

REINTEGRATING SHORT RANGE AIR DEFENSE
INTO THE MANEUVER FIGHT

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General Studies

by

DAVID C. NORWOOD, MAJOR, U.S. ARMY
B.S., United States Military Academy, West Point, New York, 2007

Fort Leavenworth, Kansas
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Name of Candidate: David C. Norwood

Thesis Title: Reintegrating Short Range Air Defense into the Maneuver Fight

Approved by:

_____, Thesis Committee Chair
Allan S. Boyce, M.S.

_____, Member
David W. Mills, Ph.D.

_____, Member
Eric A Hollister, M.A.

_____, Member
Lieutenant Colonel Jeffrey W. Irving, M.A.

Accepted this 14th day of June 2019 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, Ph.D.

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ABSTRACT

REINTEGRATING SHORT RANGE AIR DEFENSE INTO THE MANEUVER FIGHT, by Major David C. Norwood, 144 pages.

As the United States faces growing global uncertainty, the need to renew key military capabilities is vital to fight and win across any conflict that threatens U.S. interests. To retain overmatch, the combination of our capabilities must be relevant to successfully deter our potential adversaries. The Army's investment to incorporate Maneuver Short Range Air Defense into each division is a move towards this end. This thesis examines the future readiness of these forces using a historical and an Australian case study as examples of successful integration of similar capabilities at similar echelons. This study leverages historical doctrine while comparing it to modern guidance. It synthesizes our current readiness with historical success, yielding areas for development prior to reintegration. The research aims to answer the question: How can the US Army best set the Leadership and Training conditions for reintegration of divisional Short Range Air Defense?

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ACRONYMS

16ALR	Sixteenth Air Land Regiment
2ACR	Second Armored Cavalry Regiment
AAAD	All Arms for Air Defense
ACC	Army Capstone Concept
ADA	Air Defense Artillery
ADAM	Air Defense and Airspace Management
ADCOORD	Air Defense Coordinator
ADO	Air Defense Officer
AMD	Air and Missile Defense
AOC	Army Operating Concept
AWG	Asymmetric Warfare Group
BCT	Brigade Combat Team
BOLC	Basic Officer Leaders Course
CAFAD	Combined Arms For Air Defense
CCC	Captains Career Course
CTC	Combat Training Center
DA PAM	Department of the Army Pamphlet
FA	Field Artillery
FCOE	Fires Center of Excellence
FM	Field Manual
GBAD	Ground Based Air Defence
HIMAD	High to Medium Air Defense
IADS	Integrated Air Defense System

IFPC	Indirect Fire Protection Capability
IM-SHORAD	Interim Maneuver Short Range Air Defense
LNO	Liaison Officer
M-SHORAD	Maneuver Short Range Air Defense
MANPADS	Man-Portable Air Defense System
MCCC	Maneuver Captains Career Course
MCOE	Maneuver Center of Excellence
RAND	Research and Development
SHORAD	Short Range Air Defense
TACSOP	Tactical Standard Operating Procedures
TOC	Tactical Operations Center
TTP	Tactics, Techniques, and Procedures
UAS	Unmanned Aerial System

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CHAPTER 1

INTRODUCTION

General David Perkins, in *The U.S. Army Operating Concept*, said, “The environment the Army will operate in is unknown. The enemy is unknown, the location is unknown, and the coalitions involved are unknown. The problem we are focusing on is how to ‘Win in a Complex World.’”¹

Personal Introduction and Problem Statement

Beyond the scope of a graduate degree, I felt personally and professionally invested in the outcomes of this research. As a member of the most powerful Army in the world, I believe that my career field of Air Defense Artillery (ADA) lacks capability to contend with adversary air power to the scope and scale expected by the Joint Force, thus presenting a looming military problem on the modern battlefield. It is my desire that this research illuminates areas to improve across the United States Army. By considering the air threat and actions the Army must take to mitigate risks, the air defense capability will be more effective in large-scale combat operations.

Air defense was not my first choice in branch when I commissioned from the United States Military Academy at West Point in 2007, but I found my true passion in the Army when I discovered Short Range Air Defense (SHORAD). I loved the tactical, remote, austere conditions indicative of performing the task, coupled with the relevance of our presence on the battlefield. Enemy helicopters with freedom of maneuver could fix

¹ U.S. Army Training and Doctrine Command (TRADOC), TRADOC Pamphlet 525-3-1, *The U.S. Army Operating Concept: Win in a Complex World* (Fort Eustis, VA: Government Printing Office, 2014), iii.

a large-scale friendly formation and potentially sway the outcome of a battle. I loved how no other branch could perform the job—there are many means to destroy a tank, but only air defense weapons can challenge the broad spectrum of air threats. I was a necessary and valued member of the team.

Since commissioning, I served seven of my eleven-year career in a protection or fires billet of some variety, most of which were specifically SHORAD. I deployed to Iraq in 2009-2010 to execute Counter Rocket Artillery and Mortar operations as a Platoon Leader. Although not a traditional air-threat focused role, the experience of serving as a special staff member for an infantry brigade commander began to develop my passion for protecting the force, and introduced me to the maneuver language.

From 2011-2012, I served in 1st Battalion, 508th Parachute Infantry Regiment (4th Brigade Combat Team (BCT)) 82nd Airborne Division. I deployed to Afghanistan for seven months as the Assistant Operations Officer, primarily responsible for plans and future operations. Although not in my career field, this billet helped me understand maneuver concepts and realize that my education through the Fires Center of Excellence (FCOE) did not adequately prepare me for this maneuver role. In planning air assaults, raids, and combat patrols, I relied more on the lessons I learned in Ranger School and West Point than any of the institutional knowledge I learned at Fort Bliss or Fort Sill. I say this not to denigrate the branch, but rather to expose the notion that just because an air defender graduates from their education continuum does not mean that they are prepared to integrate with infantry or armored divisions.

I later returned to the branch to command Echo Battery, 3rd Battalion, 4th Air Defense Artillery Regiment (Airborne) in 2012-2014. The battery organically consists of

four Avenger Platoons and one Sentinel Radar Platoon, and is also capable of conducting airborne operations with the Stinger missile. This experience gave me first-hand experience dealing with challenges associated with the SHORAD capability gap within the U.S. Army. As one of the few remaining SHORAD units, my battery was habitually tasked to support the ready battalion from 82nd Airborne Division (Global Response Force) as well as additionally tasked to support the rotational brigades through both stateside Combat Training Centers (CTCs). With these tasks, my battery was not a sufficient force to meet the operational needs of the Army.

In 2014-2016, I served in the Military Personnel Exchange Program with duty in Australia at the School of Artillery in Puckapunyal, Victoria. Australia's Army air defense exclusively consists of SHORAD organizations. Over the course of two years, I saw the technical and tactical competence of many grades, from junior enlisted to the Regimental Commander. I felt that the performance capability of most U.S. air defenders of similar rank were on-par with their Australian counterparts, but my estimate based on my experience there is that the greatest capability shortfall is at the junior officer level (Lieutenant to Senior Captain). Although their weapon systems are as outdated as U.S. systems, I saw junior officers plan and integrate their capabilities into the fight with expertise and precision. I knew then that if SHORAD is restored, the U.S. Army's ADA officer-training continuum must improve. By steering the branch towards High to Medium Air Defense (HIMAD) and the higher-echelon threats for which it is designed, the branch became divorced from maneuver echelons. Our knowledge gap is not a product of our warfighting function, but rather our conceptual distancing from maneuver. My Australian experience is why I focused my recommendations in this research on the

human aspects of what will improve our ability to conduct SHORAD operations in divisions.

Over time, I better understood the challenge within our Army. We have developed a generational knowledge gap that will be increasingly harder to fix over time, as resident experience with integration into the maneuver force dwindles from our ranks.

Research Question

Primary: How can the U.S. Army best set the leadership and training conditions for reintegration of divisional SHORAD?

To appropriately answer the primary question, secondary questions are:

1. What are the current reintegration directives and plans?
2. What is the current air threat facing the maneuver force?
3. What are the components of the generational SHORAD knowledge gap in the areas of leadership and training?

Definition of Terms

Interim Maneuver Short Range Air Defense (IM-SHORAD): To meet urgent Army requirements to protect the maneuver force from air threats, the Cross Functional Team planned an immediate system to fill the need. IM-SHORAD uses existing, off-the-shelf technologies, meaning that the initial Stryker systems will have missile launchers and machine guns to destroy aircraft. The planned Stryker platform, facilitated by its reconfigurable turret, is designed for future upgrades relying on directed energy, electronic warfare, and other non-kinetic means (such as jamming) rather than missile

and gun technology.² This final system will lose the “interim” prefix and will just be Maneuver Short Range Air Defense (M-SHORAD). The distinction between the two is unimportant, since this research does not focus on materiel solutions but rather the capability of air defense support to maneuver units.

M-SHORAD: Although a combination of weapon systems are linked to this term, it is better used to define a capability. The National Commission on the Future of the Army defines it as, “those dedicated Air Defense Artillery and non-dedicated air defense capabilities which enable movement and maneuver by destroying, neutralizing, or deterring low altitude air threats by defending critical fixed and semi-fixed assets and maneuvering forces.”³ The concept of the capability is that an air defense unit, in support of a maneuver unit, can maintain tempo with the supported force as they continuously traverse the battlefield in support of Multi-Domain Operations. Individual needs of unit types differ, in that armored divisions’ speed, operational reach, and style of maneuver over varying types of terrain varies than that of infantry divisions, for example, but the capability requirement remains constant. This capability is intended to protect the supported force from air threats including Unmanned Aerial Systems (UAS), rotary wing aircraft, and fixed wing aircraft. This capability does not extend to ballistic missile threats.

² Sydney J. Freedberg Jr., “Army Boosts Investment in Lasers,” *Breaking Defense*, October 16, 2018, accessed March 1, 2019, <https://breakingdefense.com/2018/10/army-boosts-investment-in-lasers/>.

³ Fires Center of Excellence, Capabilities and Development Integration Directorate, *United States Army Maneuver Short Range Air Defense Battalion Organizational and Operational Concept* (Fort Sill, OK: Fires Center of Excellence, 2018), 3.

Delimitations

Another effort of air defense modernization is Indirect Fire Protection Capability (IFPC). IFPC protects “fixed and semi-fixed assets” such as “permanent facilities and structures (e.g., air bases) and transient facilities and structures (e.g., assembly areas).”⁴ This thesis delimits this effort from the scope of study.

This research follows national policy regarding potential adversaries. Current U.S. strategic documents specify potential adversaries to be China, Russia, North Korea, Iran, and terrorist organizations.⁵ This study focuses on the threat to Western Europe by solely analyzing Russia as a potential adversary. An assumption is made that most recommendations of this thesis generally apply to any potential adversary.

Assumptions

It was first necessary to assume that national strategy continues to direct the U.S. Army to retain the mission to prevent conflict in all theaters by maintaining a viable, expeditionary force and that adequate resources are applied in the future to accomplish this enduring mission.

The next assumption was that the U.S. joint force no longer enjoys air superiority versus peer threats. The expectation of the future operational environment is a significant driver for the M-SHORAD development.

⁴ Randall McIntire, “The Return of Army Short-Range Air Defense in a Changing Environment,” *Fires Bulletin* (November-December 2017): 5-8.

⁵ U.S. President, *National Security Strategy* (Washington, DC: The White House, 2017), 2.

Next, reinvigorating Air and Missile Defense (AMD) continues to be an Army priority and will be brought to fruition by delivering M-SHORAD capability to every Army division. If momentum ceases and the goal is abandoned, this research is no longer relevant.

The final research assumption was that planned units will be manned in accordance with branch propositions, which are described in the literature review portion.

Summary

This chapter introduced the foundation for the problem and presents the question this research intends to answer: How can the U.S. Army best set the leadership and training conditions for reintegration of divisional SHORAD? Research identifies the components of the generational SHORAD knowledge gap in the areas of leadership and training, the current reintegration plans and directives, and the current air threat facing the maneuver force.

CHAPTER 2

LITERATURE REVIEW

Introduction

The literature review summarized and briefly evaluated the existing literature on the research questions. It identified patterns and found gaps in the current literature which this research attempted to fill. To answer the question of what the U.S. Army has to do prior to M-SHORAD integration, the literature reviewed was strategic documents and directives including the National Security Strategy and National Defense Strategy, various U.S. Army publications, as well as ADA branch-specific publications. To explore why integrating SHORAD is important to maneuver, this research reviewed publications from the Asymmetric Warfare Group and the Research and Development Corporation to define the threat, with focus on the European Theater. To answer the question of what the Army doesn't know how to do (generational knowledge gap), this research assessed two case studies: The Second Armored Cavalry Regiment (2ACR) and America's Five-Eyes partner and ally, the Australian Defense Force. In addition to the case studies, additional sources include Department of the Army Pamphlet 600-3 to understand the future of the ADA force, both the Fires and Maneuver Centers of Excellence course syllabis for their respective officer training, and Combined Arms for Air Defense doctrine.

Directives and Plans: What the Army is Tasked to Execute

In order to best prepare for divisional SHORAD, maneuver and air defense leaders must understand existing guidance leading to the directive to build M-SHORAD battalions. Guidance originates in national strategy and filters through the Department of Defense to the Army, and on to the Air Defense branch as well as combatant

commanders. Failing to understand strategic direction results in a failure to put proper emphasis on reintegration tasks. The following section looked at each applicable directive and assisted in answering one of the secondary research questions: What are the current reintegration plans and directives?

Strategic Origins

President Donald Trump issued his first National Security Strategy in December, 2017 upon review of the global environment. To promote his “America First” foreign policy, he identified four pillars to grow the nation: Protect the American people, the homeland, and the American way of life; promote American prosperity; preserve peace through strength; and advance American influence.⁶ The President prescribed to the military more detailed tasks to remain in overmatch with potential adversaries: Modernize, fulfill critical capabilities, improve readiness, and expand the size of the force.⁷ He assessed that as a vital component to national power, the U.S. military must stand ready to deter aggression across the domains of military operations—able to be a dominant force, convincing adversaries that the American military can and will defeat them if necessary.

Former Secretary of Defense James Mattis outlined Department of Defense support of the National Security Strategy in his 2018 National Defense Strategy. Although he specified the operational requirement for layered missile defense and disruptive capabilities for the missile threat spectrum, perhaps his most relevant objective

⁶ U.S. President, *National Security Strategy*, 4.

⁷ *Ibid.*, 28.

as it relates to this study was the necessity for growth in the maneuver force.⁸

“Investments [in forward force maneuver] will prioritize ground, air, sea, and space forces that can deploy, survive, operate, maneuver, and regenerate in all domains while under attack.”⁹ The maneuver force is currently critically underprepared to manage the range of air threats from unmanned to rotary and fixed-wing aircraft. This priority from Former Secretary Mattis charged the Army to better protect the maneuver force.

Synchronized with national strategy, this research identified techniques to improve readiness over the coming years so that the U.S. Army is prepared for M-SHORAD integration, that applies modern technology to fill the critical capability gap of protecting the maneuver force from enemy air threats.

United States European Command Theater Strategy

Providing evidence for a secondary research question, European theater strategy was an important focus area. It was selected for review since Europe is the directed locale for the fielding of the first M-SHORAD battalion (5th Battalion, 4th Air Defense Artillery Regiment).

The premise for the review of this document originated with an article published on June 14, 2018 by *Defense News* in regard to the SHORAD capability gap in Europe. One can assume that leaders had previously identified it, but this is the first time a regional leader to Europe publicly specified the gap. Lieutenant General Ben Hodges, then the United States Army Europe commander, told *Defense News* during an interview

⁸ U.S. Secretary of Defense, *Summary of the National Defense Strategy* (Washington, DC: Department of Defense, 2018), 5-6.

⁹ Ibid.

in Poland his concerns in his forces' ability to counter unmanned aerial vehicles. "That is my SHORAD concern, especially if there's like a swarm."¹⁰ His chief of staff, coalition partner in the German Army, Brigadier General Markus Laubenthal, identified and simplified the SHORAD capability gap more accurately, "this is a very scarce capability, so between the assault rifle and Patriot there is not enough between to tackle short-range air defense challenges."¹¹ This problem is addressed in the strategy for the European region.

General Curtis Scaparrotti, commander of the United States European Command addressed the Armed Services Committee in the U.S. Senate on March 8, 2018, explaining many areas of concern validating their role in Europe. Outlining his Theater Strategy, General Scaparrotti's comments are most applicable for this study, as opposed to review of another theater, because the impetus for change within the U.S. Army's air defense organization lies within the European region due to the reemergence of Russia as a potential near-peer adversary. General Scaparrotti operationalized the National Security Strategy and National Defense Strategy notion of deterrence through strength by delineating the requirement to develop the Integrated Air Defense System (IADS) within the region. To this end, he explained to the Senate a portion of the planned vision. Focusing on the ground force's role through Integrated Air and Missile Defense, General Scaparrotti asserted that strength hinges on the inclusive concept of incorporating partner

¹⁰ Jen Judson, "The U.S. Army Grapples with Short Range Air Defense Gap in Europe," *Defense News*, June 14, 2016, accessed December 22, 2018, <https://www.defense news.com/smr/road-to-warsaw/2016/06/14/us-army-grapples-with-short-range-air-defense-gap-in-europe/>.

¹¹ Ibid.

nations and North Atlantic Treaty Organization allies in addition to growing our own force.¹² He specified capability for missile defense through the Terminal High Altitude Air Defense and Patriot missile defense systems, and suggested the requirement for greater protection of maneuver forces through the employment of “critical enablers.”¹³ Based on Lieutenant General Hodges’s knowledge and concern for the SHORAD critical shortage against his central concern of a “swarm” of drones, this conceptual framework is where SHORAD fits into General Scaparrotti’s strategy. Altogether, he aimed to build a more robust IADS in Europe: a system of redundant sensors and effectors under a common command and control network.

U.S. Army Plans and Directives

Filtered through National Strategy, this section examined the Army Capstone Concept (ACC), the U.S. Army Operating Concept (AOC), and additional Army directives including the Army Modernization Priorities and a review of the Joint and U.S. Army Warfighting Functions. Although these guiding documents cover much more, the purpose of this section was to specifically define air defense integration tasks and their origins.

Army Capstone Concept

The ACC was a key U.S. Army document to understand the precepts for air defense modernization. Published in 2012, the ACC described the anticipated future

¹² U.S. Congress, Senate, Committee on Armed Services, “Statement of General Curtis M. Scapparotti, United States Army, Command, United States European Command,” Washington, DC, March 8, 2018, 1.

¹³ Ibid., 16.

environment and how the Army must respond, including near to mid-term capability requirements. This document described the transition of the Army from one focused on winning two wars, to an expeditionary Army that does many things well.¹⁴

The ACC answered three questions:

1. How does the Army view the future operating environment?
2. Given the future-operating environment, what must the Army do as part of the joint force to win the Nation's wars and execute successfully the primary missions outlined in defense strategic guidance?
3. What capabilities must the Army possess to accomplish these missions?¹⁵

Review of the ACC focused primarily on principles that apply to this thesis, since it covered a spectrum of concepts and functions.

The ACC asserted that the future Army will operate in a complex and uncertain environment with adaptive threats operating in a decentralized manner.¹⁶ The enemy will incorporate "high-technology airborne systems for intelligence, surveillance, and reconnaissance, and strike."¹⁷ The application of decentralized, increasingly technologically advanced UAS platforms pose a threat to ground forces to an extent never before experienced on the battlefield. The proliferation, advancement, and

¹⁴ Army Capabilities Integration Center (ARCIC), "Capstone Concept," December 19, 2012, accessed December 23, 2018, <http://www.arcic.army.mil/Concepts/Capstone>.

¹⁵ Ibid.

¹⁶ U.S. Army Training and Doctrine Command (TRADOC), TRADOC Pamphlet 525-3-0, *The U.S. Army Capstone Concept* (Fort Eustis, VA: Government Printing Office, 2012).

¹⁷ Ibid., 7.

innovative application of unmanned aircraft will challenge the Army both tactically and operationally.

Adversary commanders will position forces and capabilities to support rapid precision attack against air and seaports of debarkation and interrupt the flow of logistics or follow-on forces. Adversaries are developing more capable unmanned aerial platforms that employ global positioning system jammers, and long-range precision strike systems including land attack and air launched cruise missiles.¹⁸

This material application is one of the certainties of the future operating environment, and is the impetus for the SHORAD capability requirement in American Army formations. In order to retain the ability to win in a complex operational environment in an era of fiscal austerity, the Army must relentlessly consider modernization.¹⁹ With regard to the Fires Warfighting Function, the ACC requires: “offensive and defensive fires capability to deter, disrupt, degrade, or destroy threat capabilities, pre-empt enemy actions, and protect friendly forces and other critical assets abroad and in the homeland in support of unified action.”²⁰ Although a generalization of required capabilities, it is upon this foundation that air defense modernization is built. Additionally applicable to the human dimension of leadership and education, the ACC also mandates leader development to accompany the incorporation of the new way of war, mirroring education with material and tactical advancements as the Army develops decisive action training and doctrine.

Future Army forces require the capability to train and educate leaders, Soldiers, and civilians using a continuous adaptive learning model that develops the initial, functional and professional skills, knowledge and attributes to provide the

¹⁸ TRADOC Pamphlet 525-3-0, 8.

¹⁹ ARCIC, “Capstone Concept,” 1.

²⁰ TRADOC Pamphlet 525-3-0, 30.

fundamental technical and tactical competence necessary to conduct decisive action in support of unified land operations..²¹

In coordination with other concepts, the ACC envisioned a more robust, more adaptable, critically thinking Army as part of a larger joint and multi-national force on the modern battlefield by combining defensive fires capability with training and educating our leaders. It also outlined the required capabilities to meet the current operating environment. Coupled with other fires capabilities, air defense investments are aimed to support expeditionary operations by providing air and missile defense to deny enemy air assets that could limit area accessibility, such as enemy UAS observing targets for long-range precision fires..²²

The ACC examined the future operational environment, which is consistent with publications from both the Asymmetric Warfare Group (AWG) and the Research and Development (RAND) Corporation. Based on that study, the document described how the Army must modernize to better support the joint force, then established required capabilities to meet demands. The ACC is a bedrock document, which propels the advancement, modernization, and integration of SHORAD into tactical and operational formations.

U.S. Army Operating Concept

Building upon the ACC, the Army developed TRADOC Pam 525-3-1, the U.S. Army Operating Concept: Win in a Complex World, published in 2014. The AOC bridges the gap between the ACC and functional concepts by describing, “how the Army

²¹ TRADOC Pamphlet 525-3-0, 31.

²² Ibid., 33.

will employ forces and capabilities in complex environments against increasingly capable opponents.”²³ The AOC described the Army’s role in globally integrated operations including multinational, coalition, and joint integration across the domains of land, air, maritime, space, and cyberspace.²⁴ The concepts published in the AOC also guide force development by identifying capabilities the force must possess to accomplish goals outlined in the aforementioned national policy. Finally, the AOC is intended to be executed by both the operational and institutional Army. “The Army centers of excellence build on the ACC and the AOC, to develop revised Army functional concepts.”²⁵

The document’s Forward from the Chief of Staff of the Army, General Raymond Odierno, described that the AOC outlined how the Army will proceed into the future by providing “the intellectual foundation and framework for learning and for applying what we learn to future force development under Force 2025 and Beyond,” against an enemy who is “determined, elusive, and increasingly capable.”²⁶ He established a sense of urgency by describing the complexity of thought and action required of members of the Army, directing that, “the Army must conduct sophisticated expeditionary maneuver and joint combined arms operations” moving away from the era of geographically stationary,

²³ Army Capabilities Integration Center (ARCIC), “The U.S. Army Operating Concept (AOC): Win in a Complex World,” October 7, 2014, accessed December 23, 2018, <http://www.arcic.army.mil/Concepts/Operating>.

²⁴ TRADOC Pamphlet 525-3-1.

²⁵ ARCIC, AOC.

²⁶ TRADOC Pamphlet 525-3-1, i.

controlled and compartmentalized maneuver, absent of overwhelming joint integration and widespread leverage of combined arms.²⁷

In the Preface from the Commander, U.S. Army Training and Doctrine Command, General David Perkins stated that one of the greatest duties of warfighting professionals is to “think clearly about the problem of future armed conflict.”²⁸ He further described the AOC to answer three questions:

1. What level of war is the concept going to address?
2. What is the environment we think Army forces will operate in?
3. What is the problem we are trying to solve?²⁹

The answers to these questions create a dilemma, or perhaps elevate the urgency for action. The AOC addressed every level of war (tactical, operational, strategic). “The environment the Army will operate in is unknown. The enemy is unknown, the location is unknown, and the coalitions involved are unknown.”³⁰ The final question was answered by the foundational problem, how to “Win in a Complex World.” Planning for the future will not be easy, and with reasonable certainty, operating in that world will be even more challenging. The implication with answering the third question in terms of this thesis is that the U.S. Army must consider now every avenue to best prepare air defense and maneuver leaders for the dynamic threats looming on the future battlefield.

²⁷ TRADOC Pamphlet 525-3-1, i.

²⁸ Ibid., iii.

²⁹ Ibid.

³⁰ Ibid.

In order to confront this challenge, General Perkins outlined that the Army must provide the Joint Force with multiple options, be able to integrate with multiple partners, across the domains, and present multiple dilemmas to the enemies of the U.S. Army.³¹ Of importance to the integration of M-SHORAD, General Perkins emphasized Joint Forcible Entry operations using combined arms with the abilities of “mobility, firepower, and protection to defeat the enemy and establish control of land, resources, and populations.”³² M-SHORAD leaders must be knowledgeable in the mobile, aggressive, expeditionary nature of Joint Forcible Entry in order to fulfill their protection tasks. Likewise, maneuver leaders, accustomed to Joint Forcible Entry operations, must gain experiential knowledge with integrating M-SHORAD capability.

In describing the development of the force, General Perkins highlighted that innovation is crucial, in that it helps anticipate challenging conditions of the future operating environment.³³ Interestingly, innovation in this context applies not only to technological advancement, but also manning of organizations and training of individuals. This accents the notion that the next fight requires intellectual flexibility, creativity, and adaptability in conjunction with superior material solutions in order to seize, retain, and exploit the initiative. This idea is affirmed when he states, “The tenets of this concept must apply to the institutional Army as well as the operational Army.”³⁴

³¹ TRADOC Pamphlet 525-3-1, iii.

³² Ibid., iv.

³³ Ibid., iii.

³⁴ Ibid., v.

The AOC defined the means by which the Army accomplishes decisive action (the simultaneous employment of offense, defense, stability, and/or defense of civilian authorities).³⁵ The Army Core Competencies are: Shape the security environment, set the theater, project national power, combined arms maneuver, wide area security, cyber operations, and special operations.³⁶ While air defense plays a role in most of the core competencies, this thesis focused on potential potential air defense roles in combined arms maneuver.

Combined arms maneuver on the modern battlefield is critical. Across the domains, combined arms maneuver is “the application of combat power in time and space to defeat enemy ground forces, seize, occupy, and defend land areas and achieve physical, temporal, and psychological advantages over the enemy.”³⁷ For the last decade, combined arms maneuver has been employed on limited terms in combat and many of the skills associated with effective employment of all assets across the warfighting functions have faded. Artillery units in Iraq and Afghanistan were tasked to perform infantry roles, and restrictive Rules of Engagement, collateral damage concerns, and high approval authority limited the employment of strike platforms from the U.S. Air Force. Additionally, over that time many of the enabling forces typical of large-scale combat operations have not been employed in their prescribed warfighting functions. An example of this gap is the divestiture of SHORAD from maneuver units. The ability to integrate

³⁵ Headquarters, Department of the Army (HQDA), Field Manual (FM) 3-0, *Operations* (Washington, DC: Government Printing Office, 2017).

³⁶ TRADOC Pamphlet 525-3-1, vi.

³⁷ *Ibid.*, 21.

and synchronize tactical air defense platforms is an absent skillset amongst most Army leaders, counter to the criticality of performing combined arms maneuver. The AOC stipulated that, “Army leaders [must] integrate and synchronize warfighting functions and joint, interorganizational, and multinational capabilities such that they achieve complementary effects.”³⁸ Division and brigade support areas and Tactical Operations Centers (TOCs) are not adequately protected from potential air threats, and the ability to plan their protection has not been required for years. These skills, when achieved, “represent the peak of military proficiency.”³⁹

Finally, the AOC described the charge to the air defense branch in regards to material and technological solutions. “Science and technology must focus on developing munitions, platforms, sensors, targeting, and mission command systems.”⁴⁰ In addition to other modernization directives, the AOC directed the development of surface-to-air fires “with extended range and enhanced precision to enable the Joint Force to . . . project power from land into the air, maritime, and space domains.”⁴¹ Thus the successful development and integration of M-SHORAD represented a contributing factor in how the U.S. Army laid plans to unravel the Gordian knot of anti-access, area denial threats.

³⁸ TRADOC Pamphlet 525-3-1, 21.

³⁹ Ibid.

⁴⁰ Ibid., 35.

⁴¹ Ibid.

U.S. Army Plans and Directives: Modernization Priorities

On October 3rd, 2017, General Mark Milley, Chief of Staff of the Army, released his guidance for modernization priorities in the U.S. Army. He highlighted that while the Army fought insurgency and terrorism, it lost the competitive advantage over near peer adversaries.⁴² Modernization is General Milley's solution to this problem, and he outlined directives for a streamlined process to incorporate six major modernization initiatives. "The Big Six" priorities are:

1. Long Range Precision Fires
2. Next-Generation Combat Vehicle
3. Future of Vertical Lift Platforms
4. The Army Network
5. Air and Missile Defense
6. Soldier Lethality⁴³

General Milley directed the Air Defense branch to "ensure our future combat formations are protected from modern and advanced air and missile delivered fires, including drones." The concept of the directive elicited many concerns, as it is not simply accomplished through the acquisition of a weapons platform that can accomplish the specified protection tasks.

⁴² Chairman of the Joint Chiefs of Staff (CJCS), *Modernization Priorities for the United States Army* (Washington, DC: Pentagon, 2017), 1-2.

⁴³ Ibid.

U.S. Army Plans and Directives: Warfighting Functions

It is important to understand conceptually where air defense fits into Army operations. Field Manual (FM) 3-0 (*Operations*) distributed Army forces into six warfighting functions, which this research often references. A warfighting function is “a group of tasks and systems united by a common purpose that commanders use to accomplish missions and training objectives.”⁴⁴ The six warfighting functions covered are: mission command, movement and maneuver, intelligence, fires, sustainment, and protection. In Army doctrine, air defense falls within the fires warfighting function. Former Army and current joint doctrine, however, position air defense in the protection warfighting function. Considering the implicit crossover of air defense into joint planning, it is necessary to define both the fires warfighting function in FM 3-0 as well as the joint function of protection.⁴⁵

To better define the complexity of where ADA fits into the Army Warfighting Functions, this research required a brief glimpse into Joint doctrine. Joint Publication 3-0 (*Joint Operations*) defines protection as force protection “which preserves the joint force’s fighting potential.”⁴⁶ Protection in joint doctrine consists of many components, and air defense is outlined under the Defensive Counter Air capability, which consists of two components: active and passive air and missile defense measures.

⁴⁴ HQDA, FM 3-0.

⁴⁵ Joint Chiefs of Staff (JCS), Joint Publication (JP) 3-0, *Joint Operations* (Suffolk, VA: Government Printing Office, 2017).

⁴⁶ Ibid.

Active AMD “Includes all direct defensive actions taken to destroy, nullify, or reduce the effectiveness of hostile air and missile threats against friendly forces and assets.”⁴⁷ This is how the depth of capabilities within the IADS, including aircraft, ADA weapons, and sensors fit into the joint functions.

Passive AMD covers all the ancillary tasks expected of anyone operating on land with contested airspace to mitigate risks associated with air threats. It includes, “All measures . . . taken to minimize, mitigate, or recover from the consequences of attack aircraft and missiles . . . measures include camouflage, concealment, deception, dispersion, reconstitution, redundancy, detection and warning systems, and the use of protective construction.”⁴⁸

FM 3-0 lost much of the detail enumerated in Joint Publication 3-0 with regard to tasks associated with air defense. In support of the publication, however, the Army generated FM 3-01 (U.S. Army Air and Missile Defense Operations), which goes into greater detail. Air defense is found nested within the fires function, or, “the related tasks and systems that provide collective and coordinated use of Army indirect fires, air and missile defense, and joint fires through the targeting process,” and consists of lethal and non-lethal effects.⁴⁹

The only specification related to SHORAD in FM 3-0’s definition of fires speaks to air defense forces assigned to the corps echelon, including, “air defense radars,

⁴⁷ JCS, JP 3-0.

⁴⁸ Ibid.

⁴⁹ HQDA, FM 3-0.

weapons systems, and appropriate communications equipment.”⁵⁰ It does not specify subordinate echelons at division and below, important to the scope of this study.

Air Defense Artillery Branch Plans and Directives

The next section is the result of actions taken in response to national strategy and Army directives and defines initiatives that the Air Defense branch is currently executing. Subsections in this topic are ADA Branch Chief Guidance on M-SHORAD, the Warfighting Functions, the M-SHORAD Organizational Model, and the M-SHORAD system review.

Branch Chief Guidance

In 2017, Brigadier General Randall McIntire, then the Commandant of Air Defense, published in the Fires Bulletin the future outlook for the branch in response to the changing threat environment and Army directives.

Citing the Russian New Generation Warfare Handbook published by AWG (described later in this research), Brigadier General McIntire defined the potential threat as, “the blending of UAS, electronic warfare jamming equipment, and long-range rocket artillery.”⁵¹ McIntire described the UAS threat in greater detail, explaining that small, low-flying aerial systems are difficult to detect and defend against, “present[ing] considerable threats to maneuver forces.”⁵² He identified the employment of UAS to detect

⁵⁰ HQDA, FM 3-0.

⁵¹ McIntire, “The Return of Army Short-Range Air Defense in a Changing Environment,” 5-8.

⁵² Ibid.

massed friendly forces as the most likely enemy course of action, but also paid homage to the rotary wing threat as the most dangerous threat to friendly forces. “Attack helicopters continue to constitute the greatest single threat to maneuver forces,” citing greater standoff ranges, advanced Electronic Warfare capabilities, and smaller radar signature as key capabilities.⁵³

McIntire also acknowledged the organizational concerns within the current Army force structure by describing the historical disposition of ADA assets embedded in Army divisions. With an organic ADA battalion, each division possessed the capability to protect assets deemed critical by the commander.⁵⁴ He explained that the methodology of divesting SHORAD from divisions was to meet the demands of the previous wars, a more critical concern at the time.⁵⁵ Accepting the risk of an air threat, decision makers reduced “the short-range ADA force post-2005 . . . to two battalions of active component Avenger and counter-rocket, artillery and mortar batteries and seven National Guard Avenger battalions; none of which are organic divisional elements.”⁵⁶ Of note, active duty Avenger battalions formerly consisted of four batteries each, but part of the mid-2000’s conversion reduced Avenger composition to one battery each for a total active duty force of three batteries. With regard to detection of aerial platforms, the sole organic air picture providers to the division are the two Sentinel radars in the division artillery

⁵³ McIntire, “The Return of Army Short-Range Air Defense in a Changing Environment,” 5-8.

⁵⁴ Ibid.

⁵⁵ Ibid.

⁵⁶ Ibid.

brigade.⁵⁷ In conjunction with the threat described numerous times in this review, this minimal air defense in terms of organic and external capabilities exposes the gap across the active component of the Army.

Brigadier General McIntire further defined the existing capability gap by elevating the sense of urgency for maneuver forces, by asserting, “the divestment of divisional ADA, continuing asymmetric threats, and the re-emergence of peer and near-peer adversaries have left our maneuver forces and key assets vulnerable to enemy air surveillance, targeting and attack from aerial platforms.”⁵⁸ Brigadier General McIntire’s analysis highlighted a central concern voiced by General Odierno in the AOC, that the modern battlefield requires “sophisticated expeditionary maneuver and joint combined arms operations.”⁵⁹ Clearly, because of minimal ADA availability and employment, the Army cannot yet claim to have achieved these ends. This capability gap is an unacceptable risk and must be quickly resolved. The remainder of Brigadier General McIntire’s publication described his plan to fill the void.

Brigadier General McIntire described a three-tiered approach to mitigate the risks associated with current shortfalls:

First Effort: To reallocate SHORAD in divisions to defeat “continuous surveillance by threat UAS and subsequent devastating attacks by fixed-wing and rotary-wing aircraft and artillery,” the branch will develop the “objective M-SHORAD

⁵⁷ McIntire, “The Return of Army Short-Range Air Defense in a Changing Environment,” 5-8.

⁵⁸ Ibid.

⁵⁹ TRADOC Pamphlet 525-3-1, i.

capability.”⁶⁰ With a focus on mobility and survivability, the components of this effort include:

1. Training 62 maneuver Soldiers in European Command on the operation of the Stinger Man-Portable Air Defense System (MANPADS). If deemed appropriate by Training and Doctrine Command, Forces Command, air defense soldiers will train an additional 600 teams (one per maneuver company).⁶¹
2. Also part of the first effort (M-SHORAD) is the development of a new Stinger missile with a proximity fuse facilitating effective engagements of low, slow, small UAS and will offer increased capability against fixed and rotary-wing aircraft.⁶²
3. A third component of the objective M-SHORAD capability is the development of the next-generation MANPADS. Although details are not available, the capability is stated to be essential in urban and mega-city environments.⁶³
4. The fourth and final component of the first effort is the identification of an interim capability until an upgraded system is generated. Also not specified in this article, the interim capability would later become refurbished Avengers.⁶⁴ Regardless of

⁶⁰ McIntire, “The Return of Army Short-Range Air Defense in a Changing Environment,” 5-8.

⁶¹ Ibid.

⁶² Ibid.

⁶³ Ibid.

⁶⁴ Jen Judson, “Short Range Air Defense Interim Solution To Be Chosen By End of Year,” *Defense News*, March 19, 2018, accessed December 22, 2018, <https://www.defense news.com/land/2018/03/19/short-range-air-defense-interim-solution-to-be-chosen-by-end-of-year/>.

the application of a hasty solution, McIntire specified intentions to field one M-SHORAD battalion of the new system per division.⁶⁵

McIntire then described the second effort of air defense modernization as Indirect Fire Protection Capability. IFPC protects “fixed and semi-fixed assets” such as “permanent facilities and structures (e.g., air bases) and transient facilities and structures (e.g., assembly areas).”⁶⁶ This thesis delimits this effort from the scope of study.

M-SHORAD and IFPC are not interchangeable, but rather complementary systems that provide a tiered defense. Incorporating both capabilities simultaneously meets the ‘mix’ air defense principle. M-SHORAD is designed to be more mobile to maintain pace with maneuver elements, while IFPC is designed to be more stationary to offer a depth of defense (large magazine capacity) against massed enemy fires.

The third effort for air defense modernization is the concept of combined arms contributions to air defense. Components of Combined Arms For Air Defense (CAFAD) include incorporating internal weapons systems to counter the enemy air threat as well as passive measures taken by the ground force. Although complementary, these measures are still critical to survivability because sometimes it is all they have. “Even with anticipated growth, the ADA force will not have the number of units and systems to provide the required defenses throughout the force.”⁶⁷ Incorporating into training the

⁶⁵ McIntire, “The Return of Army Short-Range Air Defense in a Changing Environment,” 5-8.

⁶⁶ Ibid.

⁶⁷ Ibid.

practices outlined in Army Techniques Publication 3-01.8 *Techniques for Combined Arms for Air Defense*, McIntire asserted, is a method for maneuver units to prepare.⁶⁸

Brigadier General McIntire's central concern is that countering the complexity of attacks the Army could face on future battlefields; one gadget, one unit, or one capability fails to appropriately mitigate the risk. Air defense modernization must consider a tiered approach not only by developing a layered, branch-centric IADS, but also by considering other contributing efforts across other warfighting functions to aid in the protection of ground forces.⁶⁹

U.S. Army M-SHORAD Battalion Organizational and Operational Concept

With Brigadier General McIntire's instruction based on his understanding of strategic guidance, the Fires Center of Excellence, Capabilities Development and Integration Directorate published the final version of the *United States Army Maneuver Short Range Air Defense Battalion Organizational and Operational Concept* on May 10th, 2018. It outlines the concept to integrate the M-SHORAD battalion into Army divisions. It reflects future operational environment concerns consistent with other literature (RAND and AWG publications). Additionally, it defines system characteristics and provides a concept for organizing each echelon of the M-SHORAD battalion into the supported division. The document is thorough, concise, and descriptive, which helps air defenders and other branch members alike understand and appreciate plans to integrate the capability. The information most relevant to this study is the proposed organizational

⁶⁸ McIntire, "The Return of Army Short-Range Air Defense in a Changing Environment," 5-8.

⁶⁹ Ibid.

construct, which is applicable because it helps leaders to understand leadership and training requirements for the new units.

For the first time, this document alludes to the central concern of this thesis: “The Army can no longer defend and dominate tactical airspace; a great deal of capability in both materiel and institutional knowledge has been lost in recent years.”⁷⁰ The Capabilities Development and Integration Directorate Organizational and Operational Concept describes the mitigation strategy for the materiel gap, while this thesis describes a strategy for addressing the institutional knowledge gap.

The document briefly discusses composite battalions, or a combination of M-SHORAD and IFPC capabilities to protect divisional fixed and semi-fixed assets and the maneuver force. Even with the added protection, the document reiterates that the maneuver force must bolster the IADS with internal Combined Arms for Air Defense, specifically against the UAS threat.⁷¹

Of note, the publication directly links to national strategy by specifying M-SHORAD will “deter conflict and defeat air attack against Army, joint, and multinational maneuver forces.”⁷² It defines the concept of tactical airspace dominance through tiers and layers, tiers being the application of a variety of defeat mechanisms (destroy, dislocate, disintegrate, isolate) to match appropriate shooters to targets.⁷³ Layers are the

⁷⁰ Fires Center of Excellence, *United States Army Maneuver Short Range Air Defense Battalion Organizational and Operational Concept*, 3.

⁷¹ Ibid.

⁷² Ibid.

⁷³ Ibid.

use of “interlocking, mutually supporting sensors and shooters to create a combined arms, defense-in-depth effect.”⁷⁴

The Capabilities Development and Integration Directorate describes the history of the dissolution of SHORAD from the active duty Army and identifies another key to understanding the problem statement in this thesis. “Current air defense units are located at echelons above corps and are not dedicated or resourced to support maneuvering forces.”⁷⁵ This difference in employment echelon for Patriot and SHORAD formations is crucial in understanding the leader requirements and expectations of the air defense officer in the respective unit. The SHORAD capability not only eliminates a capability gap, but it also eliminates the organizational gap between the division and the nearest air defense unit. SHORAD provides “dedicated air defense to the maneuver commander through organic sense and intercept capabilities, and through the integration of existing, non-dedicated, air defense efforts.”⁷⁶ This defines two problems for the future SHORAD leader: proper employment of dedicated SHORAD capability, and integration of other enabling air defense capabilities, across the combined arms front, introducing training, advising, and supervision responsibilities from the SHORAD leader to the maneuver units.

Mission: Considering the scope of the potential air threat and the spectrum of capability available, the Capabilities Development and Integration Directorate specifies

⁷⁴ Fires Center of Excellence, *United States Army Maneuver Short Range Air Defense Battalion Organizational and Operational Concept*, 3.

⁷⁵ Ibid., 1.

⁷⁶ Ibid.

where, within the tiered construct, a M-SHORAD battalion must fight. “The M-SHORAD battalion counters low-altitude unmanned aircraft systems, high-speed fixed-wing and rotary-wing aircraft, reconnaissance, and intelligence, surveillance and target acquisition assets in defense of the maneuver force.”⁷⁷

Background and conceptual framework aside, the document later defines the proposed organizational construct of M-SHORAD. For this description, the task organization diagram below aides understanding. Assigned to Division Artillery, the battalion is comprised of five batteries and one company: three M-SHORAD batteries, one MANPADS battery, one maintenance company, and one Headquarters and Headquarters Battery.⁷⁸

⁷⁷ Fires Center of Excellence, *United States Army Maneuver Short Range Air Defense Battalion Organizational and Operational Concept*, 4.

⁷⁸ *Ibid.*, 5.

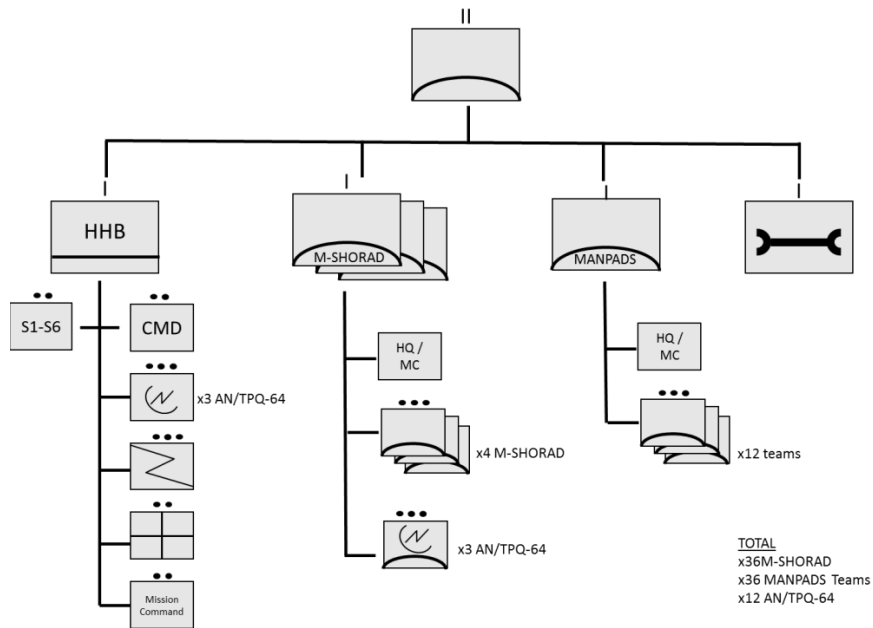


Figure 1. M-SHORAD Battalion Structure

Source: Fires Center of Excellence, Capabilities and Development Integration Directorate, *United States Army Maneuver Short Range Air Defense Battalion Organizational and Operational Concept* (Fort Sill, OK: Fires Center of Excellence, 2018).

The Headquarters and Headquarters Battery consists of command and staff entities as well as a common command and control node for the battalion, the Air Battle Management Operations Center. The Headquarters and Headquarters Battery “is staffed with personnel at the appropriate grade and Military Occupational Specialty to train, mentor, and supervise battalion and division air defense units.”⁷⁹ This concept is distinctive and actionable, and is a critical component to developing subordinate units.

⁷⁹ Fires Center of Excellence, *United States Army Maneuver Short Range Air Defense Battalion Organizational and Operational Concept*, 5.

An M-SHORAD battery provides dedicated air defense for a brigade sized element and each consists of a headquarters section, three firing platoons (four systems each), a Sentinel platoon, and two maintenance sections (weapons/systems and vehicle).⁸⁰ The battery command post integrates with the supported BCT command post, and the firing platoons integrate at the maneuver battalion echelon. The battery is additionally “responsible for the dissemination of the Air Defense Warning and Rules of Engagement to the brigade’s forces in order to integrate CAFAD as an air defense tier.”⁸¹ With reasonable certainty, the M-SHORAD battery commander is only one of two air defense officers present in the brigade TOC (assuming the Air Defense and Airspace Management (ADAM) billet is filled) and represents a key linkage between brigade tactical operations and air defense firing units. Likewise, the M-SHORAD platoon leader is the sole air defense representative in the supported battalion TOC. The platoon leader must be able to understand and verbalize employment considerations to the maneuver force and communicate maneuver plans back to the air defense battery commander thus enabling an integrated common operating picture across the brigade area of operations. The SHORAD technical and tactical competence coupled with the ability to provide clear and concise advice to operations planners at battalion, brigade, and division echelons is not commonly practiced in the current air defense force.

Similar concerns are evident for the MANPADS battery, designed to provide dedicated protection for light formations. This battery consists of a headquarters element

⁸⁰ Fires Center of Excellence, *United States Army Maneuver Short Range Air Defense Battalion Organizational and Operational Concept*, 5.

⁸¹ *Ibid.*, 10.

and three firing platoons (twelve teams each).⁸² Since teams can be individually task-organized to even lower echelons (company, platoon), this implies that MANPADS non-commissioned officers and soldiers must be trained to understand light maneuver tactics and communicate air defense employment considerations to their supported element. A former common characteristic of the SHORAD Soldier, this technical competency has vanished along with SHORAD units.

The maintenance company consists of a headquarters section as well as feeding, supply and distribution, and field maintenance elements. Maintenance and sustainment elements can be task organized to support the line batteries, and distribution elements can transport resupply items including ammunition, alleviating support requirements from parent units.⁸³ The exception is the MANPADS battery, which, because of the austerity of their employment, relies on the supported unit for sustainment.⁸⁴

The Organizational and Operational plan presented a concise review of the operational environment, historical background, existing capability gaps, and a concept for the operational and organizational employment of the SHORAD battalion. This document is significant because it established the proposed organizational structure, composition, and generates an understanding of leader requirements of the proposed formations. The future battlefield is complex, requiring many forms of air defense. M-SHORAD and MANPADS are categorized as forward deployed when compared to

⁸² Fires Center of Excellence, *United States Army Maneuver Short Range Air Defense Battalion Organizational and Operational Concept*, 5.

⁸³ Ibid., 6.

⁸⁴ Ibid., 5.

Patriot and Terminal High Altitude Air Defense (THAAD). Many air defense leaders today are not familiar with the austerity, complexity, and maneuverability of large-scale ground combat operations, but rather the isolated employment of a static asset in support of echelons above corps against a limited threat. Because of the nature of employment of HIMAD, the majority of air defense officers in the U.S. Army today are underprepared to integrate effectively into the maneuver force. The maneuver force is training on large-scale combat operations within the division and below, whereas the air defense branch has not yet reached that level of effort.

M-SHORAD Key Capabilities

The M-SHORAD platform brings tiered and layered air defense capability to the future battlefield. This section describes capabilities that identify the technological knowledge gaps of ADA leaders. With this, leaders can understand how to better incorporate the future of defense into current operations planning and training.



Figure 2. Anti-Aircraft Stryker Variant

Source: Sydney J. Freedberg, Jr., “Anti-aircraft Stryker Variant,” *Breaking Defense*, July 10, 2018, accessed March 01, 2019, <https://breakingdefense.com/2018/07/army-anti-aircraft-stryker-can-kill-tanks-too/>.

Stryker Platform: In production since 2002 and widely fielded across the U.S. Army, General Dynamics Land Systems builds the platform for M-SHORAD, the Stryker. The Stryker is a light armored wheeled vehicle. Although its survivability and mobility is somewhat limited compared to tracked vehicles, the system far exceeds the mobility of the Avenger and is sufficient for combined arms maneuver to protect armored elements. Most Strykers can carry up to nine passengers, however this variant will trade passenger space for additional ammunition.⁸⁵

⁸⁵ Sydney J. Freedberg Jr., “Army Anti-Aircraft Stryker Can Kill Tanks Too,” *Breaking Defense*, July 10, 2018, accessed March 1, 2019, <https://breakingdefense.com/2018/07/army-anti-aircraft-stryker-can-kill-tanks-too/>.

Hellfire Missiles: The M-SHORAD turret will contain two ready-to-fire Air-to-surface Guided Missile 114L Longbow Hellfire Missiles, with millimeter wave guidance system, fire and forget capability, and a range of 8km. These missiles additionally have anti-armor capability. Resupply stock inside the vehicle is unknown.⁸⁶

Stinger: A second pod of missiles expands the options for the firing unit. Four FIM-92J Stinger Missiles will be equipped with a proximity fuse warhead, different from formerly used hit-to-kill missile technology. The proximity fuse enables destruction of smaller, lightweight UAS varieties that would otherwise be difficult to achieve a direct hit.⁸⁷ The Stinger uses an infrared homing guidance system and has a range of approximately five kilometers, building options for the firing unit. As with the Avenger, the crewmembers will have the ability to use the same Stingers in a MANPADS configuration in the event the vehicle is disabled.⁸⁸

Electronic Warfare (EW): Perhaps the most interesting aspect of the M-SHORAD system is the possibility of an on-board non-kinetic means to disrupt the communications data link of enemy UAS.⁸⁹ This capability provides a cost effective means to deny

⁸⁶ Deagel, "AGM-114L Longbow Hellfire," December 7, 2006, accessed March 1, 2019, http://www.deagel.com/Defensive-Weapons/AGM-114L-Longbow-Hellfire_a001111006.aspx.

⁸⁷ Freedberg, "Army Boosts Investment in Lasers," 1.

⁸⁸ Cruise Missile Defense Systems Public Affairs, "Missile defense system upgrade meets Soldier's urgent need," *The Redstone Rocket*, September 19, 2018, accessed March 1, 2019, https://www.theredstonerocket.com/military_scene/article_1d971606-bc1a-11e8-954e-77d1c5059278.html.

⁸⁹ Janes, "Adding SHORAD: US Army rebuilds its short-range air defences," 2018, accessed March 1, 2019, https://www.janes.com/images/assets/107/84107/Adding_SHORAD_US_Army_rebuilds_its_short-range_air_defences.pdf.

observation or exploitation from UAS, and is not bound by resupply constraints as with limited ammunition quantities.

30mm M230 Chain Gun: For an additional layer of protection, the M-SHORAD is equipped with a heavy machine gun with armor piercing capability. The 30mm Chain Gun, adapted from the Apache helicopter, bolsters lethality through incorporation of a high-explosive, dual-purpose proximity round with a shaped charge to defeat armor. This system can be used in a ground role focusing on lightly armored vehicles..⁹⁰

7.62 Coaxial Machine Gun: The final tier of protection is the 7.62mm Coaxial Machine Gun. This weapon could be used as a more cost-effective means to defeat UAS and ground troops as required.

L3 Wescam's MX-GCS Sighting System: Also used on Infantry Fighting Vehicles and Main Battle Tanks, the M-SHORAD uses Wescam's MX-Gunner or Commander Sight to provide on-the-move target identification, tracking, and firing capabilities. Operators will be able to track and engage targets using high definition thermal imaging. This system replaced the Forward Looking Infrared (FLIR) on the Avenger..⁹¹

Onboard Tracking Radar: Another significant upgrade from the Avenger is the onboard multi-mission hemispheric radar. This radar uses cutting edge technology and

⁹⁰ Charlie Gao, "M230: Could This Gun Be the US Military's Ultimate Weapon?" *National Interest*, September 22, 2018, accessed March 1, 2019, <https://nationalinterest.org/blog/buzz/m230-could-gun-be-us-militarys-ultimate-weapon-31762>.

⁹¹ Wescam, "Wescam's MX-GCS Independent Stabilized Sighting System," August 2018, accessed March 1, 2019, https://www.wescam.com/wpcontent/uploads/2018/08/DataSheet_MX-GCS_1611-1.pdf.

incorporates an Active Electronically Scanned Array Antenna operating in a solid state mode. It is highly reliable and very durable, well-suited for austere fighting conditions and mobile, vehicle mounted requirements.⁹² Its compact size can detect threats up to 40 kilometers in a 90-degree coverage fan.⁹³ The M-SHORAD is equipped with multiple sensors of the same type to offer greater than 90-degree coverage. The purpose of the radar is to acquire aerial and ground targets for early warning and cued engagement. The benefit of having an on-board sensor is simple—there is no longer a single-point of failure in the short range portion of the IADS. Formerly, the Avenger relied on early warning and digital cuing from the Sentinel radar. If the Sentinel were defeated, the Avenger would lose some capability.

Reconfigurable Turret: The Moog Reconfigurable Integrated-weapons Platform is a, “flexible, scalable remote turret providing tailored overmatch and improved survivability against current and emerging threats across the full spectrum of conflict.”⁹⁴ It is lightweight, offers rapid under armor reloading (Soldiers do not have to dismount to reload), and is a common platform to facilitate modification of weapons packages. This component is key because of the modular upgrades planned for the M-SHORAD system within the decade, described next.

⁹² Leonardo DRS, “Multi-mission Hemispheric Radar (MHR),” accessed March 1, 2019, <https://www.leonardodrs.com/products-and-services/multi-mission-hemispheric-radar-mhr/>.

⁹³ Ed House, “C-UAS + M SHORAD,” *SitRep* (4th Quarter 2017), accessed March 1, 2019, <https://www.leonardodrs.com/sitrep/q4-2017-defensive-protection-systems-and-technologies/maneuver-air-defense/>.

⁹⁴ Moog, “Turreted Weapon Systems,” June 28, 2018, accessed March 1, 2019, <http://www.moog.com/markets/defense/turreted-weapon-systems.html>.

Future technology plans: Brigadier General McIntire, Cross Functional Team lead for M-SHORAD, plans to upgrade M-SHORAD after the initial fielding. The future M-SHORAD is “less about missile technology [with] more of a directed energy focus . . . we put over 50 percent of our Science and Technology money going towards directed energy products.”⁹⁵ The Army plans to field a 50-kilowatt laser by 2023, replacing some component of the previously described M-SHORAD.⁹⁶ High-powered lasers can kill low-end drones in seconds or less, adding the capability of destroying UAS swarms. Not limited by ammunition resupply, the laser is able to destroy drones as long as the vehicle generates electricity. Fratricide or collateral damage considerations are another benefit, since direct-fire kinetic weapons involve some sort of ammunition debris falling to the ground. However, weather effects such as rain and fog are a limiting considerations for effective employment of directed energy.

The combination of systems on the M-SHORAD brings a significant volume of combat power and lethality to the combined arms fight. The ability for it to defeat a spectrum of targets from tanks to helicopters, and infantry to drone swarms, make it a venerable asset to any maneuver formation. Considering the complexity of these systems, this section implied necessary training that leaders must receive prior to successful integration with maneuver.

⁹⁵ Freedberg, “Army Boosts Investment in Lasers,” 1.

⁹⁶ Ibid.

M-SHORAD Timeline

This section outlines a timeline from an array of sources to help visualize the past, present, and future of M-SHORAD. Colonel Chuck Worshim, program manager for cruise missile defense systems with the Army's Program Executive Office Missiles and Space, told Defense News that the M-SHORAD solution is moving at "lightning speed" compared to the typical acquisition process.⁹⁷ From identification of the capability gap, this section itemizes key timings in regards to the fielding of M-SHORAD. It yields refinement to answer the question: What are the current reintegration plans and directives?

July 2014: Observed by UAS, Russian artillery strikes Ukrainian forces⁹⁸

September 2017: The Army conducts a SHORAD "shoot off" of potential systems to fill the capability gap.⁹⁹

October 2017: Chief of Staff of the Army General Mark Milley designates AMD as modernization priority number five

December 2017: President Trump publishes the National Security Strategy directing modernization of the defense force to deter adversaries

December 2017: RAND Corporation publishes *The Russian Way of War*

December 2017: Brigadier General McIntire publishes ADA plans for M-SHORAD

⁹⁷ Jen Judson, "US Army's interim short-range air defense solution crystallizes," *Defense News*, June 28, 2018, accessed March 1, 2019, <https://www.defensenews.com/land/2018/06/28/us-armys-interim-short-range-air-defense-solution-crystallizes/>.

⁹⁸ Asymmetric Warfare Group (AWG), *Russian New Generation Warfare Handbook* (Fort Meade, MD: Government Printing Office, 2016), 23.

⁹⁹ Freedberg, "Army Anti-Aircraft Stryker Can Kill Tanks Too," 1.

February 2018: Army issues a directed requirement for what they call an “initial material solution” for SHORAD.¹⁰⁰

March 2018: Commander of United States European Command General Curtis Scaporatti reports to Senate the requirement to bolster the IADS in Europe

May 2018: An Army panel evaluates companies’ White Paper proposals and selects Leonardo DRS for the weapons, turret, and electronics (the Mission Equipment Package); Raytheon for the upgraded Stinger launcher (which the government then provides to Leonardo); and General Dynamics to integrate everything on the Stryker.¹⁰¹

June 2018: U.S. Army Europe Commander, Lieutenant General Ben Hodges publicly reports SHORAD capability gap.¹⁰²

Third Quarter Fiscal Year 2019: First M-SHORAD prototype to be delivered.¹⁰³

Fourth Quarter Fiscal Year 2020: First M-SHORAD battery fielded.¹⁰⁴

2021: 50 kilowatt directed energy weapon field-test (M-SHORAD).¹⁰⁵

2021: First two M-SHORAD battalions fielded.¹⁰⁶

2022: Total of four M-SHORAD battalions fielded (144 M-SHORAD systems).¹⁰⁷

2023: 50 kilowatt directed energy weapon fielded.¹⁰⁸

¹⁰⁰ Freedberg, “Army Anti-Aircraft Stryker Can Kill Tanks Too,” 1.

¹⁰¹ Ibid.

¹⁰² Judson, “The U.S. Army Grapples with Short Range Air Defense Gap in Europe,” 1.

¹⁰³ Freedberg, “Army Anti-Aircraft Stryker Can Kill Tanks Too,” 1.

¹⁰⁴ Judson, “US Army’s interim short-range air defense solution crystallizes,” 1.

¹⁰⁵ Freedberg, “Army Boosts Investment in Lasers,” 1.

¹⁰⁶ Joe Lacdan, “Army to fuse laser technology onto air defense system,” U.S. Army, October 22, 2018, accessed March 1, 2019, https://www.army.mil/article/212749/army_to_fuse_laser_technology_onto_air_defense_system.

¹⁰⁷ Judson, “US Army’s interim short-range air defense solution crystallizes,” 1.

¹⁰⁸ Freedberg, “Army Boosts Investment in Lasers,” 1.

Threat Update

This section focused leaders on the threat in the European theater of operations and aimed to answer the question: What is the current air threat facing the maneuver force? Better understanding of the threat provides focused training initiatives for both M-SHORAD and maneuver planners. This section leveraged three source documents, all which contain corroborating data. First, in December 2016, the Asymmetric Warfare Group published an unclassified document identifying specific Russian capabilities and employment tactics. This document, *The Russian New Generation Warfare Handbook*, also proposed non-material solutions to many of the concerns. Although the document described many aspects of Russian warfare across the war-fighting functions, this review only highlights functions applicable to this study. The second source document shifted its gaze to the next fight. In 2017, the RAND Corporation, an American nonprofit global policy think tank, published research on “how the Russian military would conduct combat operations in the event of a high-intensity conflict with a capable peer or near-peer adversary.”¹⁰⁹ The literature does not reference *The Russian New Generation Warfare Handbook* published by AWG, however many of the conclusions remain consistent. The overriding thesis is that Russia’s way of war is defensive in nature, but if provoked they will respond with overwhelming offensive combat power in the form of fires. The intention of incorporating early overwhelming aggression is to deny their enemies time to generate courses of action. Finally, the aforementioned AOC discusses key threat capabilities pertinent to this research.

¹⁰⁹ Scott Boston and Dara Massicot, *The Russian Way of Warfare* (Washington, DC: RAND Corporation, 2017), 1.

RAND and AWG Publications: Understanding the Threat

From 2008 to 2016, Russian forces invigorated their lackluster UAS program, developing, employing, and prioritizing their UAS capability during the campaign in Eastern Ukraine with significant success.¹¹⁰ Russia employed a spectrum of UAS, from high altitude military systems to commercial off-the-shelf quad-copters.¹¹¹ Many of these systems were integrated into their tactical formations with the primary purpose of providing full motion video (intelligence, surveillance, and reconnaissance).¹¹² Of most significance, Russian operators use live video feeds to spot and adjust artillery strikes.¹¹³

Russian forces used small, elusive drones to target rear echelon assets, such as fuel or munitions stores.¹¹⁴ Operators then drop on-board incendiary munitions, destroying the target.¹¹⁵ As troops emerge from their hidden or protected positions, follow-on drones drop secondary munitions, usually anti-personnel fragmentation grenades, killing the exposed soldiers.¹¹⁶ This inexpensive technique is significant because drones can be difficult to detect, and deep strikes behind the lines on munitions dumps, command posts, and other valuable targets can inflict critical and crippling damage to a unit. When used as an Intelligence, Surveillance, and Reconnaissance (ISR)

¹¹⁰ AWG, *Russian New Generation Warfare Handbook*, 26.

¹¹¹ *Ibid.*, 27.

¹¹² *Ibid.*

¹¹³ *Ibid.*

¹¹⁴ *Ibid.*

¹¹⁵ *Ibid.*

¹¹⁶ *Ibid.*

platform, Russia has the capability to use the video feed to rapidly direct a massing of indirect fires onto a target.¹¹⁷ This capability extends Russia's operational reach and their ability to shape their deep fight.

Where there is a friendly radar, units must consider that the enemy may detect its electronic signature. Additionally, massed friendly units (TOCs, Assembly Areas, Position Areas for Artillery, etc) pose an easily detectable signature to UAS operators. To mitigate the risk of becoming a target to the enemy's artillery, AWG recommends practicing exceptional survivability Tactics, Techniques, and Procedures (TTPs) to include tactical dispersion, camouflage, concealment, and detection (reducing physical and electronic footprint) from not only ground threats, but also aerial threats.¹¹⁸

A component of Combined Arms for Air Defense (CAFAD), AWG suggests that 'React to UAS' needs to be as common-place in the maneuver community as would 'React to Indirect Fire' or 'React to Sniper.'¹¹⁹ The process must be defined, understood, and practiced at all levels. Soldiers must understand that air superiority against a near-peer threat is not a given, and simply because it is flying does not mean it is friendly. Russia can prosecute a target in 10-15 minutes after acquisition—there is no time to develop intricate plans.¹²⁰ Developing CAFAD TTPs will reduce air threat effectiveness and set the conditions for M-SHORAD integration.

The four categories of UAS activities, described below, are:

¹¹⁷ AWG, *Russian New Generation Warfare Handbook*, 27.

¹¹⁸ *Ibid.*, 40.

¹¹⁹ *Ibid.*, 43.

¹²⁰ *Ibid.*, 23.

1. Intelligence, Surveillance, and Reconnaissance
2. Indirect Attack
3. Direct Attack
4. Swarm Tactics.¹²¹

The most likely employment of Russian UAS would be categories one and two, since historical activity in Ukraine corroborates this technique.¹²² Category one is defined as the employment of UAS to detect targets to be prosecuted by a lethal fires asset, such as artillery.¹²³ Category two uses a UAS to deliver munitions to the target (such as dropping an incendiary device).¹²⁴ The most dangerous employment of the UAS might be categories three and four, although this has not yet been observed in a near-peer arena.¹²⁵ A direct attack is when the UAS itself becomes the payload. Swarm tactics are the employment of many UAS simultaneously with the intent to overwhelm opposition systems.

Russian strategists believe that aerospace will be the primary domain in modern warfare and that the advantage goes to the side that can gain and sustain fire superiority. Interestingly, “Russian forces will not seek a parity confrontation against a peer-competitor with superior training on a unit-by-unit basis. Rather, they will employ

¹²¹ AWG, *Russian New Generation Warfare Handbook*, 43.

¹²² *Ibid.*, 44.

¹²³ *Ibid.*, 43.

¹²⁴ *Ibid.*, 44.

¹²⁵ *Ibid.*

maneuvers to find and fix an adversary and use fires to destroy it.”¹²⁶ Primarily by capitalizing on their robust long-range precision fires platforms, literature suggests that Russia will use UAS assets to detect enemy command and control nodes, headquarters locations, or concentrated troop areas, then quickly deliver overwhelming fires to destroy the target.¹²⁷ The RAND Corporation described this tactic in such a manner that it may likely become part of the ‘Most Likely Course of Action’.

The AOC states that adversary capabilities include “precision-guided rockets, artillery, mortars, and missiles that target traditional U.S. strengths in the air and maritime domains.”¹²⁸ Adversaries will use these capabilities to overwhelm defensive systems, including the IADS, in the effort to impose a high cost to the United States and coalition partners. Additionally, overmatch is a critical concern. “Overmatch is the application of capabilities or use of tactics in a way that renders an adversary unable to respond effectively.”¹²⁹ Potential enemies currently possess the capability to overmatch American weapons systems. These capabilities include long-range precision fires, air defense systems, and UAS.¹³⁰ Use of these systems in a combined-arms approach limits the joint force’s ability to achieve dominance in the air, sea, and land. A method of breaking the Anti-Access, Area Denial chain denies the enemy unfettered access to aurally observe friendly targets and necessitating the requirement for robust air defense

¹²⁶ Boston and Massicot, *The Russian Way of Warfare*, 11.

¹²⁷ Ibid.

¹²⁸ TRADOC Pamphlet 525-3-1, 8.

¹²⁹ Ibid., 9.

¹³⁰ Ibid.

throughout the theater of operations. “Improved range, lethality, and precision of surface-to-air, air-to-surface, and surface-to-surface fires may help overcome anti-access and area denial challenges, extend mutual support across long distances, and permit land forces to project power into the air and maritime domains.”¹³¹ A critical component to achieving this success is the seamless integration of M-SHORAD into tactical units (division and below) that would protect critical maneuver, logistical, and command nodes in the close and support areas.

The AWG document describes “The ‘Drone Defender’ as a non-kinetic material solution to defend airspace against UAS. The system is man-portable and is designed to electronically interrupt the UAS signal, forcing the UAS to either land or return to its ground command station depending on the UAS digital design.”¹³² “The system is ruggedized, relatively lightweight and easy to employ.”¹³³ If the enemy chooses to use small, low-flying, difficult to detect systems such as quadcopters, this presents the notion of a blending of roles of the air defender and the Electronic Warfare specialist. Fielding the capability to defeat small, low-flying drones is critical to success on the future battlefield.

In a “Most Dangerous Course of Action” scenario, Russia may incorporate other elements of air power, although this is not a strength of the total force. Combining reconnaissance, aerial interdiction, and combat air support with advancing ground forces

¹³¹ TRADOC Pamphlet 525-3-1, 13.

¹³² AWG, *Russian New Generation Warfare Handbook*, 44.

¹³³ *Ibid.*

is a capability of the Russian joint architecture, and could be employed in a high-intensity conflict.¹³⁴

Conclusion: Threat Update

Studies suggest that Russia plans to employ UAS during conflict, and use it to deliver devastating effects. Altogether, the RAND Corporation corroborates threat analysis conducted by AWG, substantiating the claim that Russia has significantly improved their unmanned Intelligence, Surveillance, and Reconnaissance capability and intend to use that capability as a cornerstone for how they fight tactically and operationally.

Colonel Charles Matallana, now the 108th ADA Brigade Commander (Fort Bragg, North Carolina), said in an address to the Command and General Staff Officer Course air defense cohort on August 8, 2018, “We are responsible for making sure the right platform is at the right place at the right time to defend a critical asset—we need dedicated knowledge and skills looking at the air for potential threats.”¹³⁵ This experienced advice is reiterated in the AOC when charging the institutional Army to train to that end. “The institutional Army optimizes individual and team performance and ensures that the right Soldier is in the right assignment at the right time to contribute to the mission. The institutional Army and operational Army develop competencies in leaders and Soldiers critical to future responsibilities.”¹³⁶

¹³⁴ Boston and Massicot, *The Russian Way of Warfare*, 9.

¹³⁵ Charles Matallana, “Re-Redding Week,” (Lecture, U.S. Army Command and General Staff College, Fort Leavenworth, KS, August 8, 2018).

¹³⁶ TRADOC Pamphlet 525-3-1, 18.

Therefore, air defenders must not rely solely on minimum-force capability to protect key nodes, such as fielding Stinger missiles to maneuver units. The institutional Army, to include all nodes of the Combined Arms Center (centers of excellence, branch schools, non-branch schools), must anticipate and fill the existing knowledge gap now. The Army must train and develop the “right” air defenders and maneuver planners alike to protect critical assets against the devastating effects of the air threat. A material solution alone cannot accomplish this charge.

Defining the M-SHORAD Knowledge Gap:
What a Generation Does Not Know

With reintegration tasks and enemy threat defined, this study explored the final component of research: What are the components of the generational SHORAD knowledge gap in the areas of leadership and training? This section conducted case study reviews of the historical execution of SHORAD in 2ACR and current SHORAD practice in America’s Five-Eyes partner and ally, the Australian Defence Force. These case studies extracts best practices in leadership and training arenas, then contrasts those best practices with the current state of the American Air Defense branch. Finally, to assess the current training continuum, this thesis contrasted the best practices found in the case studies with what is currently being taught at the MCOE and the FCOE. The purpose of this complex comparison was to identify the generational M-SHORAD knowledge-gaps that exist not only in air defense officers, but also maneuver officers so that leaders can address these concerns by bolstering schoolhouse and unit training.

Former SHORAD Construct and History

The last Soldier to die from enemy air attack was in the Korean War.¹³⁷ However, the Cold War saw a proliferation of peer air threats necessitating the mechanism to protect maneuver elements from enemy fixed and rotary wing aircraft. Many systems entered and left service between the years of 1959 and 1998, including Hawk, Chaparral, and Vulcan. The 1990's saw improvements to the Army's air defense capability, improvements that would stay relatively constant for the next decade. Patriot was introduced to the force in 1994, replacing the Hawk; and the Avenger and Bradley Linebacker were fielded in 1988 and 1997, respectively, to replace the Chaparral and Vulcan.¹³⁸

Divisional air defense was standard practice prior to the Global War on Terrorism. SHORAD enabled the force while units routinely implemented the capability in major collective training exercises and operational deployments. In the 1990s, SHORAD battalions were organic to every active duty division, and augmentees from the Army National Guard were assigned at the levels of theater army, corps, division, and below (see Figure 3).¹³⁹ At its peak, the U.S. Army once had 26 battalions of SHORAD.

¹³⁷ Jon Harper, "Army Working to Fill Air-and-Missile Defense Gaps," *National Defense Magazine*, October 2, 2018, accessed March 1, 2019, <http://www.nationaldefense magazine.org/articles/2018/10/2/army-working-to-fill-air-and-missile-defense-gaps>.

¹³⁸ Missile Defense Advocacy Alliance (MDAA), "Avenger Air Defense System," November, 2018, accessed March 1, 2019, <http://missiledefenseadvocacy.org/missile-defense-systems-2/missile-defense-systems/u-s-deployed-intercept-systems/avenger-air-defense-system/>.

¹³⁹ Global Security, "Air Defense Artillery First to Fire," May 7, 2011, accessed October 11, 2018, <https://www.globalsecurity.org/military/agency/army/ada.htm>.

This capability allowed maneuver forces to organically protect critical assets from air threats without outside enablers, such as HIMAD units or the U.S. Air Force.

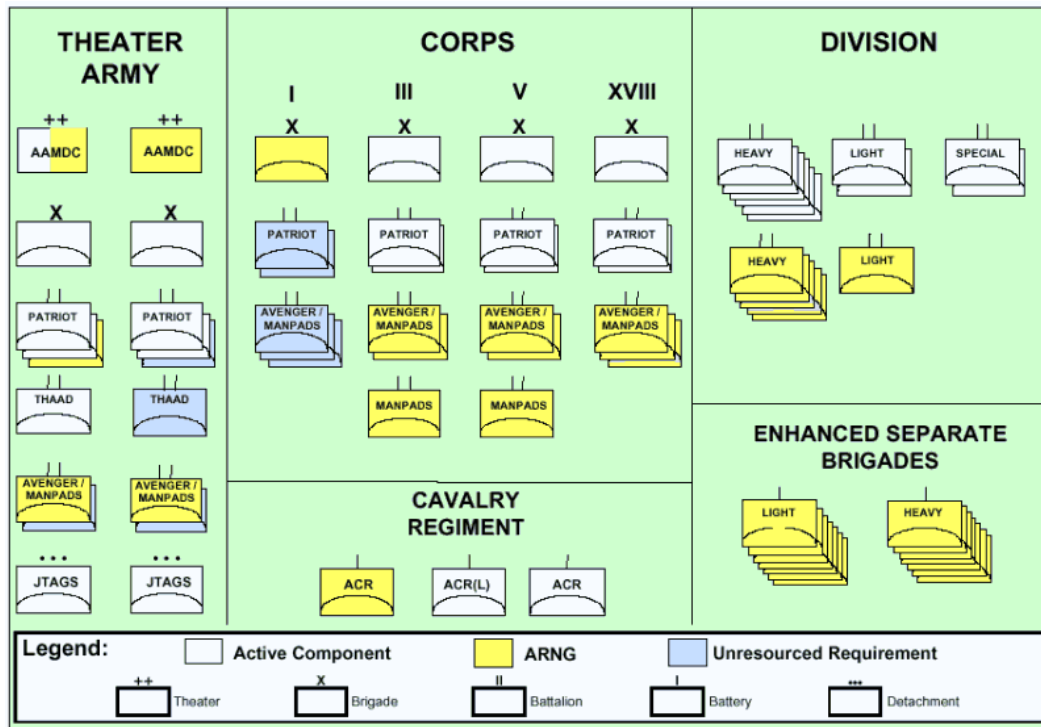


Figure 3. FY 99 Air and Missile Defense Master Plan

Source: Global Security, "Air Defense Artillery First to Fire," May 7, 2011, accessed October 11, 2018, <https://www.globalsecurity.org/military/agency/army/ada.htm>.

SHORAD battalions typically consisted of four firing batteries. Weapon systems varied by decade and location, but spanned from Chaparral and Vulcan to the Bradley Linebacker and Avenger. Although platforms modernized, the SHORAD capability consistently remained in support of Army divisions during this era. The Army habitually practiced this construct from 1983 to 2006 including multiple operational deployments

(in various roles) to Operations Urgent Fury, Just Cause, Desert Storm, Desert Shield, and to Bosnia in 1995-1997.¹⁴⁰

Post-September 11, 2001, to modernize and simplify the operational requirements during the Global War on Terrorism, the Army began to informally reorganize to fit the needs of countering an elusive, adaptive enemy while maintaining a high operations tempo of rotational deployments to the middle east. Army Chief of Staff General Peter Schoomaker directed the formal restructuring of the force to the BCT in 2006 and shifted resources to face counter insurgency operations.¹⁴¹

This pathway for the Army excluded air defense from the operational capability requirements of war-fighting brigades, eliminated SHORAD elements from the divisional construct, and compelled a branch restructure for both personnel and equipment. During the wars in Iraq and Afghanistan, SHORAD Soldiers were consolidated to ADA-pure brigades and fulfilled the relevant indirect fire protection requirement growing in both theaters. Counter Rocket Artillery and Mortar batteries were individually augmented (sometimes as part of a deploying Task Force) to static areas with the greatest threat. Since Counter Rocket Artillery and Mortar batteries were not organic to battlespace owners, and their capabilities were not maneuverable in nature; air defense leaders were not included in the combined arms operations process in combat. Gradually, from 2006 to

¹⁴⁰ Global Security, “Air Defense Artillery First to Fire.”

¹⁴¹ Peter Schoomaker, “Statement by General Peter Schoomaker, Chief of Staff United States Army, before the Commission on National Guard and Reserves,” December 14, 2006, accessed October 11, 2018, <https://web.archive.org/web/20061221114904/http://www.army.mil/-speeches/2006/12/14/989-statement-by-general-peter-schoomaker-chief-of-staff-united-states-army-before-the-commission-on-national-guard-and-reserves/index.html>.

2012, the Army transitioned SHORAD equipment to the National Guard or out of service completely, and directed a personnel restructure to include a significant reduction in the Military Occupational Specialty of 14S (Avenger Crewmember), and an elimination of the Military Occupational Specialty 14R (Bradley Linebacker Crewmember). Today, of the original 26 battalions, seven battalions remain, residing with the National Guard.¹⁴² At its lowest state, between 2012 and 2018, the active component had only one battery of Avengers remaining at Fort Bragg, North Carolina, two platoons at Fort Campbell, Kentucky, and a battery in South Korea.

The rebuilding of SHORAD began on March 27, 2018 when the 678th ADA Brigade (Avenger) from South Carolina National Guard was activated in Germany. This was the first American ADA Brigade to deploy to Europe since the end of the Cold War.¹⁴³ In November 2018, 5th Battalion, 4th Air Defense Artillery Regiment (active component) became the first unit set to receive M-SHORAD and activated in southern Germany. The battalion received Avengers in the interim before M-SHORAD is fielded.

History as an Example: Second Armored Cavalry Regiment

As a case study, this section reviewed historical documentation from 2ACR, stationed at Fort Polk, Louisiana. The publications reviewed in this thesis range from a combination of unit-specific standard operating procedures to personal notes, and even includes handwritten correspondence between leaders. Although many of the documents

¹⁴² McIntire, "The Return of Army Short-Range Air Defense in a Changing Environment," 5-8.

¹⁴³ Missile Defense Advocacy Alliance (MDAA), "Fill The Gap!" October 4, 2016, accessed March 1, 2019, <http://missiledefenseadvocacy.org/alert/fill-the-gap>.

are historical publications, these examples provide vital insight to how SHORAD units operated in the mid-1990s across the Army. The purpose is to better understand former expectations of leaders for later comparison to the knowledge gap that exists within the present generation.

The documents were graciously provided by Lieutenant Colonel (Retired) Eric Hollister, an air defender who was assigned to 2ACR from 1993-1996 in positions ranging from Avenger Platoon Leader to Regimental Air Defense Coordination Cell Officer (RADCOORD), and Battery XO.

First, it is important to understand the organization. Not subordinate to a division headquarters, 2ACR was stationed at Fort Polk, Louisiana from 1993-1997 and later deployed squadrons rotationally in consecutive support of “Operation Uphold Democracy” in Haiti from January 1995 to March 1996.¹⁴⁴ The Regiment consisted of three maneuver squadrons, a light infantry battalion (only for Training and Readiness Oversight), an attack aviation squadron, a command and control squadron which later got dissolved into the maneuver squadrons, and a support battalion. Additional enablers included an air defense battery, literally named “Air Defense Artillery Battery,” consisting of 24 Avengers, which was subordinate to First Squadron. See the task organization diagram below for additional details.

¹⁴⁴ The Second Cavalry Association, “The History of the U.S. Second Cavalry,” Dragoon History, March 13, 2018, accessed March 1, 2019, <https://dragoonshistory.com>.

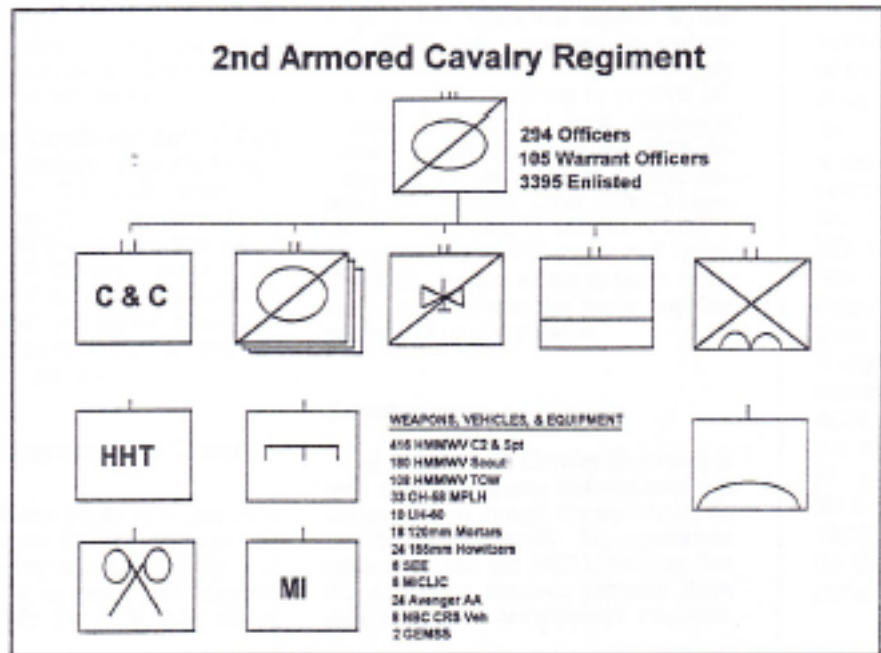


Figure 4. 2nd Armored Cavalry Regiment

Source: Joseph G. Dodd, Jr., "The 2d Armored Cavalry Regiment A Force for Peace Enforcement Operations," *Armor Magazine* 104, no. 2 (1995): 48.

Australian Defense Force Case Study

From 2014 to 2016, the author was stationed with the Military Personnel Exchange Program in Puckapunyal, Australia at the School of Artillery. As an Instructor in Gunnery in the Air Land Wing, which specialized in instruction of Ground Based Air Defence (GBAD), the author observed the difference in training for one of America's closest allies. Literature for this section includes the course packages for training opportunities afforded to young Australian officers in Regimental Officers Basic Course, a Basic Officer Leaders Course (BOLC) equivalent, Regimental Officers Gunnery Course, a Captains Career Course (CCC) equivalent, and unit activities at the 16th Air

Land Regiment (16ALR), the sole GBAD unit in the Australian Defence Force. It additionally leverages personal experience from the author. The purpose of this modern case study is to highlight areas for growth in the American SHORAD community.

DA PAM 600-3: Future State of the Force

Recently published Department of the Army Pamphlet (DA PAM) 600-3 provides a clear intent for the future of the ADA branch. The document is intended to guide career progression for all officers, with a separate chapters dedicated to the professional development of the different branches. This study primarily focuses on air defense officer progression.

The first goal is that the branch desires to forge holistic Fires Officers, “versed in ADA, field artillery (FA), maneuver, fires and effects, and tactical and technical employment concepts.”¹⁴⁵ Conversely, the Field Artillery chapter does not recommend a reciprocal knowledge of ADA employment. The Lifecycle Development Model reflects no suggested FA assignments for air defense officers, and likewise for FA officers. Interestingly, the justification for such holistic education is because the Air Defense Branch resides within the FCOE, which does offer some cross-branch training (detailed later). Operationally however, ADA and FA officers are rarely assigned to perform each other’s roles. So if the officer is not developed in an operational capacity, this limits cross-branch understanding to instruction received while enrolled at FCOE.

¹⁴⁵ Headquarters, Department of the Army (HQDA), Department of the Army Pamphlet (DA PAM) 600-3, *Commissioned Officer Professional Development and Career Management (Air Defense Artillery)* (Washington, DC: Government Printing Office, 2018), 1.

The next goal within DA PAM 600-3 states that SHORAD supports maneuver elements and that “Integration with infantry, armor, artillery, aviation, and logistics elements are critical to the success of these systems on the battlefield.”¹⁴⁶ The only remaining Avenger elements on active duty are subordinate to air defense brigades and have minimal habitual relationships with maneuver units. DA PAM 600-3 alludes to the criticality of integration, perhaps laying the groundwork for the restructuring of SHORAD elements to a maneuver echelon. In practice, SHORAD currently only supports maneuver upon receiving a tasking to support a CTC rotation, or ad-hoc relationships with division ADAM cell or fires brigade on their respective installation.

The third goal is that Patriot formations are employed “routinely in support of joint and multi-national echelons.”¹⁴⁷ Although the FCOE has a split-course concept for training oriented on the students’ next assignment (temporary effect), there is no enduring (long term effect) split career path proposed for HIMAD officers supporting echelons above corps and those SHORAD officers who routinely support tactical formations (division and below in this case).

The fourth goal regards training. According to DA PAM 600-3, an ADA officer mission essential task is to, “Train, develop, and evaluate ADA skills at CTCs.”¹⁴⁸ It goes on to say that the goal is to develop officers proficient in combined arms operations. This research could not identify any evidence that a Patriot unit has ever deployed to a CTC, or legitimately contributed to combined arms operations in training. Although the

¹⁴⁶ HQDA, DA PAM 600-3, 1.

¹⁴⁷ Ibid.

¹⁴⁸ Ibid., 2.

branch simulates the experience of large-scale combat by exercises such as Roving Sands, Patriot formations have no maneuver interaction or combined arms training. Brigadier General Christopher Spillman said, “the rest of the Army has NTC, JRTC and other opportunities to train brigades and battalions in a realistic operational training environment . . . for many of the officers, NCOs [Roving Sands] is the first time they’ve seen anything . . . at this scale.”¹⁴⁹ This is significant since, “The preponderance of the ADA force serves in Patriot organizations.”¹⁵⁰ Since Patriot is not designed to support tactical formations, the implication with this mission essential task is that SHORAD forces will train at CTCs and support combined arms maneuver. With the few remaining Avenger forces in the active component (all organic to ADA brigades), SHORAD forces are not optimally task organized to support this mission essential task. To compound the CTC training concern, DA PAM 600-3 says that, “The training and education has been periodically updated to conform to changing requirements and to maintain a clear path to professional development.”¹⁵¹ Perhaps with this guidance as a framework, the branch will recognize M-SHORAD growth in coming years and specify two career paths to facilitate focused professional development.

The fifth and final goal is depicted on the Lifecycle Development Model, under ‘additional training’. One block recommends, Joint Theater Air and Missile Defense

¹⁴⁹ Todd South, “Army missile defense soldiers revive ‘Roving Sands’ exercise, return to maneuver roots,” *Army Times*, March 9, 2018, accessed March 6, 2019, <https://www.armytimes.com/news/your-army/2018/03/09/army-missile-defense-soldiers-revive-roving-sands-exercise-return-to-maneuver-roots/>.

¹⁵⁰ HQDA, DA PAM 600-3, 3.

¹⁵¹ Ibid.

Officer (JTAMD), Air Defense Artillery Fire Control Officer (ADAFCO), Joint Interagency Intergovernmental Multinational (JIIM), and Patriot Top Gun Courses (all HIMAD-centric) then on a parallel block, recommends Air Assault, Airborne, and Ranger Courses.¹⁵² One could argue that the latter set of courses are intended to be general, non-branch-specific developmental courses. However, specialization in this set better facilitates the tactical integration of the M-SHORAD capability with maneuver. The former tier of courses are only relevant to HIMAD-centric career paths. This is a compounding argument for long-term split career tracks.

Based the current air defense organizations (13 Patriot battalions, two composite battalions, two IFPC battalions, eight Terminal High Altitude Air Defense batteries), a company-grade officer's probability of being assigned to a SHORAD formation is approximately 5.4 percent, or 1:18.5.¹⁵³ With reasonable certainty, American air defense leaders will be forced to initially fill most M-SHORAD positions with officers lacking SHORAD experience. This conundrum points back to the research question, considering this knowledge-gap, what is the branch doing to train these officers prior to their arrival in the M-SHORAD formation?

Education Continuum: Fires Center of Excellence Syllabus

The FCOE at Fort Sill, Oklahoma separately trains both FA and ADA officers in respective BOLC for newly commissioned lieutenants and CCC for junior captains.

The course outcome of BOLC is:

¹⁵² HQDA, DA PAM 600-3, 8.

¹⁵³ Ibid., 2.

Graduates of the Air Defense Artillery Basic Officer Leader Course will be adaptive officers who are steeped in the profession of arms, technically and tactically competent, confident, and capable of making independent assessments in complex, foreign, and joint environments to accomplish any mission in Unified Land Operations through mission focused leadership and critical thinking.¹⁵⁴

Although broad in concept, training is actually quite focused. Though an 18 week and three day course, totaling 697 academic hours, students first attend a common-core grouping of classes, and then split based on the first unit of officer assignment.¹⁵⁵ The final 341 academic hours are committed to either a HIMAD or SHORAD track. This split-training notion is relatively new (2016) and was not a component of training during the lean SHORAD years. The three components of the BOLC SHORAD track are MOD J: Avenger/Stinger, MOD K: Counter Rocket Artillery and Mortar/IFPC (delimited from thesis study), and MOD L: SHORAD Capstone.¹⁵⁶

The ADA CCC also splits training after the common core period. The BCT Support track “prepares the Officer to provide air defense support to BCTs conducting large scale combat operations. Students learn how to employ short-range weapons systems, de-conflict airspace, and gain an understanding of BCT Fires Cell Operations.”¹⁵⁷ This track is segmented into six components: AMD Overview, ADAM

¹⁵⁴ Fires Center of Excellence, Capabilities and Development Integration Directorate, *ADA BOLC-B Course Map* (Fort Sill, OK: Fires Center of Excellence, 2019), 2.

¹⁵⁵ Ibid.

¹⁵⁶ Ibid., 4.

¹⁵⁷ Fires Center of Excellence, Capabilities and Development Integration Directorate, *ADA CCC FY19 Course Map* (Fort Sill, OK: Fires Center of Excellence, 2019), 2.

Brigade Aviation Element, SHORAD Planning, BCT Fires Cell, Practical Exercise, and HIMAD Planning.¹⁵⁸

BOLC MOD J, and CCC SHORAD Planning Module, shows courses in Intelligence Preparation of the Battlefield, Threat Variables, and Defense Design COA Development. Additional modules cover Counter UAS. Collectively, these help to understand what the FCOE is training to prepare officers to understand the enemy and create an air defense plan so as to fulfill roles as a special staff member. Reaffirmed by a solid course package on theoretical and practical application of SHORAD tasks, these enable these officers to fulfill roles on a battalion or brigade staff to assist in planning.

Education Continuum: Maneuver Center of Excellence Syllabus

The vision of the Maneuver Center of Excellence (MCOE) is to produce, “trained combat Soldiers and is the primary driver for development of the future force.”¹⁵⁹ Since the MCOE is a key funnel for combat leader development, and since the destructive potential of the enemy air threat against a maneuver force is known, it is only fitting that this thesis reviews their training plan as it relates to air defense. Although there is an air defense warrant officer on faculty at MCOE who is dedicated to his assigned air defense instruction, he is limited to the curriculum directed by the course memorandum of instruction.

¹⁵⁸ Fires Center of Excellence, *ADA CCC FY19 Course Map*, 2.

¹⁵⁹ Maneuver Center of Excellence, “Vision,” U.S. Army, accessed March 8, 2019, <https://www.benning.army.mil/common/Content/PDF/MCoE%20Overview%20Brief.pdf>.

The MCOE Combined Arms Integration Division is responsible for delivering instruction across the war-fighting functions to the following courses: Maneuver Captains Career Course (MCCC), Infantry Basic Officer Leaders Course, Armor Basic Officer Leaders Course, Officer Candidate School, Maneuver Pre-Command Course, and Henry Caro Noncommissioned Officer Academy. Considering the scope of this study and the specific missions of the respective courses, this thesis does not study the Noncommissioned Officer Academy and Officer Candidate School course packages.

Training Continuum: Combined Arms for Air Defense Doctrine

Since the Cold War and the realization that a coalition will not have sufficient dedicated air defense coverage to protect all ground elements from the air threat of a near peer adversary, the concept of using non-dedicated air defense weapons systems against an air threat along with passive techniques intended to reduce aerial attack effectiveness has existed. This section reviews former and current CAFAD doctrine, eliminates expired techniques, describes modern techniques, and highlights similar techniques that have spanned the last four decades. Although efficiency rates of active techniques for CAFAD are questionable, they are also unavailable at the time of this research. The intent is to show techniques that should be trained to enable success on the future battlefield, and to raise the question if modern maneuver forces are adequately preparing for this threat.

The three CAFAD documents reviewed in this thesis are FM 44-8: Small Unit Self Defense Against Aerial Attack (December 1981), succeeded by FM 44-8: Combined Arms for Air Defense (June 1999), and the current doctrine, Army Techniques Publication 3-01.8: Techniques for Combined Arms for Air Defense (July 2016). Much

of the current doctrine remains unchanged through the decades, though some has developed as well.

Since 1981, doctrine agrees that air defense is a scarce commodity on the battlefield and that maneuver forces must assume they are always vulnerable to enemy targeting attempts from the air, thus suggesting that they prepare accordingly to protect themselves. Commanders today expect certain functions from various elements. For example, engineers reduce obstacles and clear routes. The Signal Corps enables redundant forms of communication. Field artillery provides the capability to target enemy forces outside the reach of direct fire systems. Doctrine, since the Cold War, identifies the fallacy of relying on air superiority and encourages combined-arms attention to the air threat.

The heart of CAFAD doctrine is the incorporation of passive and active air defense techniques. Passive air defense is “all measures, other than active air defense, taken to minimize the effectiveness of hostile air and missile threats against friendly forces and assets.”¹⁶⁰ Since 1981, doctrine further defines passive air defense into two concepts: attack avoidance and damage limiting. Unchanged are the incorporation of camouflage, concealment, and deception as vital components to attack avoidance. Damage limiting considerations are tactical dispersion, protective construction, and utilization of overhead cover. Active air defense is “direct defensive actions taken to destroy, nullify, or reduce the effectiveness of hostile air and missile threats against friendly forces and assets. It includes the use of aircraft, air defense weapons, electronic

¹⁶⁰ Joint Chiefs of Staff (JCS), Joint Publication (JP) 3-01, *Countering Air and Missile Threats* (Suffolk, VA: Government Printing Office, 2017), I-7.

warfare, and other available weapons.”¹⁶¹ Key components, unchanged through the decades, are the coordinated simultaneous employment of direct fires to maximize volume of fire, using a set aiming point for respective gunners, best visualized by a “football field” aiming technique.

¹⁶¹ JCS, JP 3-01, I-6.

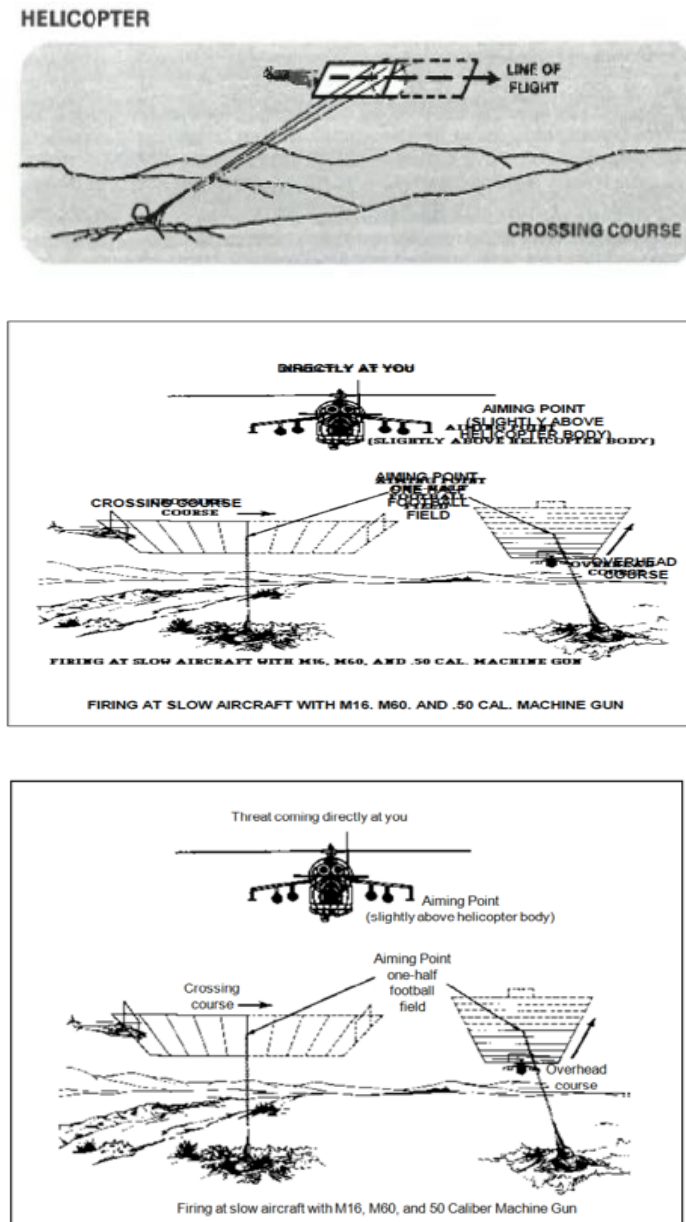


Figure 5. Evolution of Football Field Aiming Technique (1981-2016)

Source: Compiled by author using photos from Headquarters, Department of the Army, Field Manual 44-8, *Combined Arms for Air Defense* (Washington, DC: Government Printing Office, 1999); Headquarters, Department of the Army, Field Manual 44-8, *Small Unit Self Defense Against Air Attack* (Washington, DC: Government Printing Office, 1981); Headquarters, Department of the Army, Army Techniques Publication 3-01.8, *Techniques for Combined Arms for Air Defense* (Washington, DC: Government Printing Office, 2016).

NOTE: Football field aiming technique remains unchanged from 1981(left), to 1999 (center), to 2016 (right).

The majority of doctrine on active and passive air defense remain unchanged, however the additions to doctrine are to adjust to the evolving threat and to incorporate advancements in U.S. Army technology and organizational development. Modern doctrine incorporates notification of an impending air threat, identified by radars and passed down air defense communication networks. Current doctrine also delineates tasks for the ADAM/Brigade Aviation Element elements in respective headquarters, and it adds a new enemy UAS category, the Low, Slow, Small UAS.¹⁶² Review of current doctrine raises questions of how often maneuver units practice CAFAD live fires, usage of the air defense communication network for early warning dissemination, and camouflage, cover, concealment, deception during training.

Convoy planning cannot be divorced from considering the air threat and enacting mechanisms to mitigate risk. Unchanged since the Cold War are a multitude of passive techniques to mitigate risk, including traveling under limited visibility, minimizing visual presence from the air, and practicing dispersion techniques. With the evolution of air defense assets, came the recommendation to integrate SHORAD into convoys to serve as air sentries and provide en-route protection.¹⁶³

The enemy threat has certainly evolved since the Cold War. Early CAFAD doctrine only attested to fixed wing and rotary wing threats. Not until 1999 did doctrine consider UAS, ballistic missiles, and cruise missile threats as it pertains to CAFAD. As doctrine evolved, so too did techniques for better understanding potential enemy

¹⁶² Headquarters, Department of the Army (HQDA), Army Techniques Publication (ATP) 3-01.8, *Techniques for Combined Arms for Air Defense* (Washington, DC: Government Printing Office, 2016), 1-2.

¹⁶³ Ibid., 3-6.

capabilities, courses of action, and air threat planning considerations. Current doctrine further refines the UAS group, defining five different categories with focus on the more tactical (Tiers 1 and 2) categories. For these threats, current CAFAD doctrine specifies methods of UAS attack, explaining the difference between surveillance, indirect attack, direct attack, and swarm attack, mirroring AWG's Russian New Generation Warfare Handbook. To maneuver commanders, the highlighting of the UAS risk with potential catastrophic results should be cause for concern.

Air attack warning presents another significant challenge to maneuver formations. The Army's goal was to train one Stinger team per maneuver company by 2018.¹⁶⁴ Assuming this goal is now a reality, or at least close, now maneuver commanders have at their fingertips the means to destroy most low flying aircraft that present a heat signature. Although the Stinger has Identify Friend-or-Foe capability, it is the last point of fratricide mitigation before the missile is launched. In a contested environment, when air attack is expected and the airspace is congested with both American, enemy, and coalition/multinational aircraft, there is a vital responsibility for the Stinger team (in most cases one junior non-commissioned officer and one Soldier) to visually recognize the aircraft prior to missile launch. SHORAD Soldiers are trained, and are regularly evaluated, on Visual Aircraft Recognition. Commanders must be willing to assume the risk of placing a weapon in junior Soldiers hands, which could have strategic impact upon a fratricide event. The same concept applies for the initiation of active CAFAD measures.

¹⁶⁴ McIntire, "The Return of Army Short-Range Air Defense in a Changing Environment," 6.

In modern doctrine, air attack warning describes mechanisms for controlling air defense to mitigate fratricide. First, the Air Defense Warning is a brevity code (red, yellow, white) to communicate the likelihood of enemy air attack. Army Techniques Publication 3-01.8 specifies, “Any commander, after coordination and approval from the Area Air Defense Commander, may issue a higher level of warning for their command but may not lower the level.”¹⁶⁵ Next, the Weapons Control Status offers a mechanism to control the usage of air defense weapons. Doctrine suggests that the Weapons Control Status will be prescribed to maneuver formations from the air defense element in the respective echelon headquarters. Finally, pre-established Rules of Engagement offer commanders the opportunity to identify and disseminate hostile criteria, which echelon will control CAFAD, and the right of self-defense, which takes precedence over limiting control mechanisms. Maneuver platoon leaders, those who would be expected to issue fire control orders in a CAFAD scenario, must be trained in the intricacies of the fratricide mitigating tools of Air Defense Warning, Weapons Control Status, and Rules of Engagement.

Finally, CAFAD doctrine has always made some type of training recommendation to maneuver elements. Of interest, 1981 doctrine suggested the use of remote controlled aircraft at the firing range, a suggestion that did not matriculate to modern doctrine, which offers no replacement strategy for simulating an air threat. Also, since 1981, the same checklist for passive air defense has been recommended to maneuver units, pasted below.

¹⁶⁵ HQDA, ATP 3-01.8, 2-1.

BEFORE THE ATTACK			
Action			
1	Is an air watch being maintained?	YES	NO
2	Are vehicles and equipment camouflaged?	YES	NO
3	Do the troops know the air attack warning signals?	YES	NO
4	Is dispersion the maximum permitted by the terrain and the tactical situation?	YES	NO
5	Is available cover used for maximum advantage?	YES	NO
DURING THE ATTACK			
Action			
1	Was the warning disseminated in time for the unit to take damage-limiting measures?	YES	NO
2	Did all elements of the unit receive the warning?	YES	NO
3	Was the available cover used effectively?	YES	NO
4	Was dispersion used effectively?	YES	NO
5	Did the commander maintain close control during the attack?	YES	NO
6	Could the unit have engaged the aircraft had the order been given?	YES	NO
Note: If the trainer must mark a "No" in any item under "Before the Attack," stop the training exercise and take corrective action. If he marks a "No" in any item under "During the Attack," he must then assess the unit accordingly.			

Figure 6. Example Passive Air Defense Training Checklist

Source: Headquarters, Department of the Army, Army Techniques Publication 3-01.8, *Techniques for Combined Arms for Air Defense* (Washington, DC: Government Printing Office, 2016), B-2.

Current doctrine also recommends that units establish and practice CAFAD TTPs during training to find what works best for the respective unit. Soldiers are encouraged to train on visual and audio recognition of aircraft. Also of interest, Army Techniques Publication 3-01.8 recommends the use of a UAS report, offering an example format. This format is also recognized in AWG's Russian New Generation Warfare Handbook.

Line	Information Example	Example
1	Unit call sign and frequency	Red 1, FHXXX
2	Unit location	6 to 8 digit grid coordinate
3	Location of threat unmanned aircraft system	Grid or distance and direction from reporting unit location
4	Time threat unmanned aircraft system asset spotted/detected	Date/time group (DTG):
5	Estimated time on site	Was threat unmanned aircraft system asset approach observed or was it spotted overhead? How long might it have been there?
6	Flight characteristics	Is threat unmanned aircraft system loitering in one spot (possibly already spotted reporting unit), is it flying straight (en route to loitering location), what is the direction of flight, or is it flying randomly (searching)?
7	Estimated size, elevation, and physical description	Wingspan, height, color, tail configuration, other distinguish markings.

Figure 7. Recommended Threat UAS Reporting Format

Source: Headquarters, Department of the Army, Army Techniques Publication 3-01.8, *Techniques for Combined Arms for Air Defense* (Washington, DC: Government Printing Office, 2016), 3-15.

Conclusion

The literature review summarized and briefly evaluated the existing literature on the research questions. To answer the question of what the U.S. Army has to do prior to M-SHORAD integration, the literature reviewed was strategic documents and directives including the National Security Strategy, various U.S. Army publications, as well as ADA branch-specific publications. To explore why integrating SHORAD is important to maneuver, this research reviewed publications from the Asymmetric Warfare Group and the Research and Development Corporation to define the threat, with focus on the European Theater. To answer the question of what the Army doesn't know how to do (generational knowledge gap), this research assessed two case studies: The Second Armored Cavalry Regiment (2ACR) and the Australian Defense Force. In addition to the

case studies, additional sources include Department of the Army Pamphlet 600-3 to understand the future of the ADA force, both the Fires and Maneuver Centers of Excellence course syllabis for their respective officer training, and Combined Arms for Air Defense doctrine.

CHAPTER 3

RESEARCH METHODOLOGY

Assuming that American national strategy will continue to emphasize deterrence against potential adversaries of equivalent scale and M-SHORAD will continue as an Army priority, this research methodology examines a substantial problem in the Army. There is a generational SHORAD knowledge gap amongst Soldiers of every grade that will be increasingly harder to fix over time, as resident experience with integration into the maneuver force dwindles from our ranks. To help resolve this problem, this thesis yields recommendations for how the U.S. Army can best set the leadership and training conditions for reintegration of divisional SHORAD.

The methodological approach is qualitative in nature, with the purpose of understanding the underlying reasons for why the state of the force is distanced from SHORAD familiarity, and to understand prevalent trends in why the Army is now reinvesting in SHORAD. Additionally indicative of qualitative research, this study uses two case studies, is absent of in-depth statistical data, and heavily relies on the collection of information, both past and present, to formulate an opinion on recommendations.

The concept of information collection to formulate an opinion revolves around two case studies: the 2ACR Air Defense Battery and the Ground Based Air Defense capability in the Australian Defence Force. To build the base from which to argue recommendations, research areas included historical understanding of the state of the force, strategic origins of the upcoming changes to air defense structure, and modern threat analysis. With this established, when compared to the current state of the force, the case studies highlight the critical shortfalls the U.S. Army must immediately address.

A case study is research that collects and presents historical information of a specific time, location, and actors that is used as a comparative model to the primary research topic. A case study exposes both similarities and differences to better understand the main topic.

The most uncommon research method is the personal nature of the two case studies. A former member of 2ACR in an air defense billet provided valuable documents to understand the dynamics of American air defense in the 1990s. Additionally, the researcher was formerly assigned to the School of Artillery in Australia, providing a first-hand perspective on the inner workings of air defense in another nation. All other research used open-source documents to formulate the remainder of the argument.

To meet criteria for data collection, documents must have directly answered one of the three following questions: What are the current reintegration directives and plans? What is the current air threat facing the maneuver force? What are the components of the generational SHORAD knowledge gap in the areas of leadership and training? For example, the most existential threat facing America is Russia. The RAND Corporation and the AWG published insightful research on Russian military techniques. This research uses those source documents, with focus on the air threat.

The most significant weakness in this research is the lack of a historical review of a divisional air defense unit. The case study of 2ACR is immediately applicable, but was not subordinate to a division. This weakness is irrelevant, however, because 2ACR was designed to be a regional unit which, in the event of large-scale conflict, would likely be restructured to support a deployed division in Europe. So, in concept, the theories remain consistent with divisional air defense.

The central challenge for this research was the research problem itself. Since the modern generation lacks knowledge on integrating SHORAD into maneuver, the researcher was limited in leveraging resident experience for insight. The only method to overcome this challenge was to research and reference bygone TTPs and doctrine to yield solutions for the future.

Although the researcher intended to use a quantitative section of research, applying statistical data to the experience-base (as it relates to SHORAD) in the force, the Human Resources Command has insufficient means to yield such data. Future research could review by-grade experience types from Air Defense, Infantry, and Armor branches to quantifiably prove the current generational SHORAD knowledge gap.

The two case studies are the cornerstones to the results of this research. By comparing required skills of an air defense officer in the case studies, findings yielded support for the hypothesis of a generational knowledge gap as well critical weaknesses in our current Army officer corps, all captured within the recommendations section of this research.

Findings are suitable for research goals because they directly answer both the secondary and primary research questions. Listed in the recommendations section, the Army has enumerated and actionable areas to improve now to prepare for divisional SHORAD.

The details and flow of the research are outlined in the below graphic. Components of the knowledge gap were extrapolated by comparing successful practice in the case studies with the current state of the force. With emphasis on leadership and training, current operating practices within American ADA are reviewed for later

comparison to the case studies. This comparison yields the components of the generational knowledge gap. A visual representation of the literature review is depicted below in Figure 9.

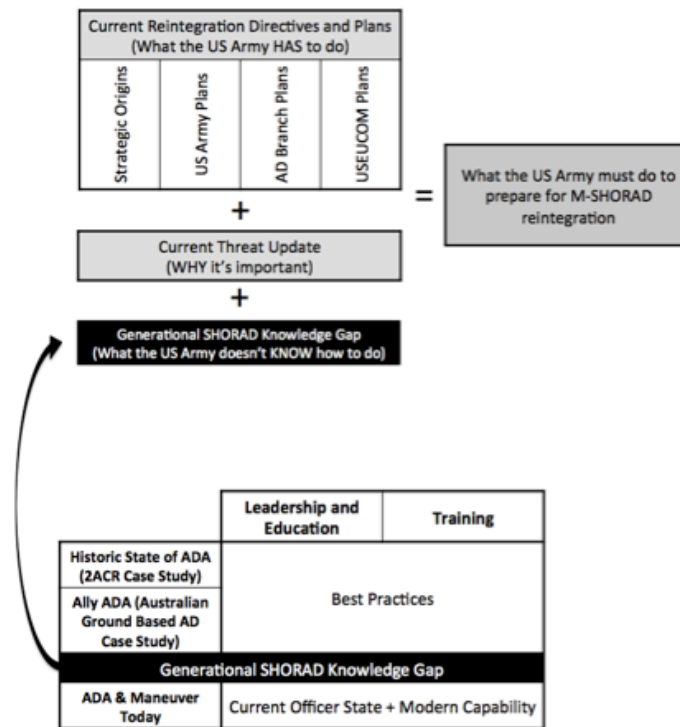


Figure 8. Framework for Literature Review

Source: Created by author.

CHAPTER 4

FINDINGS AND ANALYSIS

Introduction

This chapter presented findings from the literature review and provided analysis of the subject matter. It explored key takeaways from the 2ACR Case Study and the Australian Case Study. Next, it compared CAFAD doctrine from the past and present, reviews course syllabis from both the Maneuver and the Fires Centers of Excellence, and concludes with summarizing analysis of key concerns.

2ACR Case Study

The following section described the components of 2ACR with regards to air defense which are applicable to leadership and education. For referenced source material, see Appendix A. This section described the roles and responsibilities of key air defense players in 2ACR to show those duties which may be required in an M-SHORAD battalion. It then selected conceptual areas of expertise displayed in 2ACR in their practice of air defense.

Figure 10, Appendix A, excerpted from an article describing the 2ACR organization, further defines the task organization of the air defense battery. Platoons were “habitually associated” with each of the four squadrons that suggested some type of unique command and support relationships, other than the air defense battery of assignment. Of additional interest is the matter-of-fact declaration that “all units are trained for passive and active air defense measures,” implying that the entire Regiment was trained in those concepts outlined in CAFAD doctrine, formerly termed All Arms for Air Defense (AAAD). This is important because it highlights one of the components of

the generational knowledge gap—the U.S. Army is out of practice on implementing CAFAD.

Air defense key players and their roles are outlined in the 2ACR Common Troop Tactical Standard Operating Procedures (TACSOP), describing in detail the roles and responsibilities of each of the key members of the regiment, including the commander, staff members, and other subordinate leaders.

Regimental Commander: Establishes air defense priorities for the battery assigned to his regiment. This is consistent today with the commander's role in developing the Protection Prioritization List and Defended Asset List. He is the only leader who can designate an air defense asset to perform any other role than air defense. See Figure 11, Appendix A.

Squadron Commanders: The squadron commanders each had an Avenger platoon assigned to them for tactical employment. The squadron commander role was to employ active air defense assets, direct the employment of organic “non-air defense weapons,” and implement passive air defense measures (completing the CAFAD concept). See Figure 12, Appendix A.

ADA Battery Commander (maneuver perspective): His assigned responsibility was the coordination of all active air defense measures for the Regiment. He coordinates with external air defense elements, including his higher air defense echelon, in this case the Corps Air Defense Element. This position is not to be confused with a staff position, which is outlined later. See Figure 13, Appendix A.

ADA Battery Commander (air defense perspective): From the ADA Battery perspective, the Battery Commander was primarily responsible for commanding and

controlling the air defense battle, using radio messages, reports, and signal intelligence as available (radar feeds). The commander is not specified to be physically located in the Regimental TOC, but rather at the decisive point. He must communicate with the Regimental Commander and in so doing, is responsible for the integration of air defense assets into the maneuver force. This complex and demanding assignment spans multiple echelons—not only communicating with his assigned air defense battalion commander, but also his supported Regimental Commander and the Corps Air Defense Element, all the while conducting command activities of subordinate units. See Figure 14, Appendix A.

Air Defense Regimental Staff (maneuver perspective): The only air defense entity assigned to the Regimental Headquarters, the Air Defense Coordinator (ADCOORD) Section is the primary staff section for coordinating air defense for the Regiment. The relationship with the ADA Battery Commander must be close, but the roles are distinctly different. Similar in concept to the current ADAM cell, the ADCOORD was responsible for linking the ADA Battery Commander to the Regimental Commander. In this realm, the ADCOORD fulfilled staff roles for the Regiment. Similar to the ADA Battery Commander, the ADCOORD maintained links from the Regimental Headquarters to their higher ADCOORD, the Corps Air Defense Element. See Figure 15, Appendix A.

AD Regimental Staff (air defense perspective): This excerpt, taken from the ADA Battery TACSOP, further defines ADCOORD section roles, from the viewpoint of the ADA Battery Commander. One who has experienced modern ADAM cells might take particular interest in the specification that upon the displacement or destruction of the TOC, the ADCOORD must assume command responsibilities for the air defense battle.

This notion was a necessary component of training for large-scale combat operations, but was removed from counter insurgency training due to lack of applicability. The most important highlight is the specified ADCOORD task to relay information to the ADA battery in regards to maneuver plans and activities. This implies that the ADCOORD must be actively nested in both the plans and current operations arenas, in constant transition between making planning decisions on behalf of the ADA Battery Commander and communicating information up and down the chain of command. See Figure 16, Appendix A.

Platoon Leader: The ADA Battery TACSOP outlined the coordination a platoon leader must make with both his organic chain of command and supported unit chain of command. Generally, tasks can be categorized into the platoon leader role or the ADO (Squadron Staff) role. This unit-specific publication is missing additional categories required of the platoon leader, those liaison officer (LNO) roles, linking battalion commanders and staffs, and also the instructor roles, training maneuver forces All Arms for Air Defense techniques. Altogether, the most junior grade officer was charged with the greatest breadth of tasks amongst any air defense position in the Regiment. See Figure 17 and 18, Appendix A.

Finally, every Soldier in 2ACR had a responsibility to perform air defense. This directive covers both main portions of CAFAD, active and passive techniques. See Figure 19, Appendix A.

Consistent with guidance in CAFAD doctrine, TTPs for 2ACR began to bring about a total concept of air defense to the force. This collective air defense responsibility

attests to the reality of the air threat, and this was before the persistent aerial observation typical of today's operational environment. See Figure 20 and 21, Appendix A.

Now that 2ACR is defined in composition and roles of key air defense actors, the next section considers specific skill-sets required by air defense officers within the Regiment.

Maneuver Language. This document is one of many Knowledge Quizzes from Lieutenant Colonel (Retired) Hollister's collection. The collective subject matter of these knowledge quizzes is most important. Most questions do not focus on air defense, but rather maneuver tactics. The issuing authority understood that Lieutenant Hollister must know these concepts to successfully integrate his capability into the fight. See Figure 22 and 23, Appendix A.

In large scale ground combat operations, a division is employed as a tactical unit. The division is expected to conduct decisive action, or the simultaneous exercise of offensive, defensive, and stability operations. Since the air defense battalion is the senior air defense element in the division, air defense officers from platoon leader to battalion commander must understand the anticipated enemy, the type of operation the maneuver element is planning, and how to best employ air defense forces for the given operation. The example in Appendix A depicts an example of what is expected of a battery commander in support of a brigade. Company grade air defenders, prior to collective education at the Command and General Staff Officer's College, must understand operational frameworks, maneuver graphics, tactical tasks, and the plethora of tactical skillsets required of field grade officers. Planning of this scope and scale is not

commonly practiced in Patriot units, and marginally practiced in other air defense units not in direct support of a maneuver element. See Figure 24, Appendix A.

Special Staff Member. As described in roles and responsibilities of the air defender supporting maneuver, junior officers must support echelons far senior to their grade. A platoon leader in 2ACR must have maintained regular communication across the Squadron staff, especially the Squadron Operations Officer and Squadron Commander. Communication is not limited to technical capabilities and limitations, or factual considerations for employment, but also areas where the commander has leeway to make decisions. The next three historical documents are professional correspondence examples from Lieutenant Hollister while serving as the platoon leader and ADO in 2ACR.

The memorandum in Appendix A is professional correspondence from Lieutenant Hollister to the supported Squadron Operations Officer, Major Penn. Also included are both the original memorandum from Hollister and the handwritten response from Major Penn. In the memorandum, Hollister offers three main recommendations for Avenger integration for the upcoming Army Training and Evaluation Program, held from June 26 to July 20, 1994.

First, Hollister recommends retaining Avengers as a Squadron asset and to avoid task organizing them to respective troops. Since there is no evidence that any maneuver commander issued tactical tasks to Avengers, the central problem was not one of command relationships, but rather that Hollister, the Platoon Leader and ADO, previously experienced difficulty in controlling firing units over the radio whilst firing units simultaneously answered to maneuver units' commands. The Operations Officer

partially confirms Hollister's request, "Avengers should remain at the Squadron level for control." He goes on to confirm the importance of an overarching conceptual approach to air defense employment, best visualized by the air defense employment guidelines (mutual support, overlapping fires, balanced fires, weighted coverage, early engagement, and defense in depth).¹⁶⁶ But then, contends that movement of Avengers cannot be controlled by the ADO. "Your span of control is too limited and the lines of communication too long to think you can adequately command and control sections for movement yourself." One could conclude that Avenger tactical tasks and purposes must be issued by the ADO, but not tactical movement guidance because of limited situational awareness and the evolving ground threat.

Hollister's second assertion was tactical in nature. He recommended that Avengers maneuver behind the Scouts as opposed to with them, and still provide adequate air defense coverage of the maneuver force. Major Penn disagreed, "I still support moving Avengers with troops for protection, provided they remain with the troop rear elements."

Finally, Hollister stated that integrating Avengers with the maneuver force during operations would familiarize maneuver troops with air defense capabilities, a notion proven invalid in later correspondence.

The takeaway from this message, regardless of Hollister's unsuccessful petition, is that a junior air defense officer initiated professional correspondence with a maneuver field grade officer on topics that spanned tactics, command relationships, and training

¹⁶⁶ Headquarters, Department of the Army (HQDA), Field Manual (FM) 3-01, *U.S. Army Air and Missile Defense Operations* (Washington, DC: Government Printing Office, 2015), 1-8.

management. This supported the secondary research question of identification of the generational knowledge gap. See Figure 25 to 28, Appendix A.

After the Army Training and Evaluation Program, Lieutenant Eric Hollister offered decisions based on lessons-learned, this time to the Second Squadron Commander, 2ACR. This historical document covered multiple subjects and is an excellent example of the level of interaction and integration necessary to facilitate air defense. Decision topics are command and control, movement, emplacement, night operations, maintenance, and communications. The Commander's responses are handwritten on the memorandum.

Command and Control. As discussed earlier, ADA platoon leaders dual hat as the Squadron ADO, a special staff member. This comment references staff roles, radio communication, and the operations process. In this argument, Lieutenant Hollister's main petition is to be geographically located with his platoon. Drawing the most amount of attention, the Commander commented, "Nope . . . He's the Squadron ADCOR [sic]. He will not be maneuvering Avengers—Period!" and closes with "I'm dead set against the ADA [Platoon Leader] being out and about during the battle. His Avengers will be everywhere—He can't influence that scenario—He's the ADA Coordinator for the Squadron—He works at the TOC—Period! No Vote!" Of additional importance, to which the Commander didn't respond, were Lieutenant Hollister's concerns about simultaneous radio communication from the firing units on the air defense early warning radio network and the supported platoon. He also mentioned being more deliberate to incorporate Avenger crews in platoon and troop operations orders, to include the dissemination of operational overlay graphics.

Movement. Here, Lieutenant Hollister referenced a slight adjustment to tactics—the same request he had for Major Penn earlier—that Avengers could still protect scouts by being slightly further from the Forward Edge of the Battle Area, behind the anti-tank platoons rather than with them, thus reducing the amount of moves per firing unit. The Squadron Commander mandates integration by directing, “Avengers will position with forward deployed units along air avenues of approach using units for security.” Although Lieutenant Hollister was likely disappointed with a second negative response to the same question, the key with this comment is an air defense junior officer was actively practicing and creatively drafting improvements to large-scale ground combat operations. The Forward Edge of the Battle Area, anti-tank systems and scouts (used in their specified respective roles), are concepts that have not been habitually practiced in counter insurgency.

Emplacement. Lieutenant Hollister identifies a training shortfall for the Squadron. He doctrinally references “a lack of understanding about who should emplace the fire units.” Hollister suggested some maneuver leaders did not understand the command relationship of the ADA Platoon. The Commander charges equal responsibility, “the Avenger crew needs to be aggressive also.” Although a seemingly obvious idea, it’s possible that a cavalry first sergeant directed an air defense sergeant to adjust tactical employment, hardly a situation where aggression is commonly accepted. Hollister also suggests an education component to teach leaders Avenger capabilities. In an ideal environment, this would have happened prior to collective tactical training. But the takeaway is that a junior air defender is recommending professional development for maneuver leaders, which the Commander directed the S-3 to schedule because of this

memorandum. The implication is that Lieutenant Hollister would have then planned, prepared, and executed the training session.

Night Operations. A common force multiplying capability especially when integrated with light units, the Avenger's Forward Looking Infrared was the next topic of concern. The Forward Looking Infrared is capable of detecting infrared signatures at night, then engage observed ground targets with the M3P .50 caliber machine gun. This capability is enticing to ground commanders and can be used as a selling point for forward Avenger integration, but here Hollister reminds the Commander of the intended air defense role of the Avenger, to which the Commander agrees, "Right, Roger." The takeaway is the ADO must be informed of system capabilities and use them to market the system to maneuver elements, but apply caution to not re-task the Avenger team away from their air defense role.

Maintenance. Again, Hollister demonstrates an understanding of Avenger capabilities, in that the system is separate from the vehicle, and the system can still provide protection despite vehicle maintenance status. In essence, Hollister requests mechanics and vehicle repair parts, to which the commander agrees to support. "SMO [Squadron Maintenance Officer]—action—What are their parts? Help us, LT Hollister." This demonstrates Hollister's creativity to arrive at a solution to a complex problem by leveraging his supported unit.

Communications. Similar to the previous issue, Hollister contended that his Avengers required basic repair parts for communications equipment, the commander promises, "we will help, of course."

In conclusion, the Squadron Commander commented, “Good comments! Professional discussions like these are healthy!” The fact that the Commander denied the majority of Lieutenant Hollister’s requests does not weaken the argument of proper air defense integration, but rather bolsters it. By denying certain requests, the Squadron Commander displayed a firm holistic understanding of the roles of the Commander, the ADO, and the Avenger firing units in the air defense fight. Then, consistent with Air-Land Battle, displayed a glimpse of scalability concerns to substantiate his argument; “It was easy for [the ADO] to stay with two systems during Troop Ops, what happens during SQDN OPS!” From Hollister’s perspective, it certainly must not have been easy to make these requests, but he felt they were necessary of the position. The denied requests exemplify Lieutenant Hollister’s boldness and proactive approach to confront problems. See Figure 29 and 30, Appendix A.

Liaison officer. A liaison officer is the link between commanders and their staffs. Since the ADA battalion doesn’t have the designated manning to fill LNO positions for every supported maneuver battalion, the sole air defender, the platoon leader, must be the link between the maneuver staff and the air defense staff. Outlined in Lieutenant Hollister’s documents is a description of general tasks for LNOs, since he recognized this responsibility. Appendix A contains pertinent excerpts.

First, the document stated that LNOs are integral to conducting Air Land Battle, equivalent to modern Multi-Domain Operations. Since this is the current trajectory of America’s defense force, LNOs are implicitly required. The key is LNOs must be selected for their, “ability to communicate effectively (language capability).” The obvious implication is that an air defense officer must be able to use the same lexicon as

maneuver commanders, effectively, and be willing to initiate tough conversations. See Figure 31 and 32, Appendix A.

Secondly, LNOs must integrate with all staff sections to be effective in their role. Specifically for operations, LNOs must understand (and integrate effects) with future operations and plans, and simultaneously maintain awareness of current operations and adjust air defense assets accordingly as the situation develops. The document directs other staff section interaction as well (not pictured for sake of simplicity).

Coordination with Supported Unit. This document outlined a checklist, suitable for a platoon leader or company commander prior to initiating an air defense mission.

In Checklist One, air defense officers must understand command and support relationships, system capabilities, enemy capabilities, and the concept of sustainment, areas with great depths of requisite knowledge to provide the maneuver force.

In Checklist Two, the first five lines are arguably the most important to successful integration of the air defense asset into a maneuver formation. Mainly, they are specified tasks the air defense officer and team chiefs must perform; tasks that lie solely in the air defense realm that if not performed, expose the maneuver force to the spectrum of the given air threat. This checklist directs interaction with commanders to describe the concept of early warning and air defense practices, the instruction of AAAD referenced in modern doctrine as CAFAD, air defense planning and production of associated products, and finally the understanding and incorporation of adjacent air defense units—and that is only the first five tasks, for one officer! Clearly, expectations are great and the risk is high. See Figure 33, Appendix A.

The final component to this case study described the active and passive measures 2ACR took to prepare for the air threat. This concept, then called AAAD, is explored in a later section using past and current doctrine as a guide. In this section, however, the important takeaway was that ADOs in 2ACR must have trained the maneuver force on the proper employment of AAAD, a concept that has likely deteriorated from our maneuver ranks over the last decade.

The Regiment called on all organic shooters for active air defense including, “tanks, Infantry Fighting Vehicles, Army aviation, small arms fire, and field artillery.” Insufficient evidence exists whether these Soldiers trained on the firing range against an air threat, but the expectation alone that these Soldiers would orient their systems to the air speaks to the catastrophic danger of a near-peer enemy air threat. Specific gunner guidance is listed in this section as well. The idea of a designated “air guard,” or a vehicle mounted medium or heavy machine gun designated to provide visual early warning of enemy aircraft, further suggests a training requirement for maneuver units. In regards to passive air defense, the maneuver force must take deliberate action to mitigate risk from the air threat. Action that if not incorporated into training, cannot be adequately replicated on the battlefield. There are many specific training requirements that can be gleaned from this short excerpt. Insufficient evidence exists to confirm or deny if 2ACR actively included these components to AAAD into regular training events, so this study must assume that they trained as per dictated in their tactical manuals.

Introduction

Components of the Australian example for SHORAD are reviewed in this case study. Regimental Officers Basic Course is a 12-week course intended to train Ground

Based Air Defense officers in their technical field to operate effectively in 16ALR. Officers arrive with a basic fundamental knowledge of Army operations and planning procedures, which gives way to training specific roles and functions of the GBAD officer. Regimental Officers Gunnery Course, for junior captains, is an eight week course intended to re-acclimate officers to their career field, some of whom arrive from a broadening-type assignment. Following re-acclimation, the captains are quickly expected to perform at a high level when planning GBAD operations. This section highlights Australian officer training areas which help them to contribute more effectively to combined arms maneuver.

Australian Case Study

Understanding the Enemy. Regardless of nationality, air defense officers, not unlike other specialized career fields, are expected to assist the supported staff during Intelligence Preparation of the Battlefield to understand not only the anticipated air threat, but also employment practices for their enemy air defense counterparts. To this ends, a portion of instruction in Regimental Officers Basic Course is committed to enemy air defense platforms. This knowledge is crucial when assisting commanders and intelligence officers' understanding of the operational environment. Additionally, and most practically, GBAD officers are instructed on Visual Aircraft Recognition and attack profiles by hostile aircraft. The combination of these two seemingly fundamental concepts makes the GBAD officers valuable additions to a supported staff. Although Air Intelligence Preparation of the Battlefield is a component of American air defenders' course-load at the FCOE, Australians teach to a greater depth in specific technical capabilities and limitations of enemy systems.

Integrating GBAD into the ground scheme of maneuver. As a culminating exercise for both Regimental Officers Basic Course and Regimental Officers Gunnery Course (scaled to expectations of the officer grade), GBAD officers incorporated their technical knowledge to prepare and present an operations order in which they protect a maneuver force, given a ground scheme of maneuver. By phase, GBAD officers are expected to assess the operational plan and employ their assets according to the ADA employment guidelines and employment principles. This allowed officers the chance to demonstrate their ability to understand a supported plan and present a sound scheme of GBAD protection. A portion of the assessment includes defending the plan to a coalition brigade commander, role-played by the United States Instructor in Gunnery. This allows officers to verbally demonstrate their technical knowledge, explain risks, and offer areas for decision to the commander.

Instructing CAFAD. Finally, Regimental Officers Basic Course officers plan and execute an AAAD small-arms range. Although the students are afforded the opportunity to engage remotely piloted vehicles at a live-fire range (with low kill-rates) the purpose of the training shows lieutenants how to execute such a range in the event they are tasked to do so in support of a maneuver formation. Referencing the CAFAD doctrine section of this thesis, although familiar with the concept, American air defense officers are not taught how to train maneuver formations in active and passive air defense techniques.



Figure 9. AAAD (CAFAD) Gunnery

Source: Photos by author.

NOTE: Instructors Launching Aerial Targets (left); GBAD Students Practicing Active Measures of AAAD (right).

Large-scale maneuver training. 16 Air Land Regiment maintains a high operations tempo to support many Army-wide training events. Exercise Hamel and Exercise Talisman Sabre are multi-national, combined arms exercises executed in northeastern Australia. During these events, 16ALR provided multiple elements of support, to include GBAD. Similar to an American CTC, these experiences offer GBAD officers realistic training in support of a maneuver brigade. To prepare for these events, 16ALR regularly conducts small-scale training events, such as Exercise Raptor's Strike, where the Regiment deploys to central South Australia to train similar tasks they might face at Hamel and Talisman Sabre. Since active duty SHORAD battalions are absent from the American Army, current air defense officers lack experience with large-scale training opportunities in support of maneuver formations, whereas Australian GBAD officers are trained and prepared to integrate with maneuver formations.

CAFAD Doctrine Comparison

CAFAD doctrine through the years directed maneuver elements to expect being targeted by enemy air assets and to develop a training regime to not be caught off-guard during combat. Current doctrine recommends a thorough approach to preparing for an air threat, considering the limited availability of air defense capability. This chart compares doctrine from 1981, 1999, and 2016 and is organized by subject. The chart highlights major changes as the doctrine evolved.

Table 1. CAFAD Doctrine Comparison

	1981	1999	2016
Why CAFAD?	- o AD is a scarce commodity, maneuver must protect themselves - o Ground CDAs focus has been on winning land battle and put too much onus on AD and USAF for air superiority - o CAFAD necessitates the psychological acceptance that enemy air attack is a certainty	- o AD is a limited resource, maneuver must contribute to own defense - o Lists participants in AD (many weapons systems)	- o Limited AD resources, maneuver must be prepared to protect themselves - o Maneuver must assume they are always vulnerable to enemy targeting attempts from the air
Passive and Active AD	- o Passive AD = Attack Avoidance and Damage Limiting techniques - o Attack Avoidance= camouflage, concealment, deception - o Damage Limiting= dispersion, protective construction, cover - o Active AD: - o Coordinated direct fires - o Right of self defense - o Volume fire - o Set aiming point (football field technique) - o Proposed aiming points for FW & RW - o Proposed engagement sequence - o Individual firing positions	- o Same as 1981, nothing removed - o Additional: - o Proposed aiming points for Cruise Missiles and UAS - o Heliborne and Paratrooper attack guidance - o Friendly weapons systems engagement techniques (in addition to M16/M4) - o Tracer observation techniques	- o Same as 1981 and 1999, nothing removed - o Additional: - o Passive AD: Protection (hardening), Create recovery and reconsolidation plans - o Active AD: - o Incorporates cueing and Early Warning sensors into the scope of thought - o Discusses use of AD Network (commo) and involvement of ADAM/BAE - o Adds UAS category 'LSS' (Low, Slow, Small) into proposed aiming points chart
Convoy CAFAD	- o Travel under limited visibility (darkness or weather) - o Minimize dust clouds - o Utilize routes with natural cover/concealment - o Minimize glare: paint shiny surfaces - o Dispersion (open column, small units) - o Herringbone when at halt	- o Same as 1981, nothing removed - o Additional: - o Consider smoke to obscure movement - o Integrate SHORAD into convoy (4th or 5th Vehicle)	- o Same as 1981 and 1999, nothing removed - o Additional: - o Change profile/shape of vehicles - o Integrate Avengers if present to serve as Air Guards
Threat	- o Fixed wing - o Rotary wing	- o More holistic approach/methodology to understanding the enemy air threat, not just platform-centric - o FW, RW, UAS, TBM, Cruise Missiles	- o Same as 1999, nothing removed - o Additional: - o Classified different types of UAS (Categories 1-5) - o Defines/explains methods of attack from UAS Categories 1 and 2
Air Attack Warning	- o Air sentry in each vehicle - o Depicts search techniques - o All Soldiers: ID reflections, smoke, and/or noise from aircraft - o Lists NATO alert techniques - o All Soldiers: "Quickly recognize A/C performing hostile acts"	- o Describes Air Defense Communications Network (for passage of early warning) - o ADW, LADW, WCS, ROE - o Right of Self Defense - o Explains hostile criteria - o All Soldiers: "Visual aerial platform recognition" - o Depicts search techniques (NO CHANGE) - o Air guard per vehicle (NO CHANGE) - o Lists NATO alert techniques (NO CHANGE)	- o Same as 1999 except: - o Removed: - o One air guard per vehicle - o No longer directs individual to identify A/C type or hostile act (risk mitigation--see level of control below) - o Change/additional: - o AD Net: Describes kill chain (AADC Role) - o Describes Fire Control Orders - o States level of fire control may differ per operation - o Same Passive AD Checklist
Training Recommendations	- o Passive AD Checklist - o Suggests use of remote control aircraft for training - o List five example Tasks/Conditions/Standards for CAFAD training	o Same Passive AD Checklist only	- o Same Passive AD Checklist - o Additional: - o Directs units to develop TTPs - o Directs units to request assets and coordinate assets for air threat - o Suggests UAS reporting format (similar to 9-Line MEDEVAC) - o Suggests Visual and Audio recognition training for Soldiers

Source: Created by author.

FCOE Training and Leadership Efforts

Referencing both case studies, the Fires Center of Excellence prepares officers to understand the ground scheme of maneuver and speak the maneuver language. Based on the course packages, the FCOE is making a solid attempt, but is facing challenges for two reasons: first, instructors are air defenders raised in an Army absent of divisional SHORAD and are not subject matter experts in terms of maneuver experience. Next, FCOE does not incorporate combined training between the FCOE and MCOE or other maneuver formations in an attempt to expose future divisional SHORAD officers to different cultures within the Army.

FCOE training to be an air defense liaison is also crucial, especially in large-scale combat. Reporting up two separate chains of command is inherent to the command and support relationships typical of the SHORAD officer. Officers received no training in how to build these interactions in the FCOE. Affording officers the opportunity during the Military Decision Making Process or simulated execution exercises to react to changing plans and reporting to separate air defense and maneuver instructors might eliminate this knowledge gap. Outside the purview of the FCOE, deliberate SHORAD support of CTC rotations would yield additional training and experience to fill this void.

Finally, the FCOE is training officers to coordinate with a supported unit to train and assess CAFAD practices. Acknowledging the realism of the air threat amongst maneuver commanders is critical to the success of SHORAD. Limited air defense resources to protect a formation require active and passive measures to be commonly employed to defeat the robust UAS and rotary wing capabilities of our adversaries. If air defense officers are prepared to instruct such training, it effectively broadens the base of air defense capability in the maneuver formation and aides the effectiveness of dedicated

air defense assets. BOLC has an eight hour block of instruction on CAFAD. Although the class details are unknown, at least a significant portion of training time is committed to this concept. ADA CCC offers no similar training.

MCOE Training and Leadership Efforts

First, junior officers attending Armor Basic Officer Leaders Course and Infantry Basic Officer Leaders Course are not exposed to any air defense instruction.¹⁶⁷ This means that the components of CAFAD as described in previous chapters are untrained upon graduation, and integration of dedicated air defense support is unpracticed. Here the Army missed a key opportunity to expose young maneuver officers to the reality of air threats.

The majority of air defense training occurs in MCCC. Of 95 dedicated platform instructional hours in the course, one hour is dedicated to air defense training.¹⁶⁸ The hour of air defense instruction is segmented into two classes, ‘SHORAD Intro’ and ‘AMD Operations’.

The 30 minute SHORAD introduction class to MCCC covers the tactical employment of Stingers and Avengers during Company Phase, which describes the art and science behind employing SHORAD assets.¹⁶⁹ Concepts cover capabilities and limitations of the Avenger and Stinger, resupply & logistics, communication

¹⁶⁷ Maneuver Center of Excellence, *CAID Instructor Coverage Menu Master* (Fort Benning, GA: Maneuver Center of Excellence, 2019), 1.

¹⁶⁸ Ibid.

¹⁶⁹ Ibid.

considerations, and air threat capabilities.¹⁷⁰ Instruction is intended to educate maneuver captains on proper employment of SHORAD, since few have practical experience with the capability. This training is necessary for Company Phase instruction, since a culminating plan must incorporate SHORAD assets to counter a realistic air threat consisting of the HIND-E, HIP, and UAS.¹⁷¹ Since only a few Avenger batteries remain (organic to air defense brigades), it is unlikely maneuver officers ever saw an Avenger in a BCT formation.

The second 30-minute air defense class to MCCC, AMD Operations, is conducted during the Battalion Phase of training.¹⁷² Although briefly described in terms of operational environment and environmental effects on operations, instruction does not focus on AMD Intelligence Preparation of the Battlefield and Criticality Vulnerability Threat methodology. It focuses on ADA employment guidelines (mutual support, overlapping fires, defense in depth, early engagement, balanced fires, and weighted coverage) and employment principles (mass, mix, mobility, integration).¹⁷³ Finally, the thirty minute block of instruction covers passive air defense techniques, to include attack avoidance and damage-limiting measures described in the CAFAD section of this study. Instruction does not cover active measures to defeat the enemy air threat using non-dedicated air defense weapon systems. Of note, this instruction, per the Combined Arms Integration Division Instructor Menu (combined course syllabus), specifies that this class

¹⁷⁰ Maneuver Center of Excellence, *CAID Instructor Coverage Menu Master*, 1.

¹⁷¹ *Ibid.*

¹⁷² *Ibid.*

¹⁷³ *Ibid.*

“will be on the tail end for the Fires [warfighting function] brief,” evidence of the implied insignificance of the instruction.¹⁷⁴ Since MCCC does not have field training, no practical application of SHORAD integration or CAFAD occurs at the MCOE.

Additionally, no training is dedicated to developing a procedure to react to enemy UAS.¹⁷⁵ React to indirect fire and react to sniper are commonly known battle drills because of the lethality associated with those attacks. Since known enemy tactics include employment of UAS in various forms to inflict mass casualties, this is a critical component of education that is absent from training.

The only other course taught at the MCOE which incorporates air defense training is in Maneuver Pre-Command Course, when future battalion and brigade commanders are instructed on near and far-term ADA initiatives to include fielding the Stinger missile to maneuver units, Interim Maneuver SHORAD (IM-SHORAD), and M-SHORAD.¹⁷⁶ The 2ACR case study noted that brigade commanders establish air defense priorities for the battery assigned to their brigade (protection prioritization list and defended asset list). He or she is the only leader who can designate an air defense asset to perform any other role than air defense. Battalion commanders must employ active air defense assets, direct the employment of organic non-air defense weapons, and implement passive air defense measures (completing the CAFAD concept).

Since there is no current divisional air defense, limited SHORAD units exist to support BCTs as they train at CTCs, and minimal formal air defense education at the

¹⁷⁴ Maneuver Center of Excellence, *CAID Instructor Coverage Menu Master*, 2.

¹⁷⁵ *Ibid.*, 1.

¹⁷⁶ *Ibid.*

MCOE, it should be no surprise to senior leaders that maneuver officers are uneducated on the application of this important operational capability. Lack of SHORAD training exposes the maneuver force to the enemy air threat.

Final Analysis—Findings

This research has revealed much insight while answering the primary and three secondary research questions. The threat is relevant and real and the planned capability to defeat that threat is beyond suitable, but the Army is underprepared to face the threat. This section explained the enemy most likely course of action, assessment of the M-SHORAD capability, and described the lack of preparedness of maneuver and air defense officers.

Enemy Most Likely Course of Action: Many corroborating sources assert that the modern battlefield will be contested across all domains. In the air domain, the U.S. Air Force has enjoyed air superiority for many decades. To bypass this critical capability, potential adversaries such as Russia will employ a spectrum of UAS, which the U.S. Air Force cannot internally defeat. Using small, low-flying UAS, Russia has proven the capability to observe targets for near-immediate destruction by long range precision fires. This adversarial capability could be an initial phase to defeat land forces, including both maneuver forces and high value assets such as Terminal High Altitude Air Defense and Patriot, to defeat coalition air defense and allow air parity against the air forces, thus presenting an even more dangerous threat to maneuver forces. To eliminate this critical vulnerability, the U.S. Army must closely integrate air defense with maneuver forces, with focused targeting of tier three and four UAS.

M-SHORAD an Excellent Capability: The M-SHORAD system and organizational construct is suitable to defeat the anticipated threat and to support the speed and maneuverability of the American fighting force. However, future upgrades and an aggressive posture to modernize the M-SHORAD platform is critical. The EW suite on the M-SHORAD is an important capability in the IADS as it pertains to the close fight. Future directed energy weapons planned for the M-SHORAD system will perhaps yield multiple mechanisms to defeat small UAS.

Maneuver Officers Not Prepared: The generational knowledge gap in maneuver officers is evidenced by a general lack of concern on the potential for future air threats. This statement is predicated on the facts that MCOE has minimal instruction on air defense through the entirety of their education continuum. This fact manifests into a lack of knowledge on SHORAD capabilities and limitations to protect maneuver formations, and over-reliance on the air defense officer to integrate effectively into their scheme of maneuver to attest to the threat.

The reality is that air defense resources are limited, and it is a reasonable assumption that a commander must assume risk to employ maneuver forces without the luxury of air defense protection. CAFAD doctrine is generally underutilized and not practiced or trained. To acknowledge the air threat, units must employ passive air defense at every opportunity during tactical training and must additionally train to employ their organic weapons in an active air defense manner to defeat an enemy air threat. To have realistic expectations for CAFAD, active techniques include direct-fire machine guns such as the M2 .50 Caliber or M240, or other internal air defense capability such as a man-portable Stinger missile. An infantry Soldier trained to operate a Stinger missile

does not constitute a designated SHORAD capability, but rather bolstered active CAFAD. Active CAFAD is tenuous for many reasons. First, the enemy most likely course of action (air domain) is to employ small, low-flying, modern UAS platforms, which the Stinger is not designed to defeat. Secondly, Soldiers who operate direct fire systems that can defeat the UAS do not regularly train to engage aerial targets. Thirdly, effective rates of active CAFAD mechanisms are low.

Units such as the Asymmetric Warfare Group (AWG) have conducted numerous experiments to determine the effectiveness of small arms fire against UAS. AWG experiments have found this to be a last resort, especially when applied to UAS operating in support of other systems. Leaders must not only assess whether this is realistic, but also the current mission.¹⁷⁷

Air Defense Officers Not Prepared: The generational knowledge gap in the air defense community is significant and must be addressed prior to M-SHORAD battalion fielding. Components of the gap revolve around the diverse nature of tasks the SHORAD officer must accomplish. The graphic below depicts the components of the generational knowledge gap amongst Air Defense officers today.

¹⁷⁷ AWG, *Russian New Generation Warfare Handbook*, 44.

Table 2. Components of the Generational Knowledge Gap

	Understanding Ground Scheme of Maneuver (Maneuver Language)	Special Staff Member in Maneuver Formation	Liaison (Report up AD and Maneuver Chains)	Coordinate with Supported Unit (includes CAFAD)
2ACR	✓	✓	✓	✓
Australia	✓	✓	✓	✓
YG 04-15 AD Officers	✗*	✗*	✗*	✗
YG 16-18 AD Officers	✓**	✓	✗	✓**

*Depends on extent of individual assignment experience for each officer. However, AD schoolhouse curriculum did not support these objectives.

**FCOE SHORAD Track trains the integration of AD into maneuver plans. However, it is instructed and critiqued by AD YG 04-15 officers, not maneuver specialists. Additionally, there is no practical integration of AD planners into maneuver, such as FCOE & MCOE combined exercises.

Source: Created by author.

Furthermore, air defenders must be prepared to tactically employ and maneuver their systems in support of a maneuver formation. To accomplish this broad task, young air defenders must wear many ‘hats’. The first hat they must learn to wear is a platoon leader. Patriot platoon leaders are rarely exposed to the dynamic nature of the maneuver battlefield, nor the reality of the threat and leading troops through the hazards found in the close area. Next, young air defenders must be trained to perform duties as an ADO staff officer, understanding complexities of the ground scheme of maneuver at least one grade above what is expected of their maneuver counterparts (O1/O2 supports battalion plans, O3 supports brigade plans, O5 supports division plans). Air defenders must also perform duties as a liaison officer. Since the ADA battalion doesn’t have the designated

manning to fill LNO positions for every supported maneuver battalion, the platoon leader as the sole air defender must be the link between the maneuver staff and the air defense staff. Air defenders should also be trained on how to deliver instruction to maneuver formations to better prepare them for air attack. This training should include expectations when SHORAD is assigned to their element and what they can anticipate based on the given command and support relationships. Training must cover CAFAD techniques, to include how to conduct passive and active air defense, which will vary greatly depending on the type of maneuver formation the air defender is supporting. Finally and most importantly, a generational concern in the Army today is the marginalized voice of the air defender on staff. The air defender must be a confident, decisive communicator, both listening to maneuver instruction and making tactically sound recommendations. This shortfall and others must be trained at the centers of excellence and at operational units alike.

The U.S. Army can best set the leadership and training conditions for reintegration of divisional SHORAD through multiple venues. Operational units must attest to the air threat even with no organic ADA and develop CAFAD practices. The Human Resources Command should post an air defense ambassador in each maneuver entity, start divisional SHORAD transition today by task organizing current SHORAD units to their local division, build-out personnel for all divisional air defense battalion headquarters now, and make available Ranger School and MCCC for all SHORAD interested officers. The FCOE should consider cross-training FA officers in air defense operations, split air defense officer career tracks (focusing SHORAD officer development on the critical weaknesses outlined above), and build new linkages between FCOE and

MCOE. The MCOE should build SHORAD instruction for BOLC, MCCC, and the Maneuver Pre-Command Course. Finally, capability developers should field air defense (electronic warfare weapon system) in each maneuver squad. These recommendations are outlined in greater detail in the following section.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This research identified the problem of a gap in SHORAD knowledge for a generation of U.S. Army members. Since the Army is moving to field an M-SHORAD battalion to each division in the coming years, the Army should take advantage of the available time to prepare for the M-SHORAD reintegration. To solve this problem, this research answered the primary research question: How can the U.S. Army best set the leadership and training conditions for reintegration of divisional SHORAD? It additionally answered three secondary research questions: What are the current reintegration directives and plans? What is the current air threat facing the maneuver force? What are the components of the generational SHORAD knowledge gap in the areas of leadership and training?

Chapter four discussed findings and analysis from the research, including the enemy most likely course of action, assessment of the M-SHORAD capability, and described the lack of preparedness of maneuver and air defense officers. This chapter described an interpretation of the findings, enumerated recommendations which the U.S. Army should address prior to SHORAD reintegration, and a final summary.

Interpretation of Findings

The meaning of the results found in this research are that the U.S. Army is behind on the integration of a critical capability to the modern battlefield. The main conceptual takeaway is that the SHORAD knowledge gap is not only an air defense problem, but rather an issue the entire force must approach together. The tactical culture of Army units

does not wholistically approach the potential realities of the air threat. The implication is that in modern conflict, U.S. maneuver forces could be quickly overwhelmed by the employment of air power if the Army does not make prudent adjustments.

Recommendations

The following twelve recommendations are calls for action directed to various intities across the U.S. Army and are intended to address the central problem. Also enumerated are areas for future study which this research.

Divisions must attest to the air threat even before M-SHORAD arrives: Facing this reality will generate fertile soil for the M-SHORAD battalion to be planted into the division. To elevate training priority, Divisions must establish Counter UAS training on their Annual Training Guidance and resource training appropriately. Training for this reality does not imply more infantry Stinger teams, but the integration of the conceptual approach to the “tiered and layered” system outlined in branch guidelines, including but not limited to CAFAD practiced by every Soldier. Divisional fires representatives (even if FA officers) must be responsible for assessing enemy air threats and even in the absence of friendly air defense capability, assess critical weaknesses, resource shortfalls, and request external support. The formation, regardless of echelon, that assumes away the air threat as, “the ADA guys’ problem” is not adhering to this recommendation.

Develop CAFAD practices: Both passive and active techniques, incorporated into maneuver formations’ unit training plans as commonly as Counter Improvised Explosive Device training, convoy operations, and react to indirect fire. CAFAD must be commonly understood as not a SHORAD element, but rather a desired culture in maneuver formations. It is recommended to prioritize passive techniques outlined in CAFAD

doctrine concurrently in as many tactical exercises as possible. Although efficiency of active CAFAD could be called into question, it must be practiced as the last line of defense. Familiarize platoons on active techniques, to include a live-fire range. The inherent realism of engaging aerial targets with live ammunition will instill in every Soldier at every level the possibility of an air threat presence. Accomplishing this task will develop a new habit, and eventually a new characteristic of how the U.S. Army trains.

The Army needs an air defense ambassador in each maneuver entity, beginning with the division headquarters. Of the three Air Defense officer billets in divisions (O5, O4, O3) and the one Air Defense officer billet in a maneuver brigade (O3), Human Resources Command must select personnel based on talent management who can best establish conceptual frameworks for integrating all tiers of the proposed IADS. This individual must assist the intelligence staff on the presentation of an accurate picture of the enemy air threat and convince commanders to incorporate CAFAD into training. The ambassador must also liaise with the M-SHORAD battalion to enable coordination, integration, and adjudication of potential communication barriers with the supported command.

Train Fires officers in select air defense operations: There might be a unit without a designated ADA officer—cross-train FA officers to plan air defense in the Field Artillery Captain's Career Course. Training should be limited to capabilities and limitations of weapons systems and basic planning considerations. The purpose is to better understand enemy ADA employment considerations, capabilities of higher assets

available (such as Patriot), and how and when to employ CAFAD techniques across the formation.

Split ADA officer career tracks: The nature of the HIMAD career track does not correlate to SHORAD. Formally splitting career tracks will help to develop officers to successfully accomplish their respective tasks. It is an inappropriate analogy to compare this dynamic to rocket and cannon artillery for FA officers, or mechanized and light for infantry officers. The difference transcends weapon system for three reasons. First, the reporting chain for SHORAD crosses branches. Unlike HIMAD, SHORAD battalion commanders, battery commanders, and platoon leaders must be accustomed to reporting to maneuver commanders, depending on the command and support relationships for the given operation. In other branches, changing weapon system does not significantly change the supported commander's branch. Secondly, air defense battalion commanders must be accustomed to reporting to either the division echelon (Division Artillery) or maneuver brigade. Battery commanders must report to the maneuver brigade, and platoon leaders must report to the maneuver battalion. Supporting these echelons is not common for HIMAD officers, who typically follow their organic reporting chain. Finally, the concept of tactical employment for SHORAD is significantly different. SHORAD is closer to the threat, further from support areas, and relies on its maneuverability for survivability and to bring the capability to bear for the supported force. For these reasons, the air defense branch should split at BOLC and stay split through battalion command.

Ranger School and MCCC is offered as an additional opportunity for all SHORAD officers: Because they have been absent from BCTs over the last decade, air defense officers today lack credibility in the maneuver TOC. Ranger qualified officers

gain instant credibility, and air defense officers who graduate from MCCC can develop their individual credibility by learning how to speak the maneuver language. Education should be tailored to specific unit of assignment. For example, Ranger School is more obligatory for officers going to a light infantry division as opposed to an armored division. Also, the intent is for only a portion of SHORAD officers to attend MCCC, since otherwise the split education system would be irrelevant. A fair portion of SHORAD officers should attend MCCC to provide resident expertise to maneuver planning and to set the conditions for the SHORAD FCOE class to arrive at Fort Benning.

Assess feasibility of electronic warfare air defense weapon system in each maneuver squad: It is a liability for maneuver Soldiers to operate the Stinger missile. To develop the complexity of CAFAD and pervasiveness of air defense capability, the solution is not in the Stinger, but rather in equipping maneuver Soldiers with a Drone Defender or something similar. Electronic warfare systems will deny the enemy of their most likely course of action with the employment of small, low-flying, UAS.

Start divisional SHORAD transition today: Task organize current SHORAD batteries from 2-44 ADA Battalion and 3-4 ADA Regiment to Division Artillery 101ST Division and 82ND Division, respectively. Transitioning now will start the generation of TTPs and lessons learned. It will additionally start the reintegration of multiple systems (both conceptual and technological) and will build future M-SHORAD field grade officers.

Build-out personnel for all divisional air defense battalion headquarters before anticipated Soldier and equipment arrival, in order to facilitate training, mentorship, and

supervision of all non-dedicated air defense assets and to establish groundwork for successful integration.

FCOE linkages to MCOE: The branch must acknowledge that M-SHORAD applies more appropriately to the Maneuver Warfighting Function than the Fires Warfighting Function. Officers tracked to M-SHORAD units must train alongside officers in the MCOE for multiple purposes: Tactical and operational integration, cross-branch understanding and communication, and the establishment of personal networks amongst peers. HIMAD tracked officers should stay resident to Fort Sill for the entirety of their institutional training, while SHORAD tracked officers should travel to Fort Benning for a short combined tactical exercise, in both BOLC and CCC.

MCOE expands instruction to include SHORAD education for BOLC, MCCC, and the Maneuver Pre-Command Course: Increase the air defense presence at MCOE with SHORAD experienced officers and NCOs. Their presence will help to build the foundational knowledge of M-SHORAD and its capabilities and limitations, operational planning considerations, and tactical employment. They will also set the conditions for the SHORAD student rotation into combined exercises.

The final recommendation from this research is a call to action to all SHORAD experienced officers. There is a dearth of expertise in the Air Defense branch and likewise in maneuver formations. Those talents which SHORAD officers have developed over the course of their careers will be immensely valuable in the M-SHORAD battalions.

This research also identified areas for future research. To understand units better, what are divisions doing now in training to prepare for the air threat? To look at training

plans for tactical formations would shed insight onto this focus area. CAFAD was another critical component of this research, but efficacy rates of active air defense done by maneuver elements was called into question. Also, considering the spectrum of new intelligence collection technologies available, what needs to be addressed in current CAFAD doctrine? Future research on this conundrum would be beneficial. This research did not focus on other components of SHORAD, such as IFPC. In large scale ground combat operations, how can the U.S. Army best employ these weapon systems to best achieve a tiered and layered approach? Finally, considering the current force does not have SHORAD experienced officers to fill M-SHORAD battalions, what is the best approach to use talent management to enable immediate mission success?

Summary and Conclusion

This thesis answered the primary and three secondary research questions to help solve the SHORAD problem. If actioned, recommendations for action and research would set the conditions for successful reintegration of M-SHORAD.

APPENDIX A

SUPPORTING FIGURES

2ACR Case Study

Air Defense — The 2d ACR has an organic ADA battery equipped with 24 Avengers. Platoons are habitually associated with the squadrons, and all units are trained for passive and active air defense measures.

Figure 10. Air Defense in 2ACR

Source: Joseph G. Dodd, Jr., “The 2d Armored Cavalry Regiment A Force for Peace Enforcement Operations,” *Armor Magazine* 104, no. 2 (1995): 49.

5. Responsibilities.

A. Commander, 2d ACR: Will establish priorities for air defense protection. The decision to remove air defense systems from the air defense role for exclusive or specified ground support missions rests with the Regimental Commander. The Regimental Commander is also responsible for coordinating airspace activities within his area of operation.

Figure 11. Annex G (Air Defense), 2ACR Commander Responsibilities (ADA)

Source: 2d Armored Cavalry Regiment (2ACR), *Common Troop TACSOP (Coordinating Draft)* (Fort Polk, LA: 2ACR, 1994), 96.

D. Maneuver Squadron Commander:

(1) Employ organic non-air defense artillery weapons against aircraft when necessary. Unit SOPs will provide for use of non-air defense weapons in an air defense role.

(2) Ensure proper application of passive air defense measures.

Figure 12. Annex G (Air Defense), 2ACR Maneuver Squadron Commander Responsibilities (ADA)

Source: 2d Armored Cavalry Regiment (2ACR), *Common Troop TACSOP (Coordinating Draft)* (Fort Polk, LA: 2ACR, 1994), 96.

B. Commander, ADA Battery: Is responsible to the Regimental Commander for overall coordination of all organic and attached Air Defense Artillery. He is also responsible for coordination with the Corps Air Defense Element (CADE) and for maintaining liaison with external Air Defense Headquarters and control facilities.

Figure 13. Annex G (Air Defense), 2ACR ADA Battery
Commander Responsibilities (to Maneuver)

Source: 2d Armored Cavalry Regiment (2ACR), *Common Troop TACSOP (Coordinating Draft)* (Fort Polk, LA: 2ACR, 1994), 96.

1. Commander (CDR).

A. Operate on the Btry Command Net to issue orders and receive reports; monitor the Regimental command net, going higher to receive orders and forward situation reports as necessary.

B. Position forward at the decisive point.

C. Ensure subordinates understand commanders intent.

D. Disseminate all actions and orders received from higher.

E. Integrate and synchronize available combat multipliers with the maneuver force.

F. Keep Regimental Commander informed.

Figure 14. Appendix 1 (Key Personnel Responsibilities), 2ACR ADA
Battery Commander Responsibilities (to ADA)

Source: Cav Air Defense Battery, *Tactical SOP* (Fort Polk, LA: 2d Armored Cavalry Regiment, 1994), A-1-1-1.

C. Air Defense Coordination Officer (ADCOORD): provides the Regimental Commander with timely information from the Battery Commander and serves on the Regimental Battle Staff.

Figure 15. Annex G (Air Defense), 2ACR ADCOORD
Responsibilities (to Maneuver)

Source: 2d Armored Cavalry Regiment (2ACR), *Common Troop TACSOP (Coordinating Draft)* (Fort Polk, LA: 2ACR, 1994), 96.

C. ADCOORD: The ADCOORD Section normally operates from the RTOC, and is the CMDR's informational link to the Regimental CMDR, Battle Staff, and the Corps Air Defense Element (CADE). It provides and disseminates Air Defense information and guidance concerning the employment and real time data of all assigned or attached Air Defense assets within the Regiment's Area of Operations (AO). The ADCOORD Section must also keep the Btry CDR/TOC abreast of detailed information on current and future ground/air operations within the Corp and Regimental AO. During displacements (or upon destruction) of the TOC the ADCOORD assumes responsibility for the current battle or as directed by the Commander.

Figure 16. 2ACR ADCOORD Responsibilities (to ADA)

Source: Cav Air Defense Battery, *Tactical SOP* (Fort Polk, LA: 2d Armored Cavalry Regiment, 1994), A-1.

5. Platoon Leader (PLDR). Responsible for being familiar with the Maneuver Squadron TACSOP and to the Battery Commander, the Battery XO, the Task Force Commander, and the Task Force S-3 for the following:

- A. To the Battery Commander to:
 - (1) Advise him of the AD plan.
 - (2) Update him on the mission at any time.
 - (3) Track the battle.
 - (4) Adherence to safety requirements. See ANNEX D
- B. To the Battery XO to:
 - (1) Advise him of the AD plan.
 - (2) Report all movements and locations of all assets.
 - (3) Update him on the mission at any time.
 - (4) Report all engagements in a timely manner.

Figure 17. ADA Platoon Leader Responsibilities (1 of 2)

Source: Cav Air Defense Battery, *Tactical SOP* (Fort Polk, LA: 2d Armored Cavalry Regiment, 1994), A-1-1-2.

- (5) Report all injuries and casualties.
 - (6) Send all SPOT reports.
 - (7) Send LACE reports ASAP after the mission.
 - (8) Track the battle.
- C. To the Task Force Commander to:
- (1) Find the commander's AD priorities are.
 - (2) Develop an AD plan to meet those priorities.
 - (3) Follow AD doctrine.
 - (4) Brief him on the AD plan.
 - (5) Execute the AD plan.
 - (6) Brief him on the ADW and WCS.
- D. To the task force S-3 to:
- (1) Highlight land and other "problem" issues for resolution. Be prepared to elevate to the Squadron XO if necessary. (Tac is required when going over the S-3.)
 - (2) Send all Spot Reports.
 - (3) Report all locations and movements.
 - (4) Report all non-operational systems.

Figure 18. ADA Platoon Leader Responsibilities (2 of 2)

Source: Cav Air Defense Battery, *Tactical SOP* (Fort Polk, LA: 2d Armored Cavalry Regiment, 1994), A-1-1-3.

Upon receipt of early warning, all soldiers will employ passive air defense measures (cover, dispersion, etc.) and, if possible, leaders will direct the engagement of the aircraft with all available weapons.

Figure 19. 2ACR Information Paper, 2ACR Soldier Responsibilities

Source: Eric Hollister, *Stuff Between OAC and OBC, Personal Collection* (Fort Polk, LA: 2d Armored Cavalry Regiment, 1995), E-2.

3. **Air Defense Measures.** All regimental units protect themselves from air attack by employing active and passive ANNEX G (AIR DEFENSE) - CONTINUED

measures. They employ organic weapons to destroy attacking aircraft within fields of fire. Non-ADA weapons include tanks, IFVs, army aviation, small arms fire, and field artillery.

A. **Active Measures.** Besides use of the regiment's organic air defense weapons, use small arms in an air defense role under the following limitations:

- (1) The weapons control status and hostile criteria in effect will control fires.
- (2) Individuals under direct air strike may engage attacking aircraft without orders.
- (3) Engagement of hostile aircraft with non-air defense weapons will not seriously conflict with the accomplishment of the unit's primary mission.
- (4) All units will have designated air guards when moving. The air guard will actively search for and engage hostile aircraft. Select HMMWVs mounting machine guns (M60 or M2) as air guard vehicles, especially during movement.
- (5) Special considerations should be given to all machine gun positions. Both ground and air requirements will govern positioning, with priority given to the ground defense.
- (6) **Engagement procedures:**
 - (a) **Lead.** Lead passing aircraft as follows:
 - [1] **High performance:** 200 meters (two football fields).
 - [2] **Prop fixed wing/Helo:** 100 meters (one football field).
 - (b) Engage incoming targets just above the nose of the aircraft.
 - (c) Volume is the key to effective small arms fire.

Figure 20. Annex G (Air Defense), 2ACR Collective Responsibilities (1 of 2)

Source: 2d Armored Cavalry Regiment (2ACR), *Common Troop TACSOP (Coordinating Draft)* (Fort Polk, LA: 2ACR, 1994), 94.

B. Passive Measures. All units in this Regiment will use passive measures, employing them rapidly once in a position and improving them throughout the occupation.

(1) **Cover.** Protective emplacements for both personnel and equipment will be constructed as soon as possible after occupation of position.

(2) **Camouflage/Concealment.** All means available to camouflage the unit from aerial observation will be used as time permits.

(3) **Dispersion of tents, vehicles and soldiers** is a primary way to preclude excessive casualties from enemy air or indirect fire.

(4) **Signature reduction.**

(5) **Position hardening.**

(6) **Noise, light and litter discipline.**

C. Convoy Defense Measures.

(1) Disperse and seek cover and/or concealment.

(2) Travel during periods of inclement weather.

(3) Use routes that offer natural concealment.

(4) Use any ADA weapon systems available.

(5) Use air guards.

(6) If a convoy comes under air attack or air attack is imminent:

(a) The column should continue to move.

(b) Air guards will alert all personnel in the convoy as to the direction and location of attacking aircraft.

(c) Air guards and other personnel will, on order of the convoy or serial commander, engage attacking aircraft by massing fires in front of the aircraft.

(d) As soon as possible after air attack, the convoy will halt in a covered location to recover personnel, weapons, and all valuable items from any disabled vehicles.

Figure 21. Annex G (Air Defense), 2ACR Collective Responsibilities (2 of 2)

Source: 2d Armored Cavalry Regiment (2ACR), Common Troop TACSOP (Coordinating Draft) (Fort Polk, LA: 2ACR,1994), 94.

KNOWLEDGE QUIZ

- What 5 colors are normally used for graphics?
Black Blue Red Green Yellow
- What does the Air Defense status WHITE TIGHT mean?
Air Attack not likely, fire at positively identified hostile aircraft only
- Identify the following vehicle symbols:
 - IFV IFV (m)
 - M1 med tank
 - check point B link-up point
 - Strong Point background detail
 - CV CV (m)
- Identify the following symbols:

a. <u>Medium Mortar</u> <u>light mortar</u>	f. <u>Medium gun</u> <u>rocket-propelled</u> <u>main AT role</u>	k. <u>hacked column</u>
b. <u>OP/L</u>	g. <u>Heavy AD Gun</u>	l. <u>Hospital/Aid Station</u>
c. <u>SAW</u> <u>light AT</u>	h. <u>Antitank company</u>	m. <u>T.C.P.</u>
d. <u>Inf Plt</u> <u>primary BFP</u> <u>platoon</u>	i. <u>Follow and support</u>	n. <u>SP AD Gun</u> <u>LT AD module SP</u>
e. <u>Antitank company</u> <u>(Chap 2)</u>	j. <u>Follow and support</u>	o. <u>Medium machine gun</u> <u>Light Anti Tank gun</u>

Figure 22. 2ACR Knowledge Quiz (1 of 2)

Source: Eric Hollister, *Stuff Between OAC and OBC, Personal Collection* (Fort Polk, LA: 2d Armored Cavalry Regiment, 1995), G-3.

2. Match the terms with the correct definition:

<u>3</u> a. Clear	✓ 1. An offensive operation intended to draw the enemy's attention. Some contact with the enemy is required.
<u>89</u> b. Seize	2. To restrict enemy movement by stopping, holding, or surrounding his forces.
<u>5</u> ✓ c. FOL 6	3. To render ineffective, capture, or force the withdrawal of enemy personnel, equipment, weapons, or obstacles that could interfere w/ the unit's ability to accomplish it's mission.
<u>6</u> ✓ d. No-fire Line 8	4. To gain possession of a position or terrain feature, with or without force, and to deploy in a manner which prevents its destruction or loss to enemy action.
<u>1</u> ✓ e. Demonstration 7	5. A line beyond which conventional surface fire support means may fire at any time without additional coordination.
<u>11</u> f. Area of Influence	6. A line close to the enemy position used to coordinate the lifting and shifting of supporting fires. Not a fire support coordination measure
<u>7</u> ✓ g. Feint 1	7. An attack, or show of force, made with the aim of deceiving the enemy. No contact with the enemy is sought.
<u>2</u> h. Contain	8. NATO term for a line beyond which conventional surface fire support means may fire at any (CPZ) time without additional coordination.
<u>4</u> i. Secure	9. To clear a designated area and obtain control of it.
<u>8</u> ✓ j. CFL 5	10. Area of concern to the commander that extends into enemy territory to the objectives of current or planned operations. Also includes areas occupied by enemy forces who could jeopardize the accomplishment of the mission.
<u>10</u> k. Area of Interest	11. A geographical area where a commander is directly capable of influencing operations by maneuver and fire support systems normally under his command or control.

Figure 23. 2ACR Knowledge Quiz (2 of 2)

Source: Eric Hollister, *Stuff Between OAC and OBC, Personal Collection* (Fort Polk, LA: 2d Armored Cavalry Regiment, 1995), G-4.

1st BDE SITUATION GRAPHIC

Baby, IMPATIENT & LETHARGIC PROB VLS WILL BE REACHED FWD & RFLD SCOTCH ...

TASKS

- O/4-3 ADA DS 1ST BDE
- I/D CHAP. DS 5+1 M
- 3/D CHAP. DS 3 FS B
- 2/A VULC. DS 2-15 M
- 4/B STGR. DS 2-15 M
- 2/B VULC. DS 2-6 FAR
- 2/4/D STGR. DS 2-6 FAR
- 1/4/D STGR. DS 5-15 M
- 3/4/D STGR. DS 3-6 FAR
- 2 EW tms DS 1ST BDE

FRIENDLY ADA

- 4-3 ADA ABMOC
- G/4-3 ADA DS 2 BDR
- C/4-3 ADA DS 1/1 AD
- 1/C/6-32 HAWK

BOE MISSION: 1ST BRIGADE CONDUCTS A MOVEMENT TO CONTACT AT 180700 FEB 91
TO DESTROY ENEMY FORCES IN ZONE AND ESTABLISH DEFENSIVE POSITIONS ALONG
PL HAMMER TO DEFEAT FORCES OF THE 128TH CAA.

AD Priorities: CSS (class III+IV), BDE C2, FA C2, Maneuver in Order. ADW: YELLOW

AD Execution Matrix

AD Execution Matrix										COMMANDER'S INTENT:	
1/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED	I INTEND TO USE STINGER TEAMS FORWARD SUPPORTING MANUEVER BY FIRE EMPLOYING MASS ON DECISIVE ENGAGEMENT AREAS, VULCAN OVERWATCHING TF TRAINS IN NORTH AND TBE RESERVE TO PROVIDE DEFENSE AND DEPTH WHILE POSITIONS TO RECEIVE A % MSR MISSION. CHAIRMAN ON FA C ² IN: EBE REAR, AND DEB CLASS III #2, & STINGER TEAMS ON EDC TOC WHILE MAXIMIZING HAWK COVERAGE AGAINST FIRED WERE INTERDICTED THREAT TO KILL ENEMY AIR CRAFT AND PROVIDE 3ST 32160E THE FREEDOM TO MANUEVER.		
3/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
2/A	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
1/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
2/B	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
2/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
1/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
3/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
1/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
3/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
1/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
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1/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
3/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
1/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
3/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
1/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
3/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
1/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
3/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
1/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
3/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
1/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
3/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
1/A/D	AD PLANNING STAFF	NIC (FA C ²)	ADW REB	MADE W/ FA C ²	REVEN & REORGANIZED	CONCENTRATED FIRE ON PL CLASS	PA OWS ATTENDING & TIGHT	REINFORCE CSS & CE STATE OF REORGANIZED			
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Source: Eric Hollister, *1LT Hollister ADA, 2CR Second Platoon*, Battle Book (Fort Polk, LA: 2d Armored Cavalry Regiment, 1994), F-3-9.



DEPARTMENT OF THE ARMY
Air Defense Artillery Battery, Command and Control Squadron,
2d Armored Cavalry Regiment
Fort Polk, Louisiana 71459



AFXZ-CD-AD

18 JUN 94

MEMORANDUM FOR 2ND SQUADRON S-3

SUBJECT: ADA Support of Squadron Arteps

1. This memorandum addresses the goals of 2nd Platoon during their support of the upcoming Troop Arteps.
2. Too often during mission planning, it is automatically assumed that the Avenger Squads will be tasked organized down to troop level. Current Air Defense Doctrine, the commo status of the Avengers, and the Regimental support mission of the Air Defense Artillery Battery do not make task organizing down to the troop level the most desirable option. Indeed, it should be the (rare) exception, instead of the rule, for the following reasons:
 - In order to provide unified Air Defense coverage for the Squadron (and the Regiment), the ADO needs to have total control as to the movement and placement of the Avenger Squads. When tasked down to the troop level (and sometimes further attached to platoons by troop commanders) the squads are forced to monitor that troop's net on their only secure radio, and move when and where the troop moves.
 - This situation completely removes the control of coverage from the ADO, the ADCOORD, and the Battery. This has been regularly demonstrated during last year's War Eagle exercise, as well as during Agile Dragoon by third squadron. The Air Defense Plan was totally destroyed by this decentralization.
 - In most types of conflicts, the Avenger Squad's survivability increases by moving behind the troops instead of with them, taking them out of the major engagements against which they have little defense capabilities.
3. My goal during this exercise is to prove beyond all doubt that 2nd Squadrons Avenger Platoon can provide maximum coverage of all the Commander's priorities by moving behind the front line trace of the troops instead of with them. This will still allow for early engagement, while at the same time the ability to maintain control, communications, and overall squadron (and regimental) coverage will be enhanced.
4. These exercises will also provide the soldiers of 2nd Platoon the opportunity to maneuver within the Squadron's area of operations, and it will familiarize the soldiers of Second Squadron with the capabilities and tactical use of the Avenger Weapon system.

Figure 25. Memorandum for 2nd Squadron S-3 (1 of 2)

Source: Eric Hollister, *Stuff Between OAC and OBC, Personal Collection* (Fort Polk, LA: 2d Armored Cavalry Regiment, 1995), A-27.

5. I fully expect that by the end of these Arteps, Second Squadron and Second Platoon will lead the way in the Regiment in the proper deployment, movement, and use of Air Defense assets, and will become a model for the rest of the Regiment to emulate.



ERIC HOLLISTER
1LT, AD
Platoon Leader

Figure 26. Memorandum for 2nd Squadron S-3 (2 of 2)

Source: Eric Hollister, *Stuff Between OAC and OBC, Personal Collection* (Fort Polk, LA: 2d Armored Cavalry Regiment, 1995), A-28.

1LT Hollister

I agree with your concept. Avengers should remain at the Squadron level for control. This allows you to establish the coverage "umbrella" and tie-in with other assets (Chap, Hawk) that may be available. I disagree with the need for the Battery Commander to have control of these assets. Doctrinally, the DC does not exist after task organization for the first battle, he is relegated to the position of ADCOORD OIC in the R-TOC. The exact same relationship exists for DS Arty BNS, ENGINEERS, and Chem units. I still support moving avengers with Troops for protection, provided they remain

Figure 27. 2nd Squadron S-3 Response to 1LT Hollister (1 of 2)

Source: Eric Hollister, *Stuff Between OAC and OBC*, Personal Collection (Fort Polk, LA: 2d Armored Cavalry Regiment, 1995), A-29.

with the Troop rear elements. your span of
Control is too limited and the lines of
communication too long to think you can
adequately command + Control sections for
movement yourself.

Ken

Figure 28. 2nd Squadron S-3 Response to 1LT Hollister (2 of 2)

Source: Eric Hollister, *Stuff Between OAC and OBC*, Personal Collection (Fort Polk, LA: 2d Armored Cavalry Regiment, 1995), A-29.



DEPARTMENT OF THE ARMY
Air Defense Artillery Battery, 2d Armored Cavalry Regiment
Fort Polk, Louisiana 71459



AFZX-CA-AD

23 JUL 94

MEMORANDUM FOR COMMANDER, SECOND SQUADRON

SUBJECT: ADA Artep Support AAR

1. The following are comments and observations from 2nd Platoon, Air Defense Artillery Battery's support of Second Squadron's Troop Arteps, held between 26 JUN 94 and 20 JUL 94. Each topic is categorized, followed by discussion and possible solution.

2. COMMAND AND CONTROL: It seemed to work quite well having the ADO controlling and moving the Avengers with the troops. The system did only exercise one troop at a time, however, so it cannot be deemed infallible at this time. It appears that the fire units should monitor their platoon frequency at least 90% of the time, although exceptions (i.e. convoys and screens leading to delays) need to be addressed and become SOP. Also, troop commanders and platoon leaders need to ensure that the team chiefs from the fire units supporting them are in on all the orders and rehearsals, and are given access to troop specific graphics. This will ensure complete coordination and understanding of the troop mission.

3. MOVEMENT: During these exercises, the Avengers could easily cover the Scouts by moving behind the AT platoons. This allows the fire systems to remain in ideal locations longer (moving less frequently than if within the AT platoon), and keeps them far enough away from the FLOT to avoid unnecessary risks. Obviously, terrain and mission may dictate closer positioning.

4. EMPLACEMENT: Initially, there was a lack of understanding about who should emplace the fire units, and where they should go. This was graphically illustrated when Fox Troops AA was attacked by a UH-1 helicopter, and the Avengers were in no position to engage it. Ideally, the supported unit will tell the Avenger team chief what area needs to be covered, and the team chief, or the ADO, will position the fire unit(s). There was also some confusion about the range of the system. Some of the platoon leaders were concerned that because the Avengers were not with them, they were not covered from air attack. This misconception can be solved through education (possibly an QPD?).

5. NIGHT OPERATIONS: It was discovered during the third Artep just how valuable the Avengers can be at night, monitoring enemy ground movement as well as the air. SOP's are currently being developed to make this a more lethal asset. Care must be exercised however, to ensure that the Avenger's main mission, that of Air Defense, is not compromised. Ground monitoring is only possible when the Air Avenues of Approach match that of the ground, and when constant and reliable early warning is available (or when there is no air threat).

6. MAINTENANCE: Avengers must be fixed as far forward as possible, because when the vehicle is down, the system is fully operational (in most cases), and is normally already positioned. It is also possible to operate dismounted during repairs, but in the fast-paced arena of the Cav, this is usually not a desirable alternative. One thing that was noticed during the Arteps was that there are some M998 parts that are nearly Avenger specific. Coordination needs to be made with the SMO to ensure these parts are available during future operations.

7. COMMUNICATIONS: There are also unique comms parts for the Avenger, and resupply and repair of these items is also of significant concern. The platoon may need to deploy with their own PLL, to ensure repair parts are available.

Figure 29. Memorandum for 2nd Squadron Commander, 2ACR (1 of 2)

Source: Eric Hollister, *Stuff Between OAC and OBC, Personal Collection* (Fort Polk, LA: 2d Armored Cavalry Regiment, 1995), A-30.

8. I feel the Artops went very well, and greatly solidified the concept of support that I have been trying to develop. Operations like this are the only way the Avenger platoon will be able to learn its job, and the more contact we have with the Squadron, the more fluid the relationship will become.

9. POC this memorandum is the undersigned at 7968/0747.



ERIC HOLLISTER
1LT, AD
Air Defense Officer

* I'm dead set against the ADA PLT being out
and about during the battle. The Avengers
will be everywhere - He can't influence
that scenario - He is the ADA coordinator
for the SQDN - He works in the TOC - period.
No vote! Avengers will posture with
Forward Deployed units along Axis Avenue
of Approach using units for security.

It was easy for units stay with
this system during Troop Operations. We +
Major during SQDN ops.
1/2/7

Figure 30. Memorandum for 2nd Squadron Commander, 2ACR (2 of 2)

Source: Eric Hollister, *Stuff Between OAC and OBC, Personal Collection* (Fort Polk, LA: 2d Armored Cavalry Regiment, 1995), A-31.

2. INTRODUCTION: Liaison between units is essential to achieving, the effects of the AirLand Battle tenet synchronization. Liaison Officers (LNO) represent the commander at the headquarters of another unit for effecting coordination and for promoting cooperation between the two units. Selection criteria for LNOs should include experience, ability to communicate effectively (language capability), and other criteria which will enhance effective liaison activities (FM 101-5). This booklet contains guidance intended for use by all LNO teams from 2D ACR and within Regiment. It is generic, and applies to 2d ACR teams sent to any level (superior, subordinate, or adjacent headquarters) unless otherwise stated.

Figure 31. 2ACR Liaison Duties (1 of 2)

Source: 2d Armored Cavalry Regiment (2ACR), *Liaison Officer's Handbook* (Fort Polk, LA: 2ACR, 1994), 3.

g. Continue to periodically visit the staff. Before the battle, you will spend more time with their plans shop. During movement, you will work more closely with their HQ or movement control section. During a battle, you will of course spend most of your time working with their operations shop.

Figure 32. 2ACR Liason Responsibilities (2 of 2)

Source: 2d Armored Cavalry Regiment (2ACR), *Liaison Officer's Handbook* (Fort Polk, LA: 2ACR, 1994), 3.

COORDINATION WITH SUPPORTED UNIT

CHECKLIST 1 - Information to have before coordination begins.

1. What is your mission relationship with supported unit (DS,GS,GS-R,R)?
2. What is your command relationship with supported unit (OPCON, attached)?
3. What systems do you have and what are their capabilities?
4. What are the standard enemy capabilities?
5. Do key personnel have maps of the area of operation?
6. What is the battalion TSOP method of employment and resupply based on you command relationship with the supported unit?

CHECKLIST 2 - Questions you should be able to answer for supported unit.

1. Are you prepared to brief early warning procedures, frequencies, and when the MSCS grid reference point is?
 2. Are you prepared to teach all arms for air defense (AAFAD)?
 3. Do you have the following information for your supported unit?
 - Weapons control status. (Also applies to AAFAD)
 - Air defense warning.
 - ADA peculiar rules of engagement.
 - Hostile criteria.
 4. Are you prepared to develop an air defense annex for the supported unit's OPORD/OPLAN?
 5. What other AD coverage is in the sector (Hawk, Patriot, FAAD)?
 6. How many people do you have (by name, rank, SSN, MOS, and meal card #)?
- If attached, you should also have answers for the following questions:
1. What types of equip and how many of each do you have (Vehs, radios, etc)?
 2. What is the current status of your equipment?
 3. How is system peculiar maintenance being handled?
 4. What is your standard fuel and ammo expenditure rate by type?
 5. What are your unit DOD ammunition codes?
 6. How long do you plan to be associated with the supported unit?
 7. Where and whom do you contact for maintenance support?
 8. What provisions have been made for admin support (mail, showers, etc)?

Figure 33. ADA Coordination With Supported Unit Checklist

Source: Eric Hollister, *1LT Hollister ADA, 2CR Second Platoon*, Battle Book (Fort Polk, LA: 2d Armored Cavalry Regiment, 1994), 59.

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