pursuit operations.

CONSOLIDATE GAINS

6-80. *Consolidate gains* are activities to make enduring any temporary operational success and to set the conditions for a sustainable security environment, allowing for a transition of control to other legitimate

authorities (ADP 3-0). Though presented as part of the offensive operations section, consolidate gains are also part of defensive and stability operations.

6-81. Consolidation of gains generally signifies a greater focus on security and stability tasks than on combat operations. ADA forces support operations to consolidate gains by maintaining defense of friendly forces and critical assets as areas are secured. ADA formations, in accordance with the priorities for defense and available assets, can be positioned in corps or division consolidation areas to defend against enemy residual air and missile capabilities. While an enemy may possess few of these capabilities—the majority having been destroyed or disabled during the dominate phase (large-scale ground combat) of an operation, an attack by a single missile can have a catastrophic impact on a maneuver formation, C2 facility, or geopolitical asset.

SECTION V – TRANSITION TO STABILITY OPERATIONS AND POST-CONFLICT COMPETITION

6-82. Transitions occur throughout the theater or various areas of operation. Offensive, defensive, and stability operations can be conducted by different echelons simultaneously in various areas. This transition can occur in one part of a theater while combat operations are still underway in other parts. Post-conflict operations focus on restoring order, minimizing confusion following the operation, reestablishing host nation infrastructure, preparing forces for redeployment, and continuing a presence to allow other elements of national power to achieve the overall strategic aims. Post-conflict operations place demands on every level of command.

6-83. The post-conflict stage may be interrupted by the resumption of hostilities. The enemy may continue to challenge the establishment of normal peacetime operations or stability operations, with the objective of creating a favorable political settlement, set conditions for a protracted resistance, and alter the nature of the conflict to gain relative advantages. Thus, units must rapidly consolidate, reconstitute, train, and prepare to remain in theater should the fighting resume. During this time, force protection is vital to prevent isolated attacks. ADA units continue to execute AMD operations to prevent surprise, deter aerial attacks, permit unimpeded reconstitution, and support the joint force commander's end states for stability operations. ADA units may remain in theater after the end of hostilities to perform stability and support operations.

6-84. A *stability operation* is an operation conducted outside the United States in coordination with other instruments of national power, to establish or maintain a secure environment and provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief (ADP 3-0). While each stability task is different, AMD coordination, planning, and execution to meet the mission requirements of the maneuver commander remain the same.

6-85. The ability of ADA commanders to stabilize a crisis is directly related to their ability to defend the supported force and civilian critical assets, as necessary. ADA units can be called upon to conduct humanitarian assistance and population control. ADA personnel may be required to control prisoners, handle refugees, and perform other related humanitarian assistance and control activities. ADA units, in conjunction with joint AMD forces, will likely be required to continue to maintain presence in contested areas as armed conflict and crisis end and the environment returns to one of competition.

6-86. Redeployments occur as forces that are no longer needed in theater. Post-conflict requirements have a direct effect on the redeployment flow. Commanders contend with the same challenge as in deployment, which is balancing the factors of METT-TC (I) against available lift assets. Forces not required for subsequent operations return to home station and prepare for future missions. Protection of the force during redeployment is as critical as during deployment or any other stage of the operation. While the most significant aerial attack capabilities may have been eliminated, ADA forces must continue to be prepared to counter desperation or retaliatory air and missile attacks.

Appendix A

Annex I (Air and Missile Defense)

This appendix provides a template of Annex I (Air and Missile Defense) to a supported commander's operation plan/order. Annex I is developed in collaboration with the supported commander and staff and the ADA higher headquarters. ADA commanders at all levels should use this format to develop their own plans, supplementing them to reflect additional guidance or intentions.

[CLASSIFICATION]

Place the classification at the top and bottom of every page of the attachments. Place the classification marking at the front of each paragraph and subparagraph in parentheses. Refer to AR 380-5 and DODM 5200.001V2 for classification and release marking instructions.

Copy ## of ## copies
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Place of issue
Date-time group of signature
Message reference number

Include the full heading if attachment is distributed separately from the base order or higher-level attachment.
ANNEX I (AIR AND MISSILE DEFENSE) to OPERATION PLAN or ORDER __ [number] [code name]— [issuing headquarters] (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 annex include JP 3-01, ADP 3-19, FM 3-0, FM 3-01, and FM 3-01-44.

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

(U) **Task Organization**: *Describe the organization of forces (including attachments and detachments to and from the issuing headquarters) and their command and support relationships. State when each attachment or detachment is effective (for example, on order, on commitment of the reserve). Refer to Annex A (Task Organization) if long or complicated.*

1. (U) <u>Situation</u>. *Include information affecting AMD that paragraph 1 of the operation plan or operation order does not cover or that needs expansion.*

   a. (U) <u>Area of Interest</u>. *Describe the area of interest, which includes the area of influence, as it relates to AMD. Identify area of interest characteristics and potential locations and capabilities of threats which can affect ADA systems or assets. Refer to Annex B (Intelligence) as required.*

   b. (U) <u>Assigned Area</u>. *Refer to Annex C (Operations) as required.*
      (1) (U) <u>Terrain</u>. *Describe the aspects of terrain that impact AMD operations. Terrain information considers vegetation, type of terrain features, trafficability of roads, cross-country movement, and local water features. Refer to Annex B (Intelligence) as required.*
      (2) (U) <u>Weather</u>. *Describe the aspects of weather that will impact AMD systems. State the weather forecast for next 48 to 72 hours (including the daily highs, lows, and chance of precipitation). Refer to Annex B (Intelligence) as required.*

[page number]
[CLASSIFICATION]

Figure A-1. Sample Annex I (Air and Missile Defense) format

[CLASSIFICATION]

ANNEX I (AIR AND MISSILE DEFENSE) to OPERATION PLAN or ORDER __ [number] [code name]— [issuing headquarters] (classification of title)

    c. (U) <u>Enemy Forces</u>. *List the types, location, activity, and strength of enemy air and missile systems, to include ballistic missile, cruise missile, manned and unmanned aircraft and indirect fire. Identify number of aircraft sorties available per day by type of aircraft and known and estimated loiter and turnaround times. Develop templates presenting known and suspected airfields and FAARPs. List enemy ground force, electromagnetic warfare threats, and other capabilities that will impact friendly AMD operations. State expected enemy courses of action and employment of enemy air and ballistic assets per the AMD intelligence preparation of the operational environment. Include projected air avenues of approach, an event template, and situational template. Develop and present in Appendix 2. Refer to Annex B (Intelligence) as required.*

    d. <u>Friendly Forces</u>. *Identify the mission of higher ADA headquarters; locations and planned actions of units on left, right, front, and rear; joint and multinational AMD systems available; supported forces; surveillance and intelligence provided by information collection platforms; and security of fixed, semi-fixed, and mobile ADA units provided by supported units, as applicable. Enhance continual situational understanding by frequently updating data of friendly forces. Describe the method and timing of the data updates. Outline the higher headquarters' AMD plan. List designation, location, and outline the plan of higher, adjacent, and other AMD organizations and assets (e.g., non-dedicated Stinger MANPAD teams) that support or impact the issuing headquarters or require coordination and additional support. Develop an arrayal of friendly forces and include in Appendix 3.*

        (1) (U) <u>Higher Headquarters Two Levels Up</u>. *Identify the higher headquarters mission and commander's intent two echelons above.*

        (2) (U) <u>Higher Headquarters One Level Up</u>. *Identify the next higher headquarters mission, commander's intent, and concept of operations.*

        (3) (U) <u>Missions of Adjacent Units</u>. *State the missions of adjacent units and other units whose actions have a significant impact on the issuing headquarters.*

        (4) (U) <u>Attachment and Detachments</u>. *Identify units that are to be attached/detached in creating task forces by phase of operation.*

    e. (U) <u>Interagency, Intergovernmental, and Nongovernmental Organizations</u>. *Identify and describe other organizations in the assigned area that may impact the conduct of AMD operations or impact AMD-specific equipment and tactics. Refer to Annex V (Interagency Coordination) as required.*

    f. (U) <u>Civil Considerations</u>. *Describe the aspects of the civil situation that impact AMD operations. Refer to Annex B (Intelligence) and Annex K (Civil Affairs Operations) as required.*

    g. (U) <u>Assumptions</u>. *List any AMD-specific assumptions that support the annex development.*

2. **(U)** <u>Mission</u>. *State the AMD mission in support of the base plan or order.*

3. (U) **Execution.** *This paragraph contains the commander's visualization of the execution of an operation from start to completion.*

    a. (U) <u>Scheme of AMD</u>. *Describe how AMD supports the commander's intent (commander's vision of the battle, how the commander expects to fight, and what is expected to be accomplished) and concept of operations. State the priorities for, allocation of, and restrictions on ADA units (and non-dedicated Stinger MANPAD teams) by phase of the operation. The scheme of AMD must be concise but specific enough to clearly state what ADA units are to accomplish in the operation. It must answer the "who, what, when, where, and why" of the ADA units to be provided, but provide enough flexibility to allow subordinate commanders*

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[CLASSIFICATION]

Figure A-1. Sample Annex I (Air and Missile Defense) format (continued)

[CLASSIFICATION]

ANNEX I (AIR AND MISSILE DEFENSE) to OPERATION PLAN or ORDER __ [number] [code name]— [issuing headquarters] (classification of title)

to determine the "how" to the maximum extent possible by ensuring necessary procedural and positive control. It may include a general narrative for the entire operation that should address the AMD support tasks, allocation of assets, positioning guidance for ADA units, identification and engagement authorities (by area, type of air and missile threat, or phase of operation) and ROE. Cite applicable AMD principles and employment tenets to be implemented in the narrative. Refer to the base plan or order and Annex C (Operations) as required.

(1) <u>Task, Purpose, Execution, and Assessment</u>: *The example given in Appendix 1 (AMD Execution Matrix) provides a sample matrix for task, purpose, execution, and assessment, to be used at the discretion of the commander. See local standard operating procedures for additional guidance and details.*

(2) (U) <u>Priorities for Air Defense.</u> *Expect priorities and levels of protection to change during succeeding phases of operations per METT-TC (I).*

(3) (U) <u>Concept of Employment</u>. *Provide direction for subordinate force arrayal, including unit designations, nomenclatures, tactical tasks, and future missions. Establish the scheme of maneuver that supports the maneuver commander. Designate unit locations and primary and secondary target lines. Use Appendix 2 to show the locations of ADA units and other supporting AMD elements in the area of operations. Enact passive AMD measures; include movements to alternate sites and survivability moves in coordination with the supported unit. Refer to unit SOPs and supported unit operation plans/orders.*

b. (U) <u>Engagement and Identification Authorities</u>. *Identify the designated engagement and identification authority (authorities). Refer to the area air defense plan, airspace control plan, and special instructions. Ensure all subordinate ADA units understand who has the authority to direct an engagement.*

c. (U) <u>Support Relationships</u>. *List the support relationships of subordinate ADA units to maneuver forces and other assets as applicable. Develop a matrix and post as Appendix 4 when discussions of the relationships are too lengthy to include in this paragraph.*

d. (U) <u>Airspace Management</u>. *Keep ADA units and supporting elements aware of friendly and neutral airspace users. Determine the most effective, but least restrictive, airspace coordinating measures in coordination with other airspace management entities and organizations. Advise subordinate ADA units, other Army units (for C-sUAS elements and non-dedicated Stinger MANPAD teams), and other supporting joint and multinational AMD forces of the airspace coordinating measures in effect in the area of operations. Support the clearance of airspace and deconfliction of air users as required. Support the establishment of restricted operating zones. Present the airspace management measures in effect in Appendix 5. Refer to the unit airspace plan, Appendix 10 (Airspace) to Annex C (Operations), and the aviation plan for any local airspace coordinating measures. All ADA airspace management operations are conducted with other airspace users, such as field artillery and aviation; planning elements, such as an air defense support element, protection cell and joint air-ground integration center; and external airspace entities, such as the U.S. Air Forces' control and reporting center.*

e. (U) <u>Joint and Multinational AMD</u>. *Describe concepts for including joint and multinational AMD forces and systems in defenses in the area of operations. Address their capabilities and potential missions. Identify limitations inherent in multinational capabilities and in operating with multinational AMD forces, such as restrictions in disseminating some classified information.*

[page number]
[CLASSIFICATION]

Figure A-1. Sample Annex I (Air and Missile Defense) format (continued)

[CLASSIFICATION]

ANNEX I (AIR AND MISSILE DEFENSE) to OPERATION PLAN or ORDER __ [number] [code name]— [issuing headquarters] (classification of title)

f. (U) *Early Warning. Develop a comprehensive sensor plan, by phase of operation, based on the AMD IPOE to detect all aerial threats and present in Appendix 6. Employ unit sensors to detect aerial threats. Establish an air threat warning system with the supported commander. Coordinate with other AMD elements whose sensors can enhance early warning; coordination should be effected through the air defense coordinator/deputy air defense coordinator or the air defense artillery fire control officer. Use procedures in SOPs for instructions on voice and data transmittals. Establish an early warning frequency to transmit warnings/alerts only to at-risk units, bases, or areas and all-clear notifications once the threat is over. Develop an emission control plan.*

g. (U) *Essential Elements of Friendly Information. Provide additional information necessary for planning not already mentioned, including the following -*
    (1) (U) Date-time group, location, size, disposition, and flight path of aviation units (manned and unmanned aircraft) in the assigned area.
    (2) (U) Date-time group, location, size, disposition, and mobility of units in the area of operations.
    (3) (U) Location and disposition of command nodes.
    (4) (U) Sustainment plans and sustainment operations.
    (5) (U) Sustainment, operational, intelligence, command, control, and communication limitations and vulnerabilities.
    (6) (U) Vulnerabilities that could be exploited to jeopardize multinational support of ongoing operation.

h. (U) *Coordinating Instructions. List only instructions applicable to two or more subordinate units not covered in the base plan or order. Identify any nonstandard operating procedure type of information that will enhance coordinated AMD actions. Use an appendix (appendices) for lengthy presentations.*
    (1) (U) Operational Timeline. List time or condition when the OPORD becomes effective. List critical times. Refer to Appendix 3 (Decision Support Products) to Annex C (Operations) as required.
    (2) (U) Rules of Engagement. Identify the right of self-defense, identification criteria (applied to friendly, neutral, and hostile platforms), fire control orders, weapons control status, and levels of control in effect.
    (3) (U) Alert States. List the manning and equipment resources required to achieve various operational statuses of operation per unit SOP. Include times to achieve ready-to-fire status and desired radar emissions. Designate units for maintenance and training.
    (4) (U) Air Defense Warning Conditions. List the three air defense warning conditions. Identify the warning condition in effect. Note that subordinate ADA commanders may issue higher, but not lower, conditions for their area of operation.
    (5) (U) Firing Doctrine. Identify the method of fire to be used by each type of available ADA system against air and missile threats.
    (6) (U) Coordinating Altitude. Identify the coordinating altitude in the supported unit's (or higher echelon, as applicable) area of operation and address which commander is responsible for air traffic and management above and below it. Update as necessary in accordance with airspace control orders, airspace tasking orders, and special instructions to ensure currency.
    (7) (U) Non-Dedicated Air Defense. Transmit air defense warning conditions and ROE to supported units to guide aerial engagements. Direct the air defense coordinator/deputy air defense coordinator to ensure the supported commander is aware of the aerial operational environment.

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[CLASSIFICATION]

Figure A-1. Sample Annex I (Air and Missile Defense) format (continued)

[CLASSIFICATION]

ANNEX I (AIR AND MISSILE DEFENSE) to OPERATION PLAN or ORDER __ [number] [code name]— [issuing headquarters] (classification of title)

4. (U) <u>Sustainment</u>. *Identify sustainment priorities for AMD key tasks and specify additional sustainment after the battle to support the ADA commander's scheme of operations. Refer to Annex F (Sustainment) as required.*

 a. (U) <u>Logistics</u>. *Use subparagraphs to identify priorities and specific instructions for logistics support. Refer to Annex F (Sustainment) and Annex P (Host-Nation Support) as required.*

  (1) (U) <u>Supply</u>. *Identify the location of ammunition support activities. and POL sites. Identify other critical items of supply. List the air defense specific munitions (Patriot, Stinger, 30mm, etc. by type/load out) required supply and controlled supply rates for planning and prioritization purposes. State which unit(s) is missioned to deliver the supplies and the coordination needed to be effected with higher ADA headquarters and applicable supporting units. Refer to Annex F (Sustainment) as required.*

  (2) (U) <u>Allocation of Ammunition</u>. *List the priorities for allocation/resupply of missile and gun munitions for each phase of the operation based on the amount of Class V available. Refer to Annex F (Sustainment) as required.*

  (3) (U) <u>Maintenance</u>. *List maintenance actions to be performed internally or by a higher ADA headquarters and those required by a supported force or installation. Designate and prioritize contact teams and personnel for support of ADA systems, motors, and communications.*

  (4) (U) <u>Equipment Recovery Plan</u>. Designate areas/locations for non-repairable ADA equipment to be recovered for assessment and rapid return to mission capable status by cross-leveling of parts, or retrograded to the rear for higher echelon maintenance repair or evacuation to depot repair. Define authority for controlled substitution and/or cannibalization of ADA systems

 b. (U) <u>Personnel</u>. *Use subparagraphs to identify priorities and specific instructions for human resources support, financial management, legal support, and religious support. Refer to Annex F (Sustainment) as required.*

 c. (U) <u>Health Service Support</u>. *Refer to Annex F (Sustainment) as required.*

 d. (U) <u>Financial Management</u>. *Refer to Annex F (Sustainment) as required.*

5. (U) **Command and Signal**. *This paragraph contains instructions relative to command and to the operation of communications equipment.*

 a. (U) <u>Command</u>.

  (1) (U) <u>Location of the Commander and Key Leaders</u>. *State the chain of command and locations of the commander and key AMD leaders, to include joint air commanders such as the area air defense commander and regional/sector air defense commander as appropriate.*

  (2) (U) <u>Succession of Command</u>. *State the succession of command if not covered in the unit's SOPs.*

  (3) (U). <u>Command Posts</u>. *Describe the employment of command posts, including the location of each command post and its time of opening and closing, as appropriate. State the primary controlling command post for specific tasks or phases of the operation and designated alternate in the event the primary command post is moving or unable to continue to operate.*

 b. (U) <u>Signal</u>. *Describe the concept of signal support, including location and movement of key signal nodes and critical electromagnetic spectrum considerations throughout the operation. State the primary, alternate, contingency, and emergency communications plan. Include the supported unit frequency; convoy frequency, if applicable; challenge, password, signals, and code words; early warning frequency; IFF code book number; and listening silence instructions. Refer to Annex H (Signal) as required. Present the plan/architecture in Appendix 8.*

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Figure A-1. Sample Annex I (Air and Missile Defense) format (continued)

[CLASSIFICATION]

ANNEX I (AIR AND MISSILE DEFENSE) to OPERATION PLAN or ORDER __ [number] [code name]— [issuing headquarters] (classification of title)

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[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.

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ATTACHMENTS: *List lower-level attachment (appendixes, tabs, and exhibits).*

Appendix 1– AMD Execution Matrix
Appendix 2– Enemy Force Arrayal
Appendix 3– Friendly Force Arrayal
Appendix 4– Support Relationships
Appendix 5– Airspace Management Measures
Appendix 6—Sensor Plan
Appendix 7– Coordinating Instructions (as necessary)
Appendix 8- AMD Communications Architecture

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

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ADA	air defense artillery	JP	joint publication
ADP	army doctrine publication	MANPAD	man-portable air defense
AMD	air and missile defense	METT-TC	mission, enemy, terrain and weather, troops and
AR	army regulation		support available, time available, civil considerations,
C-UAS	counter-unmanned aircraft system		and informational considerations
DODM	department of defense manual	mm	millimeter
FARP	forward arming and refueling point	OPORD	operation order
FM	field manual	POL	petroleum, oils, and lubricants
IFF	identification, friend or foe	ROE	rules of engagement
IPOE	intelligence preparation of the operational environment	SOP	standard operating procedure

Figure A-1. Sample Annex I (Air and Missile Defense) format (continued)

Appendix B

Air and Missile Defense Execution Matrix

This appendix discusses the AMD execution matrix and how it is used as a decision support tool to guide ADA leaders and Soldiers in identifying and synchronizing their unit's tasks with the supported commander's mission objectives. The AMD execution matrix introduces the memory aid *Sense, Track, Target, Engage, and Assess* (referred to as ST2EA) to assist ADA planners in determining how to prioritize essential AMD tasks as they plan and conduct operations.

INTRODUCTION

B-1. The AMD execution matrix assists ADA commanders, leaders, and staffs organize forces and capabilities and identify AMD tasks as they develop their initial plans to synchronize their units' AMD fires with the higher headquarters scheme of AMD. Information used to complete the AMD execution matrix should focus on the commander and staff's assessment of the supported commander's concept of the operation, threat, required tasks, and timing of events. The analysis helps the commander understand the unit's mission requirements and visualize the operation going forward as the staff begins developing initial estimates and war-gaming potential courses of action. The AMD execution matrix tool offers ST2EA as a memory aid designed to assist ADA leaders visualize and assess how to link their unit's essential tasks and purpose to the AMD engagement sequence.

B-2. The AMD execution matrix is specifically designed to be used as a routine planning tool. It offers users a framework describing how to arrange units by task and purpose with the higher headquarters mission and assigned priorities for AMD. Like other decision support aids, the AMD execution matrix is adaptable to most planning processes and situations. The data articulated in working versions of the matrix can be used to validate several other products being developed. For example, planners can use the matrix as an initial checklist while addressing units and required capabilities and recording planning decisions as tasks are identified. The AMD execution matrix allows commanders to synchronize their subordinate units' tasks to the supported commander's mission objectives by phase of an operation by—

- Establishing criticality/priority of asset or area defended.
- Directing timing of events and triggering engagement decisions.
- Directing weapon or sensor movements, positioning, and timing.
- Activating or deactivating emissions control plans.
- Coordinating surveillance options and fires when operating in or near adjacent areas or restricted volumes of airspace.
- Anticipating changes in missions and facilitating transitions.
- Controlling timing of unit maintenance events and enabling sustained operations.
- Directing survivability actions during periods of vulnerability, such as equipment failures or unit relocations.

B-3. The AMD execution matrix can also be used as a tool helping the staff gather information and prepare for combined arms rehearsals and commanders' briefs, or as a draft planning tool to help describe operational requirements by phase. The matrix should be kept current throughout planning and operations and can eventually be used a way to develop the unit's concept of operations.

ESSENTIAL TASKS

B-4. The AMD execution matrix tool shows how to identify essential AMD tasks, organize units and capabilities to the task, and decide timing of events as they develop and synchronize their subordinate plans. Identifying subordinate unit AMD tasks and timing of events are critical decision points for commanders and staffs.

B-5. During planning and operations commanders use task and purpose as a common language to identify and assign essential tasks to subordinate units without having to specify everything the task or mission entails. An *essential task* is a specified or implied task that must be executed to accomplish the mission. (FM 6-0)

B-6. AMD tasks should be listed by unit, priority of effort (given numerical order of precedence of time and importance) and be supportable. A *decision point* is a point in space and time when the commander or staff anticipates making a key decision concerning a specific course of action (JP 5-0).

B-7. Table B-1 provides guidelines for developing AMD tasks. Definitions listed should be standardized for use when outlining the task, purpose, AMD priority, allocations, positioning guidance, and information regarding applicable restrictions to AMD operations to complete the AMD execution matrix.

Table B-1. AMD task and purpose definition guide

AMD Task and Purpose Definition Guide	
Task	A *task* is a clearly defined action or activity specifically assigned to an individual or organization that must be done as it is imposed by an appropriate authority. (JP 1, Volume 1). An AMD task describes anticipated targeting objectives AMD fires must create to achieve desired effects against enemy air attacks and surveillance. The task is developed by considering the objective, available formations, and the air and missile defense function. Several terms can be used to describe the task as it relates to the ADA commander's targeting objectives. For example, some common terms used to describe a desired end state of a task are deter, defeat, and destroy enemy air and missile attacks and surveillance.
Purpose	The purpose describes the commander's intent and operational purpose for the task. When describing purpose use the commander's purpose from the Scheme of Air and Missile Defense or OPORD. Identify the supported maneuver formation that will leverage the defense coverage and effect and describe in space and time what the effect will accomplish. An example of the purpose, "To allow a maneuver element to occupy or move into an assembly area while preparing to conducting wet gap crossing operations without becoming decisively engaged by enemy air and missile attacks."
AMD Priorities	The AMD priority designates the level of criticality and importance of an assigned asset or area that requires active AMD. AMD priorities are normally listed conveying a desired level of protection for a defended area or asset. This is achieved using the methods of allocation, positioning, and restrictions using the appropriate air defense capability available against all projected air threats.
Allocations	*Allocation* is the distribution of limited forces and resources for employment among competing requirements (JP 5-0). For an ADA task force, it's about the right force in the right place to adequately defend critical high value military and geopolitical assets and forces. For example, the AAMDC orchestrates the allocation of Patriot and THAAD units, as well as integrating ADA brigade headquarters with joint and multinational AMD capabilities to defend high priority theater and corps assets in the strategic support and joint security areas against the cited threats.
Positioning Guidance	Positioning is the movement of combat power to support the task. During offensive operations, supported commanders direct the positioning of available organic or supporting radars and short-range ADA systems to locations where they can best support the unit's attack in accordance with the critical and defended asset lists (ADP 3-90).
Restrictions	Restrictions are closely tied to the positioning guidance and are essentially a commander's adherence to the constraints placed upon their operations. Restrictions can come many forms or from multiple sources. These are normally instructions or procedural rules, such as rules of engagement, a supporting control measure, or restrictive coordinating procedure, placed on commanders or an area in which they may operate.

AAMDC	army air and missile defense command	JP	joint publication
ADA	air defense artillery	OPORD	operation order
ADP	army doctrine publication	THAAD	terminal high altitude area defense
AMD	air and missile defense		

B-8. The AMD execution matrix gives commanders and staffs a way to save time and organize their thoughts as they decide what their essential tasks are. When using the matrix, planners should list only the essential tasks required and not get caught up in the intricacies of listing all related subtasks, as they are implied tasks. The commander and staff should assign identified AMD tasks to specific units with the

required capability addressing unit/task force designations, purpose (mission and desired end state), and positioning information. They should also provide the execution and assessment methods associated with the AMD engagement sequence. All tasks identified should be developed taking into consideration only organic forces available, previously established command and support relationships, and the supported commander's priorities for AMD. Allocation and positioning must be tied to the supported commander's AMD priorities, phase of operation, and METT-TC(I).

EXECUTION MATRIX

B-9. Developing a detailed AMD execution matrix is a way for commanders to provide the who, what, when, where, how, and why as they rehearse and prepare to organize forces and align capabilities to AMD priorities stated in the higher/supported commander's mission orders. The AMD execution matrix is designed to identify tasks and associated purposes using the AMD engagement sequence as a tool to expand on routine planning information.

B-10. The tool shows how to relate the unit's task and purpose to the AMD operations using an engagement sequence. Routine information to consider includes the supported commander's priority of the AMD action or asset, allocation of forces and capabilities, positioning and threat orientation guidance for units (grid/heading/primary and secondary target lines), and any accompanying restrictions placed on units operating within the designated area of operations that is normally included in the base order or special instructions. An example of the AMD execution matrix and engagement sequence tool (ST2EA) is shown in figure B-1 on page 164.

AMD Execution Matrix							
WHY	**PHASE:** *State phase of the operation or provide a descriptor as required.*						
	Supported Commander Task (WHAT): *State the supported commander's air and missile defense task and the type(s) of desired effects ADA units and systems must provide for that phase of the operation (for example, defeat enemy anti-access/area-denial capabilities, destroy inbound air and ballistic missile threats, neutralize enemy integrated air defense systems capabilities, support an offensive operation).*						
	Supported Commander Purpose (WHY): *State the supported commander's purpose and desired end state for air and missile threats and air superiority objectives. There may be more than one task or purpose per phase.*						
	Supported Commander AMD priorities: *State the priority of assets under the unit's command and control that can be defended against air and missile threats by available ADA units. (Refer to the Protection Prioritization List in Annex E).*						
	Allocations: *List available assets and capabilities and any additional forces assigned or attached.*						
	Positioning guidance: *Provide weapon system and sensor positioning guidance for subordinate and adjacent units in supporting roles within the area of operations. Identify search sectors and primary/secondary target lines.*						
	Restrictions: *List all restrictions by phase.*						
	Targeting information: *List anticipated target types (both planned and unplanned). For example, fixed-and rotary-wing aircraft, cruise missile, and small unmanned aircraft systems. Use the AMD engagement sequence- Sense, Track, Target, Attack, and Assess as a guide to assist task identification/priority, and decision support when filling in this execution matrix.*						

WHAT	**ADA Task 1:** *Task for the ADA headquarters echelon captured in this order/annex/appendix as it pertains to the guidance outlined by the supported commander above. List as many tasks that are required by the guidance and are supportable. This should align to the narrative of the scheme of maneuver/air and missile defense.*						
	ADA Purpose 1: *The ADA purpose is tied to the task listed above.*						
	Apply Memory Aid "ST2EA" to clarify task and purpose, using AMD engagement sequence						
	Task Number (Task & Purpose)	**Assign Unit** (Allocation)	**Supported Unit / Relationship**	**(S) Sense**	**(T) Track**	**(T) Target**	**(E) Engage**	**(A) Assess**
	ADA task # Prioritize task by level of importance. Task must support higher HQ mission.	*Identify unit assigned to defend designated priority asset supporting commander's direction.*	*Identify Unit being supported / DS/GS/GSR/R*	*Position forces and capabilities to detect and locate targets entering defended area. Select targets for prosecution*	*Track is a tool used to discriminate and determine identity and classification of observed target activities and movements. Report target location and heading (by Grid/UTM)*	*Perform threat evaluation and decide effects. Coordinate all restrictions, clearances, assign weapons, and timing of engagements.*	*Order to direct or authorize units and/or weapons to attack designated targets in accordance with C2, weapons control status, and firing doctrine.*	*Determine if desired effects were generated and report or process for potential reengagement.*

Note: the "Task Number / Assign Unit / Supported Unit / Relationship" header row has nine columns but the "WHAT" label spans the left margin.

HOW	**Decision Support Tool for Assigning Units to Tasks (Force Arrayal)**							
	Task 1: Neutralize air and ballistic missile threats entering vicinity of objective RED	A/3-43 ADAR (Patriot)	V Corps / GS	Dedicated sensors, 1x Patriot Radar.	Track information disseminated through the joint/ tactical data network AMDWS/ CDLIM/AMDPCS and early warning via voice communications.	Characterization of the aerial object including point of origin, threat type, and suspected friendly asset it is arrayed against. Track data is conveyed by the AMDWS.	# of Patriot Missiles available by type and method of fire. Engagements are executed IAW ADW, WCS, and ROE.	# of threats destroyed by type and # of munitions expended by type.
	Task 2: Deny aerial attacks and surveillance of assembly area	C/4-60 ADAR (M-SHORAD)	1-1 AD / DS	Dedicated sensors, 3x Sentinel, 4x MHR per weapon system.	Disseminated through the joint/integrated fire control network/division early warning via AMDWS, FAAD C2, and voice communications.	Characterization of the aerial object including point of origin, threat type, and suspected friendly asset it is arrayed against. Track data is conveyed by the AMDWS, CDLIM, and FAAD C2.	Stinger Missile, 30mm auto cannon, and Non-Dedicated Stinger MANPAD Teams. Engagements are executed IAW ADW, WCS, and ROE.	# of threats destroyed by type and # of munitions expended by type.
	Task 3:							

Continue to list additional ADA tasks as necessary to meet the supported commander's intent

AD	armored division	GS	general support
ADA	air defense artillery	GSR	general support reinforcing
ADAR	air defense artillery regiment	HQ	headquarters
ADW	air defense warning	IAW	in accordance with
AMD	air and missile defense	M-SHORAD	maneuver short-range air defense
AMDPCS	Air and Missile Defense Planning and Control System	MANPAD	man-portable
AMDWS	air and missile defense workstation	MHR	multi-mission hemispheric radar
C2	command and control	R	reinforcing
CDLIM	common data link interface module	ROE	rules of engagement
DS	direct support	UTM	Universal Transverse Mercator
FAAD	forward area air defense	WCS	weapons control status

Figure B-1. Example of an AMD execution matrix

Appendix C

Threat

Russia's attacks mark the largest employment of offensive missile systems in Europe since World War II. Other potential adversaries across the globe are developing, fielding and normalizing the use of increasingly diverse, robust and lethal offensive missile systems in an attempt to gain coercive power and strategic advantage over the United States and our allies and partners.

LTG Daniel Karbler

This chapter summarizes existing and emerging threat aerial tactics and identifies the air and missile threats facing the Army and joint warfighting forces. The air and missile threats are addressed in terms of generic capabilities. The threats to be countered by ADA systems are ballistic missiles, large-caliber rockets, cruise missiles, air-to-surface missiles, hypersonic weapons, UASs, manned fixed- and rotary-wing aircraft, and indirect fires (rockets, artillery, and mortars). Questions used by ADA analysts to evaluate threat capabilities are appended to the end of each threat discussion. Electromagnetic warfare, cyberspace, and threats from space are also addressed.

SECTION I – THREAT TACTICS AND OBJECTIVES

C-1.   The threat will attempt to develop an overmatch in an area to mitigate the capabilities of the U.S. force. Traditional tactics of massing fires to overwhelm a defense and surveilling or attacking from any direction and altitude will continue to be employed. In massing fires, for instance, the threat will launch more missiles against a defense than the defending Army or joint AMD force can engage. Cruise missiles, UASs, and fixed- and rotary-wing aircraft have freedom of maneuver through 360 degrees in support of both attack and intelligence, reconnaissance, and surveillance operations. Threats will prioritize AMD forces and AMD control elements as high priority targets.

C-2.   Advanced electronic attack, in which a threat system jams or spoofs across the electromagnetic spectrum in an attempt to hamper an AMD (Army and other Service) system's ability to detect or engage a threat system or missile, will also be employed. And, as the AMD force becomes more network centric, a sophisticated cyberspace attack could potentially hamper the AMD network's ability to support the detection, identification, or engagement of a target.

C-3.   The threat will continue to exploit the use of countermeasures tailored to the attacking platform and the AMD capabilities being countered. Ballistic missiles can employ decoys, in-atmosphere maneuver (which can also aid accuracy of delivery), and electronic jamming pods. Air threats can employ electronic jamming and spoofing, flares, chaff, and other penetration aids. Penetration aids are devices carried on air and missile objects and/or tactics used to counter AMD systems. ADA units must be knowledgeable of the various types of countermeasures that could be employed and prepared to defeat them.

C-4.   Complex integrated attacks are routinely seen on battlefields today. A complex integrated attack is designed to overwhelm defense of a site by the employment of different capabilities. Simple attacks that send one threat type at a time against a defense are more easily defeated in detail, as a defense can concentrate its capabilities against the specific operational characteristics of that type of threat. For example, when ballistic missiles attack within a sector of the defense's coverage, the defense can concentrate surveillance and firepower into that sector. However, when out-of-sector cruise missiles are integrated with ballistic missile attacks, the defense must counter the combined effects of the total attacking force. **A *complex integrated attack* is a synchronized attack of a friendly asset by a mix of air and missile threats arriving near-simultaneously from different directions, altitudes, and ranges.** This mix can include any or all air and missile threats, from ballistic missiles to indirect fires. The defending force's surveillance and firepower must be capable of defending throughout the entire 360 degrees; if the defending force is focused on only one threat or sector (for example, the ballistic sector of attack), the complex integrated attack will destroy or

significantly damage the defended asset. Complex integrated attacks will likely be supported by enemy activities in other domains, such as jamming efforts in the cyberspace domain and special operations forces' attacks in the land domain.

SECTION II – THEATER AIR AND MISSILE THREATS

C-5.   The emerging air and missile threats encompass a wide range of missiles, rockets, projectiles, and air platforms. The number of countries developing weapons of mass destruction is unconstrained, and delivery systems with increasing range and accuracy are being sought and developed. Compounding these threats is the potential for initiation of electronic and cyberspace attacks.

C-6.   Air and missile threats consist of ballistic missiles, air threats, and rockets, artillery, and mortars. A *ballistic missile* is any missile that does not rely on aerodynamic surfaces to produce lift and consequently follows a ballistic trajectory when thrust is terminated (JP 3-01). Air threats include manned fixed- and rotary-wing aircraft, UASs, and aerodynamic missiles. Rockets, artillery, and mortars comprise the indirect fire threat.

BALLISTIC MISSILES

C-7.   Ballistic missiles are a means to project power in regional and strategic contexts, and they provide the capability to launch an attack from a distance. Ballistic missile proliferation continues, and countries are acquiring a greater number of ballistic missiles, increasing their range, incorporating ballistic missile defense countermeasures, and making them more complex, survivable, reliable, and accurate. Ballistic missiles can be used as antiaccess weapons by potential regional adversaries. These weapons can be used to reduce military options for combatant commanders and threaten the survivability of regional military assets. There is an increasing threat of the technologies being furnished to other countries and hostile non-state groups.

C-8.   Ballistic missiles are categorized in terms of their ranges, from close range to intermediate range (table C-1).

Table C-1. Ballistic missile ranges

Type	*Range*
Close range	Up to 300 kilometers
Short range	Up to 1,000 kilometers
Medium range	1,000 to 3,000 kilometers
Intermediate range	3,000 to 5,500 kilometers

C-9.   Ballistic missiles are surface-launched missiles with ballistic trajectories. They are often launched from highly mobile, difficult-to-detect transporter erector launchers and can carry nuclear, biological, and chemical weapons. Most are single-stage missiles with an estimated circular error probable accuracy of one-tenth of one percent of the range. State-of-the-art guidance technologies, such as the Global Positioning System, can increase this accuracy to less than 50 meters. The most proliferated of these missiles are the close- and short-range ballistic missiles which are available to more than 30 states and non-state actors worldwide. Ballistic missiles are inherently difficult to defend against. Characteristics that increase their survivability include a small radar cross section, high terminal velocity, short notification time for defending forces, a variety of difficult-to-kill warheads, and an all-weather launch capability. With the introduction of penetrations aids such as decoys, chaff, and maneuvering warheads, ballistic missiles have become increasingly sophisticated, accurate, and more difficult to defeat.

C-10. Iran has steadily increased its ballistic missile force, deploying next-generation short- and medium-range missiles with increasing accuracy and new submunition payloads. It is continuing to develop new missiles and working to enhance lethality and effectiveness of existing systems with improvements in accuracy and warhead designs, to include maneuvering reentry vehicles and submunition payloads. Iran's increasing capabilities and willingness to use ballistic missiles was demonstrated in January 2020, when it bombarded U.S. troops in Iraq for several hours with over 20 ballistic missiles in retribution for the U.S. killing of Qasem Soleimani. This attack damaged U.S. facilities and injured over 100 U.S. personnel.

C-11. North Korea has expanded the size and sophistication of its ballistic missile forces, from close-range to intercontinental variants, and has conducted an unprecedented level of nuclear tests and ballistic missile launches since 2016, including its short-range, medium-range, intermediate-range, long-range, and submarine-launched ballistic missiles. Today, North Korea fields hundreds of missiles that can reach U.S. forces forward deployed in the Republic of Korea and Japan, as well as ballistic missiles that can reach the United States.

C-12. The People's Republic of China is building and deploying a modern missile arsenal. China is developing a combination of ballistic and cruise missiles launched from air, land, and sea to target the United States and U.S. allied military assets in the Asia-Pacific theater in an antiaccess and area denial role. China is also developing a number of advanced capabilities, such as maneuverable anti-ship ballistic missiles, multiple independent reentry vehicles (known as MIRVs), and hypersonic glide vehicles. The combination of these types of systems can degrade the survivability of critical power projection elements such as an aircraft carrier and forward air bases. China also has nuclear intercontinental ballistic missiles capable of striking the U.S. homeland, as well as a growing fleet of nuclear ballistic missile submarines.

C-13. Ballistic missiles are being used by Russia in its war with the Ukraine. Russian missiles have caused major damage to Ukraine's economy and infrastructure. In a June 2023 attack, Russia struck a Ukrainian air base in Poltava with a barrage of eight ballistic and cruise missiles combined with drone one-way attack munitions. Ukraine stated it shot down only two cruise missiles, meaning some ballistic missiles penetrated Ukrainian defenses. Complex attacks such as these will likely be the norm in the future. Russia has large stocks of ballistic missiles with capabilities to easily strike inside Ukraine. Russia has fielded an air-launched ballistic missile which greatly enhances their operational reach in a theater and increases its ability to launch potential attacks throughout 360 degrees. Russia also has ballistic missiles that can reach the United States.

C-14. Questions regarding ballistic missiles that need to be answered by ADA analysts include:
- Unit organizations?
- Types?
- Performances (missile flight time, speed, trajectory, and launch restrictions)?
- Number of ballistic missiles transporter erector launchers?
- Number of ballistic missiles available per transporter erector launcher?
- Warhead type and size?
- Number of multiple independently-targetable reentry vehicles?
- Guidance modes?
- Maximum and minimum ranges?
- Circular error probable?
- Crew proficiency?
- Reload and fire time?
- Location of launch sites?

LARGE-CALIBER ROCKETS

C-15. Large-caliber rockets, classified as those of 200 millimeters and greater, are unguided, surface launched, indirect fire rockets with ranges greater than 40 kilometers. They can be fired from single or multiple launch platforms. In the past 20 years, large-caliber rockets have increased in range (some as much as 300+ kilometers) and now, with enhanced guidance packages, are morphing into close- and short-range ballistic missiles.

C-16. Rockets can deliver high rates of fire and a variety of warheads, making them ideal weapon systems for fire support missions. The highly mobile launchers can rapidly move around the battlefield. This mobility, coupled with the rockets' short burn time, gives maneuver forces little warning. Their short range and salvo capability complicate engagement by current AMD systems.

C-17. Like ballistic missiles, large-caliber rockets are found in many countries. They are inexpensive and were used against U.S. forces in Iraq and against Israel forces and its general population. North Korea has a

300-mm multiple launch rocket system that can easily range Seoul and many U.S. forces stationed in South Korea, including those at Osan Air Base.

C-18. Questions regarding large-caliber rockets that need to be answered by ADA analysts are similar to those for ballistic missiles. See paragraph C-14 on page 167.

AERODYNAMIC MISSILES

C-19. Aerodynamic missiles use lateral surfaces to maintain their flight path. Aerodynamic missiles include cruise missiles and tactical air-to-surface missiles.

C-20. Cruise missiles are unmanned, self-guided vehicles that maintain sustained flight at one or more pre-determined constant (cruise) altitudes and have ranges from 30 to 3,000 kilometers. Tactical air-to-surface missiles are similar to air-launched cruise missiles, but are smaller, have shorter ranges, lack the wings and aerodynamic lift associated with cruise missiles, and are launched by tactical fighter-bomber aircraft. Though regarded as distinctly separate threats, the application of new technologies has given cruise missiles and tactical air to-surface missiles virtually identical capabilities.

C-21. Questions regarding cruise and tactical air-to-surface missiles that need to be answered by ADA analysts include:
- Organizations?
- Type?
- Numbers available by echelon?
- Targeting capability?
- Performance (flight time, speed, altitude, and launch restrictions)?
- Contour flying capability?
- Warhead type and size?
- Guidance mode?
- Maximum and minimum ranges?
- Accuracy?
- Vulnerability to countermeasures?
- Launch platforms and launch platform load capacity?
- Location of launch sites?

CRUISE MISSILES

C-22. Modern cruise missiles can travel at low-to-supersonic or high subsonic speeds, are self-navigating, and can fly non-ballistic trajectories at very low to very high atmospheric altitudes. Cruise missiles can be found in two general categories: land attack and anti-ship. Cruise missiles are generally very expensive and have complicated navigation devices, two considerations which minimized their proliferation; regardless, many nations have shown an increased interest in obtaining the ability to produce these missiles after seeing the U.S. success in employing the land attack variants. Cruise missiles are the hardest air target to detect and intercept which makes them particularly well suited against static ADA systems.

C-23. Cruise missiles are reliable, accurate, survivable, and lethal. They can be launched from the land, air, or maritime platforms. They are difficult to detect, can fly indirect routes at low altitudes to avoid heavily defended areas, and can attack from any direction. Today's cruise missile can hit a target with remarkable accuracy; tomorrow's smarter, maneuverable, more accurate missile pose a far greater threat. Cruise missiles are ideal for striking high-value targets in highly defended areas since aircraft and aircrews are not put at risk.

C-24. The use of air-breathing turbojet and turbofan engines has given cruise missiles a longer range and the capability to fly at high, subsonic speeds and altitudes lower than 50 meters above ground level. Their flight paths can be programmed using sophisticated guidance systems, such as the Global Positioning System, inertial navigation systems, and terrain contour matching. Their guidance systems contribute to overall accuracy, optimize surprise, and help avoid air defenses. A terminal guidance seeker increases accuracy to less than 10 meters. A wide array of conventional warheads, including individually targetable submunitions, allow

targeting of both soft and hard targets. In addition, cruise missiles can carry weapons of mass destruction warheads.

C-25. Many countries have cruise missiles in their arsenal. Some countries have nuclear-capable cruise missiles.

TACTICAL AIR-TO-SURFACE MISSILES

C-26. These missiles are air-launched, precision-guided munitions designed to strike ground targets. They are ideal against targets such as bridges that are difficult to destroy with conventional dumb bombs. Tactical air-to-surface missiles are an extremely lethal threat because of their versatility and pinpoint accuracy.

C-27. Most variants employ radio-command, laser, anti-radiation homing, or electro-optical guidance systems. Missiles that employ anti-radiation homing systems are referred to as anti-radiation missiles; they represent the greatest threat to radars such as those employed by Army, joint, and multinational AMD units. An aircraft firing an anti-radiation missile will usually launch from outside the lethal envelope of the ADA system defending the asset. Laser-guided systems provide the least standoff range, generally less than 10 kilometers. Electro-optical or video-guided systems and anti-radiation missiles offer the greatest standoff range and aircraft survivability. Some electro-optical systems have ranges of approximately 100 kilometers.

HYPERSONIC WEAPONS

C-28. Technological advances are now making hypersonic weapons practicable. The hypersonic weapon's speed and maneuverability offer an adversary greater operational reach, open the air environment to 360-degree attack azimuths, and challenge the ADA units' defense design concepts

C-29. There are two main types of hypersonic weapons: hypersonic cruise missiles and hypersonic glide vehicles. Hypersonic cruise missiles, which are powered by scramjet, are restricted below 100,000 feet; hypersonic glide vehicles can travel higher. Hypersonic weapons, by definition, travel five or more times the speed of sound. Some weapon systems have characteristics of both ballistic and cruise missiles. For example, ballistic missile-launched hypersonic glide vehicles are essentially unpowered cruise missiles. Future supersonic/hypersonic powered cruise missiles may be launched by large rocket boosters that have traditionally been associated with ballistic missiles.

C-30. Hypersonic glide vehicles are being developed as a new type of ballistic missile payload. They are maneuverable vehicles that travel at hypersonic (greater than Mach 5) speed and spend most of their flight at much lower altitudes than a typical ballistic missile. The combination of high speed, maneuverability, and relatively low altitude makes them challenging targets for missile defense systems.

UNMANNED AIRCRAFT SYSTEMS

C-31. An *unmanned aircraft system* is that system whose components include the necessary equipment, network, and personnel to control an unmanned aircraft (JP 3-30). Threat UASs are categorized in groups (see table C-2 on page 170), typically based on weight, operating altitude, and speed. Groups 1 through 3 are further described as small systems.

Table C-2. UAS groups

	Speed / Altitude / Weight	*Characteristics*	
Group 1 Micro / Mini UAS	• Normally operates below 1,200 feet AGL at speeds less than 100 knots. • 0 to 20 pounds with payload.	• Generally hand-launched. • Real time video and control. • Small payloads; focus on reconnaissance, surveillance, and intelligence gathering.	• Operates within LOS of user (limited range) unless flight is preprogrammed or autonomous.
Group 2 Small Tactical	• Normally operates below 3,500 feet AGL at speeds less than 250 knots. • 21 to 55 pounds with payload.	• Launched in unimproved areas by a small number of personnel. • Medium range and endurance. • Payload focus: reconnaissance, surveillance, and intelligence gathering; may add weapons. • Requires LOS to ground control station unless flight is preprogrammed or autonomous.	
Group 3 Tactical	• Normally operates below 18,000 feet MSL at speeds less than 250 knots. • 56 to 1,320 pounds with payload.	• Launched in unimproved areas by a small number of personnel. • Range and endurance vary significantly. • Payload focus: reconnaissance, surveillance, and intelligence gathering; may add weapons. • Requires larger logistics footprint than Groups 1 and 2.	
Group 4 Persistent	• Normally operates below 18,000 feet MSL at any speed. • Greater than 1,320 pounds	• Can be used both strategically and tactically. • Requires a runway for launch and recovery. • Extended range and endurance. • Payloads: reconnaissance, surveillance, intelligence, gathering, and ASM weapons. • Operates at medium-to-high altitudes.	
Group 5 Penetrating	• Normally operates higher than 18,000 feet MSL at any speed. • Greater than 1,320 pounds.	• Strategic-level asset. • Requires an improved runway for launch and recovery. • Greatest range, endurance, and airspeed. • Payloads: suite of optics for targeting and weaponry for engagements. • Operates at medium-to-high altitudes. • Logistical footprint similar to that of a manned aircraft.	
AGL above ground level ASM air-to-surface munition LOS line-of-sight		MSL mean sea level UAS unmanned aircraft system	

C-32. UASs include drones and remotely piloted vehicles. Drones fly preprogrammed flight paths and patterns; remotely piloted vehicles are controlled by ground-based operators. Each can perform a variety of missions, ranging from reconnaissance and battlefield surveillance to attack and electromagnetic warfare. UASs have extensive commercial applications and, as a result, are readily available and arguably the most developed system in many armies around the world. Due to the prolific use of unmanned systems, commercial off-the-shelf UASs are readily available and can be weaponized with relative ease. There are over 1,000 current and developing UAS programs worldwide. UASs are typically comprised of a control element, communication systems, support elements, an unmanned aircraft, a payload or pod, and a human element.

● The control element generally consists of UAS operators and leaders providing aircraft programming or control, payload control, weapons control, and communications supporting the commander's and staff's planning and execution requirements. It also includes the control station itself from which the unmanned aircraft receives its commands. The control station can be mounted on tactical vehicles, in stationary and static structures, on civilian vehicles such as vans

or trucks, and on ships; it could even be placed in orbit around the Earth. (One-way attack UASs are normally pre-programmed to fly to a target; once programmed and launched, they are not controlled or in communication with the control element.)

- Communication with an UAS is normally conducted via line-of-sight communications or satellite control; it is often encrypted to increase information protection and survivability. UASs also make effective platforms for communications relay stations due to their potentially high mission endurance and ability to avoid (over-fly) terrain that ground-based vehicles with relay components would be unable to navigate.

- The support element includes all logistical systems required to deploy, transport, recover, enable, and generally sustain the UAS.

- The unmanned aircraft can manifest itself in a variety of types to include fixed-wing, rotary-wing, aerospace, and even balloons. Typically, the larger the aircraft the greater its endurance and the higher the altitude at which it can operate. The sUASs are particularly dangerous as they present detection and identification challenges to friendly sensor systems due to their low radar, heat, and noise signatures, and for weapon systems to consistently defeat given their low/slow kinematic profiles. UASs are also easily obtained commercially and inexpensive, making them even more of a threat.

C-33. UASs serve as intelligence, surveillance, and reconnaissance platforms for target detection, identification, and location; weapon targeting; target designation; and battle damage assessment. UASs can assist commanders with early warning to develop friendly courses of action. State-of-the-art sensors and data links provide real-time targeting for fire support systems, maneuver forces, and aircraft. UASs equipped with laser designators provide immediate targeting assistance and terminal guidance of munitions. UAS platforms also can serve as a means for weapons delivery or may themselves serve as the weapon, and have been used extensively to attack high payoff targets without endangering pilots. Threat actors consider UASs expendable.

C-34. UASs have relatively low radar cross sections, low speed, and low thermal signatures, thus making them difficult to detect, track, and engage. Mission-dictated flight profiles take full advantage of terrain, increasing system survivability and optimizing coverage. Flight altitudes for UASs vary by their size and mission and can range from meters to thousands of kilometers. UASs conducting intelligence, surveillance, and reconnaissance missions operate at altitudes consistent with their sensor systems. They normally fly at altitudes safe from small arms fire and can stand off and detect from up to 25 kilometers.

C-35. UAS optical payloads consist of daylight television, infrared video, and recording cameras (for reconnaissance missions). Other major payload categories include electromagnetic warfare (jammers), electronic intelligence, radar, communications relay and attack warheads. Several nations are developing and fielding anti-radiation homing UAS capabilities with the primary mission of attacking battlefield radio frequency emitters (radars and communications). These platforms have a variety of launch options and are usually fire-and-forget systems.

C-36. UASs, especially in groups 1-3, have been extensively used in the war in Ukraine. UASs have changed war as we know it. Both Russia and Ukraine are using inexpensive, sUASs for battlefield surveillance, many of which were designed for commercial use. Russia is developing the capability to build low-cost sUASs closer to the front to minimize the time to get them to the fight. Russia employs one-way attack drones (expendable ammunition with fire-and-forget missions) in massed multi-axis attacks with decoy UASs to increase chances of successful attacks against critical Ukrainian assets. UASs have inflicted great damage to Ukraine facilities as well as military equipment. Ukraine is also using UASs for short-range missions and for long-range missions deep into Russia, as far as Moscow.

C-37. Questions regarding UASs that need to be answered by ADA analysts include:
- Organizations?
- Type (attack, surveillance, other)?
- Numbers available?
- Performance (speed, altitude, and launch restrictions)?
- Endurance and range?
- Contour flying or terrain limiting factors?

- Target acquisition and standoff range?
- Loiter time (how long can the UAS stay on station)?
- Sensor package and payload (maximum weight, type, and load mixture)?
- Visibility effects on acquisition?
- Modes of recovery and turnaround time?
- Real-time data link capability?
- Guidance modes (ground controlled or preprogrammed)?
- Crew proficiency.

MANNED ROTARY-WING AIRCRAFT

C-38. Most countries maintain helicopter fleets to support military operations. While most helicopters can be armed to perform a variety of roles, the attack helicopter poses the greatest threat to maneuver forces. The versatility of helicopters makes them ideal for use in most combat areas.

C-39. Threat ground force commanders rely primarily on helicopters to fulfill direct air support requirements. Helicopters can perform a variety of missions. Hovering and low-flying helicopters, taking full advantage of terrain masking, are difficult to acquire and target. An especially challenging ingress technique is nap-of-the-earth flying, in which a helicopter hovers at a masked point, dashes to the next mask point, and hovers again. This technique is challenging because of short exposure times and varying between near-zero Doppler and moderate Doppler velocities. Improvements in fire control and weapon capabilities enable helicopters to search, acquire, and fire at ground targets from longer standoff ranges, thus increasing their survivability and effectiveness. **A *standoff range* is a range at which an air threat can surveil or attack an asset while staying beyond the engagement capability of a defending air and missile defense system.**

C-40. Questions regarding rotary-wing aircraft that need to be answered by ADA analysts include:
- Organizations?
- Numbers available?
- Performance (speed, altitude, and weapon load capacity)?
- Range and ingress and egress altitude and speed?
- Level of combat readiness?
- Sortie generation rate?
- Capability to conduct pop-up maneuvers?
- Standoff range?
- Target acquisition capability and identification range?
- Number and types of ordnance available?
- Typical ordnance load (type and load mixture)?
- Navigational capability (night and adverse conditions)?
- Location of airfields and forward operating bases?
- Combat radius?
- Type, quantity, and quality of training the pilot received?

MANNED FIXED-WING AIRCRAFT

C-41. Manned fixed-wing aircraft remain essential to virtually every type of military operation and despite ballistic missiles and cruise missiles, they will continue to play a role in future conflicts. There are more than 40,000 operational military aircraft today; of these, some 10,000, many produced during the Cold War era, are in developing nations' inventories. Over 50 countries have an aviation industry of some kind, and over 20 countries design their own aircraft.

C-42. Manned fixed-wing combat aircraft are highly flexible and can perform a variety of missions in offensive and defensive operations: air interdiction, strategic attack, suppression of enemy air defense, and close air support. Fixed-wing aircraft can employ a variety of munitions, including bombs, guns, rockets, cruise missiles, and tactical air-to-surface missiles. Integrated navigation/bombing computers and related

mission equipment provide new combat aircraft with a precision-strike capability day or night and in bad weather.

C-43. New aircraft incorporate such features as radar warning receivers, on-board jammers, chaff, flares, and a lower radar cross section to improve survivability and mission success rate. In addition, the proliferation of fixed-wing aircraft throughout the world increases the probability that opposing forces can employ the same type of aircraft in a conflict; this exacerbates the already challenging problem of identification.

C-44. Questions regarding rotary-wing aircraft that need to be answered by ADA analysts include:
- Organizations?
- Numbers available?
- Performance (speed, altitude, weapon load capacity)?
- Endurance, range, and ingress and egress altitude and speed?
- Level of combat readiness?
- Sortie generation rate?
- Target acquisition capability and identification range?
- Type and capability of ordnance (range, accuracy, release altitude, reload and refire time, and guidance modes)?
- Number and types of ordnance available?
- Typical ordnance load (maximum weight, type, load mixture, and level of sophistication)?
- Navigational capability (night and adverse-weather capability)?
- Launch sites (airfields or forward operating bases)?
- Combat radius (with or without external tanks, ordnance, or location of staging bases)?
- Expectant loiter time (how long will it have on station over the target area)?
- Type, quantity, and quality of training the pilot received?

INDIRECT FIRES

C-45. Rockets, artillery, and mortars are traditional indirect fire threats to ground forces. These systems vary in size and effect. Rockets and artillery are usually fired from towed or self-propelled platforms while mortars are frequently transported by dismounted crews.

C-46. Rockets are unguided projectiles with a short boost phase and unpowered flight and fly ballistic trajectories. The most common type of warhead is high explosive with a point detonating fuse. Rockets are commonly fired from self-propelled platforms known as multiple rocket launchers. Multiple rocket launchers can fire large volleys of rockets (20 to 40) with multiple launchers being used in a volley. Rockets come in many calibers such as 57-millimeter, 68-millimeter, 80-millimeter, 81-millimeter, 107-millimeter, 120-millimeter, 122-millimeter, and 127-millimeter. Their high rate of fire and volume of fire make them a stressing threat. Hybrid and irregular forces have used rockets as harassing fire, with improvised firing methods and delays to limit counterfire effects. Large caliber rockets, 200-millimeter and greater, were addressed earlier.

C-47. Artillery and mortar rounds are also traditionally unpowered and fly ballistic trajectories. All armies throughout the world have some form of artillery. The most common artillery calibers are 122-millimeter, 152-millimeter, and 155-millimeter. Unless using rocket assisted projectiles, artillery systems are generally limited to 20 to 30 kilometers. Newly developed artillery rounds, with insights from the war in Ukraine, have been tested with extended ranges and with precision guidance systems. The most common mortar calibers range from 60 to 120-millimeter, but include many variants, such as 81-millimeter, 82-millimeter, 100-millimeter, and 160-millimeter.

C-48. Questions regarding indirect fires that need to be answered by ADA analysts include:
- Organization?
- Type?
- Number available by echelon?
- Performance (flight time, speed, altitude, and launch restrictions)?

- Maximum and minimum lethal ranges?
- Warhead size?
- Accuracy?
- Burn time?
- Potential launch site(s)?
- Launch types (stationary vehicle, stationary site, moving vehicle)?

SECTION III – ELECTROMAGNETIC WARFARE AND CYBERSPACE

C-49. Electromagnetic warfare and cyberspace threats are continuously present throughout the tactical, operational, and strategic realms. Electro warfare involves the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack an enemy. Electromagnetic warfare includes electronic attack, electronic protection, and electromagnetic warfare support. A threat will attempt to deny, degrade, disrupt, or destroy friendly emitters (radar and communications) and other electromagnetic spectrum dependent devices. Sensors to locate emitters or to listen for information and intelligence can be mounted on ground or air platforms. Cyberspace attacks will target technical networks, systems, and data. For more information see FM 3-12.

C-50. The most common form of tactical electronic attack is electromagnetic jamming. Jamming consists of an emitter radiating electromagnetic energy to prevent a radar receiver from distinguishing the expected return from the background noise or a radio from receiving voice or data. Advanced jamming techniques allow the threat to project false location, speed, and altitude, creating confusion for radar operators. Electromagnetic warfare is proving highly effective against sUASs for both sides in the Russia-Ukrainian war.

> *Note*. Jamming can also be self-induced by positioning two friendly sensors, for instance, within the footprint of one another. This leads to mutual interference and frequency management conflicts.

C-51. The use of an electromagnetic pulse, normally envisioned as produced by a high-altitude nuclear explosion, is a threat to friendly electronic systems. Several countries are experimenting with generating an electromagnetic pulse from non-nuclear explosives. The U.S. military's increasing dependence on advanced electronics systems results in the potential for an increased electromagnetic pulse vulnerability, and if unaddressed makes electromagnetic pulse employment by an adversary an attractive asymmetric option (Electromagnetic Pulse Commission Report).

C-52. ADA organizations, from the tactical to the strategic level, face multiple types of sophisticated cyberspace threats, whether in garrison or operating in the field. Regional powers, peer states, and transnational terrorist organizations have personnel with capabilities to conduct cyberspace attacks on installations and forward operating sites. Cyberspace attacks are expected against C2 nodes; theater and tactical data and voice networks, information systems, radars and their tracking and targeting systems, and missile guidance packages. An enemy can be expected to use cyberspace attacks in conjunction with physical attacks as part of a larger campaign. Cyberspace attacks can prevent detection, tracking, and engagement of an enemy's munitions and platforms. An enemy is also likely to expand attempts to penetrate networks for data collection and exploitation with a growing sophistication to conduct cyberspace attacks. Strategic organizations, with "on-line" missions, face multiple types of cyberspace threats on a continual basis.

C-53. Russia has made extensive use of cyberspace attacks since December 2022, launching phishing campaigns to target the Ukrainian defense industry, military, and Ukrainian webmail users. Russia's campaign includes phishing emails, spoofed security, and other system administrator type notifications. In addition, Russian cyberspace operators have disseminated narratives that are pro-Russia and disinformation to undermine support to Ukraine.

SECTION IV – STRATEGIC MISSILE THREATS THAT MAY IMPACT THE THEATER

C-54. Despite the end of the Cold War, the threat of accidental, unauthorized, or limited strategic strikes against the United States continues to exist. Intercontinental ballistic missiles and submarine-launched ballistic missiles are a threat to the United States. They carry nuclear warheads and employ a variety of penetration aids.

C-55. Intercontinental and submarine-launched ballistic missiles pose significant challenges to active defense and attack operations forces. Some intercontinental ballistic missiles are road mobile, reducing the time that they can be targeted, while others are designed with countermeasures to ballistic missile defense systems. Some submarine-launched ballistic missiles can be launched from surfaced or submerged submarines from various launch locations.

INTERCONTINENTAL BALLISTIC MISSILES

C-56. An intercontinental ballistic missile is a ballistic missile with a range greater than 5,500 kilometers and typically designed to deliver one or more nuclear warheads. Most modern designs support multiple independently targetable reentry vehicles, allowing a single missile to carry several warheads, each of which can strike a different target.

C-57. Although current intercontinental ballistic missiles -producing countries are limited, several countries are developing production capabilities. Thus, the threat to the United States continues to grow. Other countries developing ballistic missiles are also likely to build various responses to U.S. defenses. Developing countries will probably rely on available countermeasure technologies such as separating reentry vehicles, spin stabilizing reentry vehicles, radar absorbing material, low-power jammers, and simple decoys such as balloons.

C-58. Rudimentary technologies from earlier versions of missiles are more readily available and are adequate for use by nations not overly concerned with missile accuracy, reliability, or safety. The increased availability of technical assistance from other nations and access to classified information related to ballistic missiles and weapons of mass destruction will shorten development programs. Once launched, intercontinental ballistic missiles are difficult to defeat. Their targets may be strategic or political, civilian or military. These missiles will most likely use nuclear warheads, and many will carry multiple reentry vehicles. Projected improvements include mobile basing, improved reliability, increased accuracy, and improved penetration aids.

C-59. Iran's progress on space launch vehicles—along with its desire to deter the United States and its allies—provides Tehran with the means and motivation to develop longer-range missiles, including intercontinental ballistic missiles. In April 2016, Iran launched a space launch vehicle, which could be capable of intercontinental ballistic missiles ranges if configured as such. In April 2020, Iran launched its first successful military satellite. In 2023, it also used solid propellant in space launch vehicles. These advances can be steps leading to the fielding of an intercontinental ballistic missile. Iran may be able to deploy an operational missile in the near-term if the regime chooses to do so.

C-60. North Korea continues with an aggressive program. North Korea launched several intercontinental ballistic missiles in tests in 2017 and claims to be capable of ranging most of the continental United States with these missiles. In 2023, North Korea claimed the launch of a solid fueled missile which it states is a powerful strategic attack means.

SUBMARINE-LAUNCHED BALLISTIC MISSILES

C-61. Submarine mobility provides launch location options unavailable to intercontinental ballistic missile forces and makes detection difficult. Submarine-launched ballistic missiles provide intercontinental ballistic missile capabilities with the added advantages of better hiding, shorter flight times, and depressed reentry angles. Targets will generally be identical to those of intercontinental ballistic missiles. Projected improvements include more sophisticated payloads and guidance systems, improved reliability, increased range, and improved penetration aids.

C-62. North Korea is developing a submarine-launched ballistic missile and conducted multiple flight tests of this new capability in the 2015 and 2016 timeframe. In February 2017, North Korea publicized the launch of a new solid-propellant missile that appeared to be a land-based variant of its submarine-launched missile. The missile was launched from a canister carried on a previously unseen tracked launcher. North Korea has continued to develop its capabilities and test/demonstrate them within the last two years. Submarine-launched ballistic missiles give anyone possessing those systems the ability to approach U.S. shores for a surprise launch.

SECTION V – SPACE

C-63. Space is the new high ground for operations. It has become an increasingly congested, competitive, and contested environment. Space systems are critical to the tactical, operational, and strategic levels of warfighting. The quantity and quality of foreign satellites on orbit is rapidly increasing, and foreign countries are developing counters to the U.S. space advantage, including methods to disrupt or deny access to communications; position, navigation, and timing; and intelligence, surveillance, and reconnaissance satellites. Employment of these threat space-based capabilities can have a significant impact on U.S. systems and their ability to execute missions.

C-64. Peer competitors are pursuing space efforts for military, economic, and political objectives. They recognize the strategic value of space and view U.S. dependency on space for projection of military power as a vulnerability. They operate satellites for communications, navigation, earth resources, weather, intelligence, surveillance, and reconnaissance purposes, in addition to conducting manned space and space exploration missions.

C-65. Over the next 10 years, hundreds of commercial or government-sponsored imaging satellites are projected to be launched. The sheer number of these new satellites, and the fact that most are foreign or consortia owned, diminishes the ability of the United States to impose political constraints on the use of satellite imagery products. These new commercial imaging capabilities will allow an adversary to challenge the U.S. force's ability to achieve strategic and tactical surprise and to gain and sustain information superiority.

SUMMARY

C-66. Ballistic, cruise missiles and hypersonic weapons are and will continue to be offensive weapons of choice for many nations. These threats, as standalone systems or complemented with UAS, electromagnetic warfare and cyberspace, and other capabilities described above, create formidable challenges for Army, joint, and multinational AMD forces. Table C-3 beginning on page 177 provides a summary of the air and missile threats, their primary targets, and their capabilities and trends.

Table C-3. Air, missile, and electromagnetic warfare/cyberspace threats to surface targets

System Category	*Targets*	*Capabilities*	*Trends*
Ballistic Missiles	• Geopolitical/population centers. • Airports and seaports. • Logistical areas. • Troop concentrations.	• To 5,500 kilometers range. • Low radar signature. • Warheads: conventional, weapons of mass destruction, submunitions. • Launch from mobile platforms. • Penetration aids, decoys, chaff, maneuvering warheads.	• Increased range: solid fuel, multi-stage. • Improved accuracy: terminal guidance, Global Positioning System. • Increased survivability: decoys, signature reductions.
Large Caliber Rockets	• Assembly areas. • ADA/field artillery locations. • Defensive positions. • Chokepoints/routes of advance.	• High rates of fire, rapid reload and highly mobile. • Extended Range: 300+ kilometers. • Low signature and flat trajectory. • Warheads: conventional, weapons of mass destruction, submunitions.	• Course corrected munitions. • Increased ranges blurring line with close- and short-range ballistic missiles. • Increased accuracies with Global Positioning System guidance.
Cruise Missiles	• High-value military/industrial complexes. • Airports and seaports. • Logistical areas. • C2 centers. • Maneuver force concentrations.	• 30-3,000-kilometer range. • 360-degree threat; very low radar signature. • Air, sea, or ground launched. • Warheads: conventional, weapons of mass destruction, submunitions.	• Increased number of land attack variants. • Reduced radar signatures. • Improved accuracy and increased range.
Tactical Air-to-Surface Missiles	• Armored vehicles. • Radars. • Bridges or other point targets. • ADA sites.	• >100-kilometer range. • Supersonic speeds (Mach 3). • Extremely accurate. • Radio-command, laser, anti-radiation, or electro-optical guidance.	• Improved accuracy and lethality. • Lock-on-after-launch or loitering. • Dual/tri mode seekers: increased reliability and all-weather capability.

Table C-3. Air, missile, and electromagnetic warfare/cyberspace threats to surface targets (continued)

System Category	Targets	Capabilities	Trends
Rotary-Wing Aircraft	• Troops/armored vehicles. • Convoys. • C2 centers.	• Multi-role: attack; reconnaissance, surveillance, and target acquisition; electromagnetic warfare. • Combat diameters out to 460 kilometers; terrain masking/hovering. • Payloads: daylight TV, cameras, missiles, laser designators, retransmitters.	• Modular upgrades to airframes. • Expanded night/adverse weather capability. • Improved fire control systems/engagement capability: at greater ranges. • Improved countermeasures.
Fixed-Wing Aircraft	• Ports. • Assembly/logistical areas. • C2 centers. • Geo-political/ population centers. • Maneuver force vehicles/ formations.	• Multi-role: close air support; reconnaissance, surveillance, and target acquisition; electronic attack; interdiction; strategic attack; suppression of enemy air defenses. • Precision strike. • Equipment: missiles, rockets, bombs, submunitions, guns.	• Multi- versus single-mission aircraft. • Greater use of standoff and precision. • Reduced radar and infrared signatures. • Integrated electronic attack. • Proliferation increases identification challenges.
Indirect Fire	• Troops/armored vehicles. • Fixed/semi-fixed sites.	• Variable payload. • Saturation of airspace. • Mass fires. • Easily moved/relocated.	• Extended ranges. • Improved accuracy. • Greater lethality.
Electromagnetic Warfare and Cyberspace	• C2 nodes. • Tactical data and voice information, networks, and systems. • Theater data and voice information, networks, and systems. • ADA radars. • ADA tracking and targeting systems. • Missile and UAS guidance systems.	• Disrupt data and voice communications. • Locate C2 nodes for targeting. • Disrupt targeting and guidance systems. • Electromagnetic warfare techniques, such as interception and spoofing, to gain information on planning and operations. • Radar jamming. • Electromagnetic pulse to incapacitate electronic systems.	• Cyber-attacks in conjunction with physical attacks. • Expanded attempts to penetrate networks for data collection and exploitation. • Growing sophistication of threats. • Increased exposure of tactical systems to cyber threats as office systems are combined with tactical systems.

Table C-3. Air, missile, and electromagnetic warfare/cyberspace threats to surface targets (continued)

System Category	Targets	Capabilities	Trends
Inter-continental Ballistic Missiles	• Large fixed military installations. • Capitals and other population centers. • Major industrial sites/regions. • Intercontinental ballistic missile sites.	• Mobile launchers. • Multiple warheads, including nuclear. • Penetration aids.	• Mobile basing. • Improved reliability and accuracy. • Improved penetration aids.
Submarine-launched Ballistic Missile	• Large fixed military installations. • Capitals and other population centers. • Major Industrial areas/sites. • Intercontinental ballistic missile sites.	• Mobile. • Hide/wait/launch from anywhere. • Worldwide targeting. • Multiple warheads, including nuclear. • Penetration aids.	• More sophisticated payloads and guidance systems. • Increased range and accuracy. • Improved reliability and penetration aids.
Space Systems	• Lodgment areas. • Massed troops. • Ships. • Missile launch sites.	• Functions: communications/navigation support, weather prediction, surveillance, reconnaissance, intelligence collection, and counter-space operations. • Payloads: synthetic aperture radar, electro-optical, imaging infrared. • Disrupting communications.	• Easy access to improved commercial sources. • Remote sensing resolution to one meter. • Advanced data processing/ storage.
ADA air defense artillery C2 command and control TV television UAS unmanned aircraft system			

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Source Notes

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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 publication for terms is listed in parentheses after the definition.

SECTION I – ACRONYMS AND ABBREVIATIONS

AADC	area air defense commander
AADP	area air defense plan
AAMDC	army air and missile defense command
ADA	air defense artillery
ADAFCO	air defense artillery fire control officer
ADP	Army doctrine publication
ADSE	air defense support element
ADSO	air defense support officer
AMD	air and missile defense
AMDWS	air and missile defense workstation
ATP	Army techniques publication
AWACS	Airborne Warning and Control System
BCT	brigade combat team
C2	command and control
C-sUAS	counter-small unmanned aircraft system
DIVAD	divisional air defense
FAAD	forward area air defense
FM	field manual
G-2	assistant chief of staff, intelligence
G-3	assistant chief of staff, operations
G-6	assistant chief of staff, signal
HIMAD	high-to-medium altitude air defense
IBCS	Integrated Air and Missile Defense Battle Command System
IPOE	intelligence preparation of the operational environment
J-2	intelligence directorate of a joint staff
J-3	operations directorate of a joint staff
JP	joint publication
LPWS	Land-Based Phalanx Weapon System
MANPAD	man-portable air defense
MDMP	military decision-making process
M-SHORAD	maneuver short-range air defense
METT-TC (I)	mission, enemy, terrain and weather, troops and support available, time available, civil considerations, and informational considerations
NASAMS	National Advanced Surface-to-Air Missile System
ROE	rules of engagement
S-2	battalion or brigade intelligence staff officer
S-3	battalion or brigade operations staff officer

S-6	battalion or brigade signal staff officer
SHORAD	short-range air defense
sUAS	small unmanned aircraft system
THAAD	terminal high altitude area defense
UAS	unmanned aircraft system

SECTION II – TERMS

air defense

Defensive measures designed to destroy attacking enemy aircraft or aerodynamic missiles, or to nullify or reduce the effectiveness of such attack. (JP 3-01)

air and missile defense

Direct (active and passive) defensive actions taken to destroy, nullify, or reduce the effectiveness of hostile air and ballistic missile threats against friendly forces and assets. (JP 3-01)

*air defense artillery

(Army) The dedicated Army systems, personnel, and forces that provide active, land-based defense against air and missile attacks. (Joint) Weapons and equipment for actively combating air targets from the ground. (JP 3-01)

*air defense coordinator

The senior air defense artillery commander for the corps, division, or brigade combat team who is the maneuver commander's primary advisor to plan, coordinate, and integrate air and missile defense fires and support in the execution of assigned tasks.

air defense warning condition

An air defense warning given in the form of a color code corresponding to the degree of air raid probability with yellow standing for when an attack by hostile aircraft or missiles is probable; red for when an attack by hostile aircraft or missiles is imminent or is in progress; and white for when an attack by hostile aircraft or missiles is improbable. (JP 3-01)

air operations center

A jointly staffed facility established for planning, directing, and executing joint air operations in support of the joint force commander's operation or campaign objectives. (JP 3-30)

airspace control plan

The document approved by the joint force commander that provides specific planning guidance and procedures for the airspace control system for the joint force operational area. (JP 3-52)

agility

The ability to move forces and adjust their dispositions and activities more rapidly than the enemy. (ADP 3-0)

*alert state

A condition that prescribes the number of resources required to achieve a ready-to-fire status and desired radar emissions, and which specifies manning requirements and equipment configurations.

allocation

Distribution of limited forces and resources for employment among competing requirements. (JP 5-0)

area air defense commander

The component commander with the preponderance of air defense capability and the required command, control, and communications capabilities who is assigned by the joint force commander to plan and execute integrated air defense operations. (JP 3-01)

area of influence

An area inclusive of and extending beyond an operational area wherein a commander is capable of direct influence by maneuver, fire support, and information normally under the commander's command or control. (JP 3-0)

area of interest

Area of concern to the commander, including the area of influence, areas adjacent to it, and extending into enemy territory. (JP 3-0)

area of operations

An operational area defined by a commander for the land or maritime force commander to accomplish their missions and protect their forces. (JP 3-0)

ARFOR

The Army component and senior Army headquarters of all Army forces assigned or attached to a combatant command, subordinate joint force command, joint functional command, or multinational command. (FM 3-94)

*assess

In the air and missile defense engagement sequence, the analysis of the effectiveness of the engagement and of the potential for reengagements.

assign

To place units or personnel in an organization where such placement is relatively permanent, and /or where such organization controls and administers the units or personnel for the primary function, or greater portion of the functions, of the unit or personnel. (JP 3-0)

attach

The placement of units or personnel in an organization where such placement is relatively temporary. (JP 3-0)

ballistic missile

Any missile that does not rely upon aerodynamic surfaces to produce lift and consequently follows a ballistic trajectory when thrust is terminated. (JP 3-01)

*classification

The process of characterizing a detected object by its type, model, variant, nationality, and any other distinguishing feature or attribute.

close operations

Tactical actions of subordinate maneuver forces and the forces providing immediate support to them, whose purpose is to employ maneuver and fires to close with and destroy enemy forces. (ADP 3-0)

combined arms

The synchronized and simultaneous application of arms to achieve an effect greater than if each element was used separately or sequentially. (ADP 3-0)

command

The authority that a commander in the armed forces lawfully exercises over subordinates by virtue of rank or assignment. (JP 1, Volume 2)

command and control

The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. (JP 1, Volume 2)

command post

A headquarters, or a portion thereof, organized for the exercise of command and control. (FM 6-0)

*complex integrated attack

A synchronized attack of a friendly asset by a mix of air and missile threats arriving near-simultaneously from different directions, altitudes, and ranges.

concept of operations

A statement that directs the manner in which subordinate units cooperate to accomplish the mission and establish the sequence of actions the force will use to achieve the end state. (ADP 5-0)

convergence

An outcome created by the concerted employment of capabilities against combinations of decisive points in any domain to create effects against a system, formation, or decision maker, or in a specific geographic area. (ADP 3-0)

consolidate gains

(Army) Activities to make enduring any temporary operational success and to set the conditions for a sustainable security environment, allowing for a transition of control to other legitimate authorities. (ADP 3-0)

control

Authority that may be less than full command exercised by a commander over part of the activities of subordinate or other organizations (JP 1, Volume 2).

coordinating altitude

An airspace coordinating measure that uses altitude to separate users and as the transition between different airspace control elements. (JP 3-52)

course of action

A scheme developed to accomplish a mission. (JP 5-0)

*cover

In air and missile defense, a fire control order that instructs a unit to assume a posture that will allow engagement of a target.

critical asset list

A prioritized list of assets or areas, normally identified by phase of the operation and approved by the joint force commander, that should be defended against air and missile threats. . (JP 3-01)

deep operations

Tactical actions against enemy forces, typically out of direct contact with friendly forces, intended to shape future close operations and protect rear operations. (ADP 3-0)

defended asset list

A listing of those assets from the critical asset list prioritized by the joint force commander to be defended with the resources available. (JP 3-01)

defense operations center

A command and control facility established by the base commander to serve as the focal point for base security and defense. (JP 3-10).

defeat

To render a force incapable of achieving its objectives. (ADP 3-0)

defeat in detail

Concentrating overwhelming combat power against separate parts of a force rather than defeating the entire force at once. (ADP 3-90

defeat mechanism

A method through which friendly forces accomplish their mission against enemy opposition. (ADP 3-0)

defensive counterair

All defensive measures designed to neutralize or destroy enemy forces attempting to penetrate or attack through friendly airspace. (JP 3-01)

defensive operation

An operation to defeat an enemy attack, gain time, economize forces, and develop conditions favorable for offensive or stability operations. (ADP 3-0)

direct support

A support relationship requiring a force to support another specific force and authorizing it to answer directly to the supported force's request for assistance. (FM 3-0)

*discrimination

The process to distinguish real objects of interest from other objects or phenomena and military significant objects from those that are not.

domain

Defined portion of an operational environment requiring a unique set of warfighting capabilities and skills. (FM 3-0)

engage

In air and missile defense, a fire control order used to direct or authorize units and/or weapon systems to attack a designated target. (JP 3-01)

*engage hold

A fire control order which prevents automatic engagement of the specified target by the system when the system is operating in the automatic mode.

engagement

An attack against an air or missile threat. (JP 3-01)

engagement authority

An authority vested with a joint force commander that may be delegated to a subordinate commander that permits an engagement decision. (JP 3-01)

*engagement operations

Functions and activities required to execute the air, missile, and counter-surveillance battle.

*engagement sequence

The successive actions taken by all of the Services' air and missile defense systems in the engagement of aerial threats.

execution

The act of putting a plan into action by applying combat power to accomplish the mission and adjusting operations based on changes in the situation. (ADP 5-0)

*fire control quality data

Usable guidance updates to a weapon in flight that allows a seeker to acquire the target.

*firing doctrine

The application of the methods of fire to achieve the required level of engagement effectiveness.

fires warfighting function

The related tasks and systems that create and converge effects in all domains against the adversary or enemy to enable operations across the range of military operations. (ADP 3-0)

*force operations

Actions and functions required to plan, coordinate, prepare for, and sustain the total air and missile defense mission.

force tailoring

The process of determining the right mix of forces and the sequence of their deployment in support of a joint force commander. (ADP 3-0)

forcible entry

>   The seizing and holding of a military lodgment in the face of armed opposition or forcing access into a denied area to allow movement and maneuver to accomplish the mission. (JP 3-18)

general support

>   Support given to the supported force as a whole and not to any particular subdivision thereof. (JP 3-09.3)

general support reinforcing

>   A support relationship assigned to a unit to support the force as a whole and to reinforce another similar type unit. (FM 3-0)

high-altitude missile engagement zone

>   A defined airspace within which high-altitude surface-to-air missiles engage air and missile threats. (JP 3-01)

*high-to-medium altitude air defense

>   Capabilities that provide defense against longer-range air and ballistic missile threats.

high-value target

>   A target the enemy commander requires for the successful completion of the mission. (JP 3-60)

homeland defense

>   The protection of U.S. sovereignty, territory, domestic population, and critical infrastructure against external threats and aggression, or other threats as directed by the President. (JP 3-27)

identification

>   The process of determining the friendly or hostile character of an unknown detected contact. (JP 3-01)

implied task

>   A task that must be performed to accomplish a specified task or mission but is not stated in the higher headquarters' order. (FM 5-0)

integrated air and missile defense

>   The integration of capabilities and overlapping operations to defend the homeland and United States national interests, protect the joint force, and enable freedom of action by negating an enemy's ability to create adverse effects from their air and missile capabilities. (JP 3-01)

intelligence preparation of the operational environment

>   The systematic process of analyzing the mission variables of enemy, terrain, weather, and civil considerations in an area of interest to determine their effect on operations. (FM 2-0)

joint force air component commander

>   The commander within a unified command, subordinate unified command, or joint task force responsible to the establishing commander for recommending the proper employment of assigned, attached, and/or made available for tasking air forces; planning and coordinating air operations; or accomplishing such operational missions. (JP 3-0)

joint security area

>   A specific area to facilitate protection of joint bases and their connecting lines of communications that support joint operations. (JP 3-10)

*keep-out altitude

>   The vertical distance above a defended asset at which a successful engagement denies an adversary's desired weapons effects against the defended asset.

*keep-out range

>   The horizontal distance from a defended asset at which a successful engagement denies an adversary's desired weapons effects against the defended asset.

key tasks

Those significant activities the force must perform as a whole to achieve the desired end state. (ADP 6-0)

*kill chain

The successive linkage of commanders who can authorize engagements of air and missile threats.

leadership

The activity of influencing people by providing purpose, direction, and motivation to accomplish the mission and improve the organization. (ADP 6-22)

low-altitude missile engagement zone

A defined airspace within which low-to-medium altitude surface-to-air missiles engage air and missile threats. (JP 3-01)

*lower tier

A layer of low-to-high airspace within the atmosphere in which air and missile defense engagements are conducted.

*methods of fire

The firing options for air defense artillery interceptors employed against aerial threats.

missile defense

Defensive measures designed to destroy attacking enemy missiles or to nullify or reduce the effectiveness of such attack. (JP 3-01)

missile engagement zone

A defined airspace in which surface-to-air missile systems engage air and missile threats. (JP 3-01)

mission command

(Army) The Army's approach to command and control that empowers subordinate decision making and decentralized execution appropriate to the situation. (ADP 6-0)

military decision-making process

An iterative planning methodology to understand the situation and mission, develop a course of action, and produce an operation plan or order. (ADP 5-0)

mobility

A quality or capability of military forces which permits them to move from place to place while retaining the ability to fulfill their primary mission. (JP 3-36)

multidomain operations

The combined arms employment of joint and Army capabilities to create and exploit relative advantages to achieve objectives, defeat enemy forces, and consolidate gains on behalf of joint force commanders. (ADP 3-0)

mutual support

Support which units render each other against an enemy, because of their assigned tasks, their position relative to each other and to the enemy, and their inherent capabilities. (JP 3-31)

named area of interest

The geospatial area or systems node or link against which information that will satisfy a specific information requirement can be collected, usually to capture indications of enemy and adversary courses of action. (JP 2-0)

offensive counterair

Offensive operations to destroy or neutralize enemy aircraft, missiles, launch platforms, and their supporting structures and systems both before an after launch, and as close to their source as possible. (JP 3-01)

operational approach

A broad description of the mission, operational concepts, tasks, and actions required to accomplish the mission. (JP 5-0)

operational control

The authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission. Also called OPCON. (JP 1, Volume 2)

operational environment

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

operational framework

A cognitive tool used to assist commanders and staffs in clearly visualizing and describing the application of combat power in time, space, purpose, and resources in the concept of operations. (ADP 3-0)

operational level of warfare

The level of warfare in which campaigns and operations are planned, conducted, and sustained to achieve operational objectives to support achievement of strategic objectives. (JP 3-0)

organic

Assigned to and forming an essential part of a military organization as listed in its table of organization for the Army, Air Force, and Marine Corps, and are assigned to the operating forces for the Navy. (JP 1, Volume 2)

*out-of-sector

That part of the air and missile defense operating area which cannot be covered by a sensor or defended by an air and missile defense weapon.

*position area for air defense

An area assigned to an air defense artillery unit where individual air defense artillery systems can maneuver to increase their survivability.

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. (JP 3-52)

positive identification

An identification derived from observation and an analysis of target characteristics including visual recognition, electronic support systems, non-cooperative target recognition techniques, identification friend or foe systems, or other physics-based identification techniques. (JP 3-01)

*primary target line

An azimuth assigned to a weapon system or unit along which the system fire control personnel and or gunners focus their attention.

principle

A comprehensive and fundamental rule or an assumption of central importance that guides how an organization or function approaches and thinks about the conduct of operations. (ADP 1-01)

procedural control

A method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures. (JP 3-52)

rear operations

Tactical actions behind major subordinate maneuver forces that facilitate movement, extend operational reach, and maintain desired tempo. (ADP 3-0)

recconaissance

A mission undertaken to obtain information about the activities and resources of an enemy or adversary, or to secure data concerning the meteorological, hydrographic, geographic or other characteristics of a particular area, by visual observation or other detection methods. (JP 2-0)

rehearsal

A session in which the commander and staff or unit practices expected actions to improve performance during execution. (ADP 5-0).

reinforcing

A support relationship requiring a force to support another supporting unit. (FM 3-0)

*resilience

In air and missile defense, the quality of the defense to maintain continuity of operations regardless of changes in or unanticipated tactics by enemy air or losses of critical air and missile defense components.

restricted operations zone

Airspace reserved for specific activities in which the operations of one or more airspace users is restricted. (JP 3-52)

rules of engagement

Directives issued by competent military authority that delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered. (JP 3-84)

running estimate

The continuous assessment of the current situation used to determine if the current operation is proceeding according to the commander's intent and if planned future operations are supportable. (ADP 5-0)

*secondary target line

A pre-planned alternative target line used to shift the orientation of fires to assure all likely threat avenues of ingress are adequately defended.

sector of fire

That area assigned to a unit or weapon system in which it will engage the enemy according to the established engagement priorities. (FM 3-90)

setting the theater

The broad range of activities continuously conducted to establish conditions for the successful execution of operation in a theater. (ADP 3-0)

*short-range air defense

Capabilities that provide air defense against low-altitude air threats.

short-range air defense engagement zone.

A defined airspace in which short-range air defense weapons engage air threats and which may be established within a low- or high-altitude missile engagement zone. (JP 3-01)

specified task

A task specifically assigned to a unit by its higher headquarters. (FM 5-0)

stability operation

An operation conducted outside the United States in coordination with other instruments of national power, to establish or maintain a secure environment and provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief. (ADP 3-0

*standoff range

A range at which an air threat can surveil or attack an asset while staying beyond the engagement capability of a defending air and missile defense system.

tactical control

> The authority over forces that is limited to the detailed direction and control of movements or maneuvers within the operational area necessary to accomplish missions or tasks assigned. (JP 1, Volume 2)

tactical level of warfare

> The level of warfare at which forces plan and execute battles and engagements to achieve military objectives. (JP 3-0).

target area of interest

> The geographical area where high-value targets can be acquired and engaged by friendly forces. (JP 2-0)

task-organizing

> The act of designing a force, support staff, or sustainment package of specific size and composition to meet a unique task or mission. (ADP 3-0)

tenets of operations

> Desirable attributes that should be built into all plans and operations and are directly related to the Army's operational concept. (ADP 1-01)

theater strategic level of warfare

> The level of warfare at which combatant commanders synchronize with unified action partners and employ all elements of national power to fulfill policy aims within the assigned theater in support of the national strategy. (ADP 3-0)

*threat evaluation

> The process of determining the threat's intended target, predicted impact point upon the defended asset, and arrival. time.

unmanned aircraft system

> That system whose components include the necessary equipment, network, and personnel to control an unmanned aircraft. (JP 3-30)

*upper tier

> A layer of airspace that encompasses very high altitudes within the atmosphere to outside the atmosphere, in which air and missile defense engagements are conducted.

weapons control status

> An air and missile defense control measure declared for a particular area and time by an area air defense commander, or delegated subordinate commander, based on the rules of engagement that establish conditions under which fighters and surface air defense weapons are permitted to engage threats. (JP 3-01)

weapon engagement zone

> A defined airspace in which a particular weapon system is normally responsible for engagement of air and missile threats. (JP 3-01)

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